Downstream mergers and upstream investment*

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Abstract

In this paper, we show that downstream mergers increase the incentives of an upstream firm to invest in cost-reducing R&D. The upstream firm revenues increase with industry profits, which in turn increase with concentration downstream and this explains the positive link between concentration and investment. This effect is so important that it outweighs the negative effect on prices due to lower competition. Therefore, in our context, horizontal mergers are pro-competitive.

Keywords: downstream mergers, upstream innovation, competition

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1 Introduction

Horizontal mergers are seen with suspicion by antitrust authorities as they can be used as a way to reduce competition and increase prices. This is why their approval is subject to conditions summarized in the US in the Merger Guidelines jointly issued by the U.S. Department of Justice and the Federal Trade Commission. However, horizontal mergers may help to countervail the market power of large suppliers and this may result in lower prices to consumers. For example, von Ungern-Sternberg (1996) and Dobson and Waterson (1997) find that lower prices obtained by buyers after a merger are passed on to consumers only when there exists enough competition in the downstream market.

In this paper, we explore another explanation of why downstream mergers may be pro-competitive. We consider a model where the distinctive feature is that an upstream firm invests in cost-reducing R&D. It turns out that downstream mergers stimulate R&D investment by the upstream firm, which translates into lower wholesale prices that finally benefit consumers through lower final prices. Not only consumer surplus but also upstream and downstream profits increase as a consequence of the merger process.

It is well-known that the increase in downstream profits does not imply that firms find mergers profitable due to their public good nature (Salant et al. (1983)). However, we indeed find that mergers are privately profitable and that monopolization is the outcome of a standard merger game.

There is a growing literature on buyer power. Some papers (for example, Chipty and Snyder (1999) and Horn and Wolinsky (1988)) focus on how mergers affect the distribution of profits between upstream and downstream firms. However, there are in the literature few papers that consider the implications of buyer power on the incentives to invest in R&D (Chen (2004), Inderst and Shaffer (forthcoming) and Inderst and Wey (2003, 2005). However, the paper more closely related to ours is Inderst and Wey (2005). They study the effect of the size of buyers on the incentives of the upstream firm to invest in cost-reducing R&D. Similarly to our paper, they obtain that the larger the buyers the higher the R&D investment. However, there are differences in the setting that are worth mentioning. First, in our model, downstream firms can buy the input, in case of disagreement, in a less efficient competitive market, whereas in Inderst and Wey (2005) downstream firms can integrate backwards to produce the input. Economies of scale implies that integration is more profitable the larger the firm because the total cost of investment can be shared among more units of output.

Second, Inderst and Wey (2005) do not allow mergers among competing firms, whereas in our paper mergers take place in only one market. This provides the upstream firm with an additional incentive to invest in R&D as industry profits increase with horizontal mergers. The result that final prices decrease with mergers is in our model more striking, because the effect of R&D investment on prices has to compensate an opposite effect due to lower market competition.

Third, whereas in Inderst and Wey (2005), the merger process is not formally analyzed, we put more emphasis on building a formal model of merger formation because in our paper merger profitability can not be taken for granted given that nonmerging firms increase output after the merger. Contrary to well-known results about the lack of profitability of mergers in Cournot competition (Kamien and Zang (1990,1991,1993)), we obtain that monopolization occurs even for very unconcentrated markets. In this way, our model adds to the literature on endogenous merger formation.

Next section solves the model for a given number of downstream firms. In Section 3, the number of dowsntream firms is endogeneously determined through solving a merger game. Final conclusions put the paper to an end.

2 The model with an exogenous market structure

Consider an upstream firm that sells an input to n firms in a downstream market. Downstream firms transform the input into a one-to-one basis, without additional costs, to obtain a homogenous good with inverse demand $P = a - Q$, where Q is the total amount produced. The upstream firm faces a constant marginal cost for the input $(c - r)$, where r is a cost reducing investment. The cost of the investment is given by $\frac{1}{2}r^2$. Downstream firms may alternatively obtain the input from a competitive supply at cost c.

Observe that r represents the (endogenous) cost advantage of firm U and it measures the degree of competition in the upstream market. On the other hand, n represents the degree of competition downstream and it affects the vertical relationship of downstream firms with the upstream supplier.

The upstream firm and downstream firms set vertical contracts that establish the terms under which inputs are transferred. We model this vertical relationship following the framework in Rey and Tirole (forthcoming), where contracts are secret (or unobservable) and firms have passive conjectures. After contracts are set, competition downstream is à la Cournot.

More specifically, the game is modelled according to the following timing:

First, the dominant supplier chooses the level of investment, $r \in [0, c]$. Once the investment is sunk and observed by the downstream firms the supplier offers a contract to each of the downstream firms. We assume a two-part tariff contract (F_i, w_i), for $i = 1, ...n$. where F_i specifies a fixed amount and w_i is the wholesale price. Each downstream firm can observe its contract but not the contracts offered to the rivals. Finally, there is Cournot competition in the downstream market. We solve for the subgame perfect (Bayesian) equilibrium of this game by backward induction.

The part of the game that follows after the investment decision has been independently analyzed in the literature by Caprice (2005) and Bru and Faulí-Oller (2004). In order to have a unique equilibrium we assume "passive beliefs" on the part of downstream firms as those papers do. Thus, when receiving an unexpected offer from the supplier, downstream firm i does not update its beliefs about the offers made to the rivals. Then, the equilibrium contract to downstream firm i maximizes the bilateral profits of the upstream firm and downstream firm i. Therefore, the wholesale price is set equal to marginal cost $w_i = c - r$, for all i. As a consequence, each firm produces in equilibrium the Cournot output:

$$q_i^* = \frac{a - c + r}{n + 1}, \ i = 1, ...n.$$

The fixed fee will be set to extract all the rents from firm i, except the profits it can obtain by using the competitive supply of the input. This profit is obtained assuming that competitors produce the equilibrium outputs and firm i produces at cost c:

$$\pi_i(n, r) = \underset{q}{Max}(a - c - (n-1)q_i^* - q)q = \begin{cases} \frac{(2(a-c)-r(n-1))^2}{4(n+1)^2} \text{ if } r < \frac{2(a-c)}{n-1} \\ 0 \qquad \text{otherwise} \end{cases}$$

The upstream firm obtains the whole industry profits minus the outside option of downstream firms.

Next, we turn to analyze the first stage of the game where the upstream firm decides the level of cost-reducing investment (r). The supplier chooses r to maximize:

$$\begin{aligned} \pi_U(n, r) &= n(\frac{a - c + r}{n + 1})^2 - n\pi_i(n, r) - \frac{1}{2}r^2 \\ s.t. r &\in [0, c] \end{aligned}$$

A sufficient condition to obtain an interior solution is that $c > a/2$. Simple computations show that the optimal investment is given by:

$$r^* = \frac{2(a-c)n}{2+n(n-1)}$$

Given total investment, one can calculate total quantity, profits of the upstream firm, profits of downstream firms and total welfare in equilibrium. They are given respectively by

$$\begin{aligned} Q(n) &= \frac{(a-c)n(2+n+n^2)}{2+n+n^3} \\ \Pi^U(n) &= \frac{(a-c)^2n^2}{2+n+n^3} \\ \Pi^D(n) &= \frac{4(a-c)^2}{(2+n+n^3)^2} \\ W(n) &= \frac{(a-c)^2n(8+n(2+n)(4+n(1+n)^2)}{2\left(2+n+n^3\right)^2} \end{aligned} \tag{1}$$

In the next section, we will endogenize market structure by analizing a process of horizontal mergers. Therefore, it seems interesting to perform comparative statics with respect to n, the number of downstream firms. This is what it is captured by the following proposition.

Proposition 1 *Whenever $n > 2$, R&D investment, total output, profits of the upstream firm, profits of downstream firms and social welfare in equilibrium are decreasing in n.*

The key point to understand the result is to see the evolution of the optimal R&D investment. It is useful to separate the supplier's profits into two parts. On the one hand, it gets the industry profits. On the other hand, it has to pay the outside option to downstream firms. R&D investment has a positive effect on supplier's profits because it increases industry profits and reduces the outside option. As far as industry profits are concerned, the higher the concentration the higher the incentives to invest in R&D. On the other hand, the sign of the effect of concentration on the incentives of the upstream firm to reduce the outside option is ambiguous and it depends on the magnitude of the investment. However, overall we have that R&D is decreasing in n. For the case $n = 2$ and $n = 1$, we must take into account the following. On the one hand, regarding industry profits, incentives to invest are higher in monopoly because of the reason we have already mentioned. On the hand, regarding the outside option incentives are higher in duopoly, because in the particular case of a bilateral monopoly ($n = 1$), the outside option does not depend on the investment. (Observe that the outside option amounts to the monopoly profits using the alternative supply). It happens that both effects cancel out and the level of investement is the same both in monopoly and duopoly.

Given the relationship between concentration and investment, the effect of concentration in the downstream market on final prices is *a priori* ambiguous. On the one hand, a higher concentration exacerbates the allocative inefficiency due to the higher margin. On the other hand, the higher investment increases productive efficiency which is transmitted to consumers via the lower wholesale price. However, it turns out that price is increasing in n for $n > 2$. Thus, the increase in the margin due to the higher concentration is more than offset by the reduction in the marginal cost faced by downstream firms (via de lower wholesale price). As we know for the particular case of $n = 1$, R&D investment is the same as in duopoly and therefore price is higher. Overall, we have that price is minimized in $n = 2$.

With respect to total downstream profits, they can be written as:

$$n\pi_i(n, r^*(n))$$

If we take the total derivative with respect to n, we get:

$$\left(\pi_i(n, r^*(n)) + n\frac{\partial \pi_i(n, r^*(n))}{\partial n}\right) + \left(\frac{\partial \pi_i(n, r^*(n))}{\partial r}\frac{\partial r^*(n)}{\partial n}\right) \tag{2}$$

The first term captures the effect of n on downstream profits for a given R&D level. As it is standard in models of competition this effect is negative. The second term captures the fact that R&D changes with n. On the one hand, the higher the level of investment, the lower the wholesale price charged to downstream firms, the higher their individual output and the lower the profits they can get by using the alternative supply. On the other hand, we have seen that R&D investment is decreasing in n. As a result, we have that the second term in (2) is positive. It turns out that the sum of both effects is negative and total downstream profits are maximized with monopolization.

As far as the upstream profits are concerned, they can be written as

$$\pi_U(n, r^*(n))$$

If we take the total derivative with respect to n and applying the envelope theorem we get

$$\frac{\partial \pi_U(n, r^*(n))}{\partial n} \tag{3}$$

Caprice (2005) analyzes the same model taking as given the level of R&D and studies the sign of (3). Making use of his result for the particular case where $r = r^*(n)$, we get that (3) is positive whenever

$$n < -1 + 2\sqrt{\frac{a - c + r^*(n)}{r^*(n)}} \tag{4}$$

Condition (4) is satisfied if $n < 1.79$. Then by comparing the upstream profits in monopoly and duopoly, we get that they are maximized in $n = 2$. As in Caprice (2005), we have shown that the upstream firm is interested in generating competition downstream to reduce the outside option of downstream firms.

The evolution of social welfare obtains from the previous analysis. In particular for $n > 2$, we have that downstream profits, upstream profits and consumer surplus are decreasing in n. Therefore, social welfare is also decreasing in n. On the other hand, social welfare in duoply is higher than in monopoly, because we have the same R&D investement in both cases but higher competition in duopoly.

So far we have only performed comparative with respect to the number of firms n. One step futher would be to endogenously determine market structure. A natural way to proceed would be to design a suitable merger game. This is what we do in the next section. Observe that we have seen that mergers up to duopoly would increase both joint profits and welfare. However, this does not imply that mergers will materialize in equilibrium due to the public-good nature of mergers. Mergers benefit all firms but the costs are only borne by the acquiring firm.

3 The model with an endogenous market structure

The most widely accepted merger game is the one developed by Kamien and Zang (1990,1991,1993). In Kamien and Zang (1990) each firm simultaneously chooses a bid for each competitor and an asking price. A firm is sold to the highest bidder whose bid exceeds the firm's asking price. They get that, with linear demand and Cournot competition, monopolization does not occur when we have three or more firms. Buying firms is expensive because by not accepting a bid a firm free-rides on the reduction in competition induced by the remaining acquisitions.

In Kamien and Zang (1993) this base game is repeated L times in order to check whether the possibility of sequential acquisitions makes it easier to monopolize an industry. Two scenarios are analyzed. In the first, they consider a single buyer and find that monopolization occurs if there are less than four firms. In the second scenario, every owner in the industry is allowed to be a potential buyer. In this case, they get that sequential monopolization becomes easier as compared to the case of a single buyer. The reason for this result is that with several buyers the cost of acquisitions may be shared among them.

In this section we design a merger game inspired in the previous papers in order to endogenize the market structure. We restrict attention to a simple game where there is only one acquiring firm and two rounds of acquisitions. Observe that these two assumptions make it more difficult to get monopolization. As we will see below, however, with the downstream profits inherited from the investment game of the previous section, the only equilibrium of the merger game is monopolization even for very unconcentrated industries.

We assume that there are initially n symmetric downstream firms in the industry. One of them, say firm 1, can make simultaneous bids to acquire rival firms.

More specifically, the timing of the game is the following.

First, firm 1 offers bids b_i to buy firm i $(i = 2, ..n)$. Second, these firms decide simultaneously whether to accept the bid or not. If firm i accepts the offer, it sells the firm to firm 1 at the price b_i. Third, firm 1 makes bids to buy the remaining independent firms. Fourth, the remaining independent firms decide whether to acccept the bids or not. Given the equilibrium market structure that results at the end of stage four, the investment game of the previous section is played.

We solve by backward induction starting at stage four. At this stage, the relevant profits to take into consideration for downstream firms are those they would obtain if they remained independent. They are given by

$$\Pi^D(m) = \frac{4(a-c)^2}{(2+m+m^3)^2}$$

where m denotes the number of independent firms and is obtained from expression (1).

Assume that l firms have been bought at stage 2. This means that we have $n-l$ independent firms at stage four. Firms other than one will accept the offers whenever the bid is not lower than their ouside option, which of course depend on the acceptance decisions of the other firms. If, for example, $k-1$ firms (other than firm j) accepted, the outside option of firm j would be $\Pi^D(n-l-k+1)$. At the third stage, firm 1 has to decide the number of firms to acquire, taking into account that in order to buy k firms it has to make a bid of $\Pi^D(n-l-k+1)$. Then, the payoff of firm 1 as a function of the number of acquisitions k is given by:

$$\Pi^D(n-l-k) - k\Pi^D(n-l-k+1) \tag{5}$$

The maximizer of the previous expression is $k = n-l-1$ if $n-l \leq 9$ and $k = 0$ otherwise. In the second stage, firms (other than one) have to decide whether to accept the offer of firm 1 or not. They will accept the offer whenever the bid is not lower than their ouside option. If, for example, $k-1$ firms (other than firm j) accepted, the outside option of firm j would be $\Pi^D(n-k+1)$ if $n-k+1 > 9$ and $\Pi^D(2)$ otherwise. Observe that if the number of acquisitions in the first round leads to monopolization in the second round, the outside option of downstream firms amounts to the duopoly profits. Otherwise, the outside option is like in stage 4 because the second round plays no role in the acquisition game.

In the first stage, firm 1 has to decide how many firms to acquire, taking into account how this decision will affect the subsequent mergers at the second round and therefore the outside option to be paid in the first stage. If $n \leq 9$, firm 1 will decide to monopolize the industry no matter in which round. If $n > 9$, whenever firm 1 buys at least $n-9$ firms, we know that the remaining independent firms will be acquired in the second round. Then in order to minimize the cost of monopolization firm 1 buys exactly $n-9$ firms in the first round paying $\Pi^D(10)$ per firm and 8 firms in the second round at the cost $\Pi^D(2)$ per firm. Observe that buying more than $n-9$ firms in the first round involves buying all firms at the price $\Pi^D(2)$.On the other hand, buying less than $n-9$ firms in the first round implies that no acquisition will take place in the second round. Therefore, the profits of firm 1 as a function of the number of acquired firms k are given by:

$$\Pi^D(n-k) - k\Pi^D(n-k+1)$$

From the analysis of stage three, we know that given that $n > 9$, profits are maximized in $k = 0$. As a consequence, in order to obtain the optimal strategy of firm 1 we have just to compare the profits of monopolizing the industry ($\Pi^D(1) - (n-9)\Pi^D(10) - 8\Pi^D(2)$) with the profits of buying no firm ($\Pi^D(n)$). This is solved in the next proposition.

Proposition 2 *If $n < 7122$, the merger game leads to monopolization. Otherwise, no merger occurs.*

Observe that the result is striking, because if we had no upstream investment monopolization would only occur for less than four firms.

We have seen that market forces lead to monopolization of the downstream market. From the results in Section 2, we know that social welfare and consumer surplus are maximized in duopoly. One possibility for the competition authorities would be to announce at the beginning of the merger game a policy forbidding monopolization of the downstream market. Nevertheless, we are going to show that this policy may be not optimal when it disrupts the overall merger process, and the market remains very unconcentrated, which hinders R&D investment and it is worse than monopoly.

First of all, in the following Lemma we derive a counterpart of Proposition 2, for the case where monopolization is forbidden.

Lemma 3 *When monopoly is forbidden, if $n < 68$, the merger game leads to duopoly. Otherwise, no merger occurs.*

The proof of this lemma follows the same lines than the one of Proposition2. In stage 3, the restriction imposed by the antitrust authority reduces the profitability of acquisitions by firm 1. In this case, mergers to duopoly occur for $n \leq 8$. In the first stage of the acquisition game, the relevant comparison by firm 1 is between merging to duopoly and acquiring no firm. In the former case, firm 1 would buy $n-8$ firms to trigger the merger process and reduce the acquisition price to $\Pi^D(9)$. One can check that $\Pi^D(2)-(n-8)\Pi^D(9)-7\Pi^D(3) > \Pi^D(n)$ for $n < 68$.

The optimal merger policy is prescribed in the following proposition.

Proposition 4 *If $n < 68$, monopoly should be forbidden. Otherwise, no merger policy is needed.*

If $n < 68$, the prohibition of monopolization leads to duopoly that is the optimal market structure. If $n \geq 68$, the prohibition completely stops the merger process and we have a downstream sector composed of n firms. Then to assess the the effect on social welfare we have to determine the sign of $W(1)-W(n)$. For $n \geq 68$, it is positive and therefore allowing all mergers is the optiomal merger policy.

4 The case of a general investment cost function.

In this section, we analyze the case where the investment cost is given by $C(r) = dr^2$, where $d \geq \frac{1}{2}$. This will help to check the robustness of our results to increasing the convexity of the cost function. One natural guess is that increasing d will attenuate the results we have obtained so far, because the role played by the upstream firm will be less important.

Straightforward calculations show that the equilibrium investment is given by:

$$r(d) = \frac{2(a-c)n}{(n-3)n + 4d(n+1)}$$

As expected the higher d, the lower the investment, because it becomes more costly. The main point of this section will be to study how does it evolves with n. In the second section, we showed that when $d = \frac{1}{2}$, investment was decreasing in n. However, we pointed out that it was the result of two opposite effects. On the one hand, as far as industry profits were concerned, the higher the concentration the higher the incentives to invest in R&D. On the other hand, the sign of the effect of concentration on the incentives of the upstream firm to reduce the outside option was ambiguous and it depended on the magnitude of the investment. This explains that for higher values of d we can obtain that investment increases with n as next proposition explains:

Proposition 5 *Upstream investment increases (decreases) with n if $n < (>) 2\sqrt{d}$.*

We are only aware of an empirical study of how downstream concentration affects upstream investment. Farber (1981) finds that supplier's R&D investment can both increase or decrease with downstream concentration. This result corresponds with the one obtained here. In our paper, it is the result of the upstream intent of increasing industry profits and reducing the outside option of firms.

One of the most striking results in the second section was that price increased with n. The reason was that the positive effect concentration had on investment compensated the traditional effect it has on price. So a necessary condition for price to increase with n is that investment decreases with n. Therefore, using the result of previous proposition, we know that when $n < 2\sqrt{d}$, price decreases with n. So the beneficial effect of mergers on price can only hold for unconcentrated industries. After some calculations we obtain that the derivative of equilibrium price with respect to n is positive whenever the next expression is positive:

$$n^2(n(6+n)-3) - 8dn(n^2-1) - 16d^2(n+1)^2 \tag{6}$$

Inspecting (6) we see that it will be positive only if n is high enough with respect to d. Indeed, one can easily check that (6) is positive, and therefore mergers reduce price, if $n > 16d$. So in the general case, we get a qualification on the result of proposition 1, mergers benefit consumers only in unconcentrated enough industries.

Another striking result of the model was that downstream mergers were so profitable that monopolization was obtained for basically any initial market concentration. One may presume that the negative effect of d on investment should imply that downstream firms have less incentives to merge. An indication of this is that the ratio between monopoly and duopoly profits (very important for monopolization to be profitable) is decreasing in d and converges to $\frac{9}{4}$ (its value in the symmetric Cournot model) when d tends to infinity.

5 Conclusions

Competition authorities worry about horizontal mergers because lower competition can lead to lower final prices. However, this may not be the end of the story, because other crucial variables can be affected by the mergers. In this paper, we focus on how horizontal mergers downstream affect the incentives of the upstream firm to invest in cost-reducing R&D. We show that downstream mergers increase R&D investment. The reason is the following: the upstream firm's revenues increase with industry profits which in turn increase with concentration downstream and this explains the positive link between concentration and investment. This effect is so important that it outweights the negative effect on prices due to lower competition. Therefore, in our context, horizontal mergers are pro-competitive.

6 Appendix

Proof of Proposition 2

Stage 4 is explained in the text. The objective of firm 1 is given in expression (5):

$$F(n,k) = \Pi^D(n-l-k) - k\Pi^D(n-l-k+1) \tag{7}$$

Simple computations show that whenever $n-l \leq 12$, the result in the text holds. For $n-l \geq 13$, we proceed as follows. We check that for $m \geq 9$

$$\frac{\Pi^D(m)}{\Pi^D(m+1)} < 2 \tag{8}$$

This implies that for $n-l-9 \geq k \geq 2$, we have that $\dfrac{\Pi^D(n-l-k)}{\Pi^D(n-l-k+1)} < 2$. This implies that $F(n,k) < 0$. For $n-l-1 \geq k \geq n-l-8$, simple computations show that $F(n,k) < 0$. Finally, $k = 1$ yields less profits that $k = 0$, because of (8).

Stages 2 and 1 are explained in the text.

Proof of Lemma 1: Simple computations show that whenever $n-l \leq 12$, the results in the text hold. For $n-l \geq 13$, proof of proposition 2 shows that the optimal choice is $k = 0$.

7 References

Bru and Faulí-Oller (2002) "Horizontal Mergers for Buyer Power" Mimeo.

Caprice,S. , 2005, "Incentive to encourage downstream competition under bilateral oligopoly", Economics Bulletin, 12. 9. pp.1-5.

Chen, Z (2004) "Countervailing Power and Product Diversity" Mimeo

Chipty, T. and C.M. Snyder (1999) "The role of outlet size in bilateral bargaining: a study of the cable television industry". Review of Economics and Statitistics 81, 326-340.

Dobson, P.W and M. Waterson (1997) "Countervailing Power and Consumer Prices" The Economic Journal 107, 418-30.

Farber, S. C. (1981) "Buyer market structure and R&D effort: a simultaneous equations model" Review of Economics and Statistics, 63, 336-345.

Horn, H. and A. Wolinsky (1988) "Bilateral monopolies and incentives for merger" Rand Journal of Economics 408-419.

Inderst, R and G. Shaffer (forthcoming) "Retail merger, buyer power and product variety" Economic Journal.

Inderst, R. and C. Wey (2003), Bargaining, mergers and technology choice in bilaterally oligopolistic industries, RAND Journal of Economics. 34, 1-19.

Inderst, R. and C.Wey (forthcoming) "Buyer Power and Supplier Incentives", European Economic Review

Inderst, R. and C.Wey (2005) "Countervailing Power and Upstream Innovation" Mimeo.

Kamien, M. and I. Zang (1990) "The limits of monopolization through acquisition" Quarterly Journal of Economics, 105, 465-499.

Kamien, M. and I. Zang (1991) "Competitively cost advantageous mergers and monopolization" Games and Economic Behavior, 3, 323-338.

Kamien, M. and I. Zang (1993) "Monopolization by sequential acquistion" The Journal of Law, Economics and Organization 9(2), 205-229.

Rey, P. and Tirole, J., 2003, A primer on foreclosure. Forthcoming in: Handbook of Industrial Organization, vol. III. New York. Elsevier- North-Holland.

Salant, S.W., S. Switzer and R.J. Reynolds (1983), "Losses from horizontal mergers: The effects of an exogenous change in industry structure on a Cournot-Nash Equilibrium". The Quarterly Journal of Economics, 98 (2), 185-199.

von Ungern-Sternberg, T. (1996), "Countervailing Power Revisited", International Journal of Industrial Organization 14, 507-520.