

On the Coordinated Effects of Conglomerate Mergers

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Abstract

Issues of multimarket contact have recently been raised in European merger cases. Coordinated effects have thus been recognized as a potential reason for blocking conglomerate mergers (or horizontal mergers with conglomerate aspects). In this paper we analyze the impacts of incremental conglomerate mergers on the scope for collusion. In a simple benchmark model we show that the ability to collude does not depend on the number of firms that are present in multiple markets. We derive a neutrality benchmark for mergers and show that there is a pivotal merger that creates all of the collusion potential. We then discuss a bargaining effect of conglomerate effects that generates slightly different predictions. We then show the fundamental difference between mergers that link asymmetric markets with symmetric firms from mergers with symmetric markets but complementary asymmetries between firms. While in the first case the price in one market typically falls as a result of coordinated effects, all prices rise in the latter case. We discuss the consequences for competition policy rules.

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1 Introduction

In the context of horizontal mergers, coordinated effects have been an important topic of discussion in recent years. However, the theory of multi market contact suggests that conglomerate aspects of mergers may also have the potential to facilitate collusion in markets. In fact, Kühn (2004) has suggested that a coordinated effects analysis should also consider aggregate market positions across different geographic markets to assess the coordinated effects of horizontal mergers. The idea is that collusion in all geographic markets can be facilitated if mergers can symmetrize the market position of firms across markets. Implicitly this argument appeals to a coordinated effect arising from conglomerate aspects of such a merger.

The potential coordinated effects of mergers have hitherto not been explicitly considered in merger decisions. However, a recent merger application in Europe has shown that it has to be taken as a potentially serious issue in future merger decisions. The case involved a planned effective merger in the markets for carton packaging of liquid foods. The proposed concentration involved a merger between the main competitors of the market leader TetraPak in the aseptic and fresh carton markets respectively. One of these firms (SIG) is exclusively active in the aseptic market. The other party to the proposed merger, Elopak, is virtually exclusively active in the fresh market and is the biggest competitor to TetraPak in that market. It recently entered on the basis of a product that it had been able to make suitable for the aseptic market, but only for a market niche and not one in which SIG was active. The European Commission opened an investigation because the number of major players in carton packaging went from 3 to 2. One cannot exclude that horizontal issues might have played a role but clearly the major concerns were about the elimination of a potential entry in the aseptic market and the scope of the merger to facilitate collusion across the industry. Before these issues could be discussed in detail the merger investigation was closed because the merger bid itself failed in face of an alternative bidder.

The question that this case raises are important, however, for the treatment of mergers in highly concentrated markets. When should coordinated effects of conglomerate mergers be taken into account? And how would we measure the importance of such effects? The literature is relatively quiet on this policy issue. Bernheim and Whinston (1990) have generally shown that multimarket contact can facilitate collusion because it allows the pooling of incentive constraints. Hence, if firms operate in different markets as separate entities collusion is harder than if they do not. The essential insight is that slack in the incentive constraint in one market can be used for making collusion more credible in a second. But what is the marginal impact of a single conglomerate merger? When do such mergers have large impact or small? How many firms need to have multi-market contact to generate effects? These are questions that have so far not been answered.

In this paper we attempt to identify a couple of effects arising from incremental conglomerate mergers that help to answer such questions and structure a systematic approach to assessing potential coordinated effects of conglomerate mergers. We set up a model of two markets that are symmetric in terms of demand structure, costs, and number of firms in the market. Asymmetries between markets can be generated through differences in the discount factor (demand growth) or differences in the total capacity stock. Asymmetries within markets can be generated from differences in capacities. This allows for the study of both intra and inter market asymmetries and their differential effects on the impact of conglomerate mergers.

We first look at pure inter market asymmetries in the form of differences in the discount factor in a model in which firms cannot collude in market A but not in market B in the absence of conglomerate firms. We use this model to derive a benchmark merger neutrality result. Consider the distribution of profits between any pair of plants, one operating in market A and the other operating in market B . We show that the bilateral profit distributions that can be obtained remains the same if the number of independent firms in market B is small enough that this subset of firms by themselves could fully collude. Similarly, if the number of independent B firms is larger than the number at which full collusion is possible, the achievable payoff distribution is also independent of the number of firms. Hence, there is one critical conglomerate merger that realizes all of the collusive potential of multimarket contact. It should be noted that if there are only two firms in the market this can be the first merger, so that there is no multimarket contact between firms in the usual sense. This shows that the usual empirical approach to counting market encounters as an index of multimarket contact does not capture the structure of incentives in a theoretical model.

The problem of this an analysis is that it ignores of how agreement on coordinated conduct is achieved. When we allow for bargaining over the equilibrium to be played, we have to recognize that conglomerate mergers also change the relative bargaining position for firms in the industry. Essentially, a merger will always reduce the bargaining position of the merged entity. This may lead to outcomes that do not maximize industry surplus. From this there is the possibility that a sequence of mergers can all have a marginal effect on market performance after the merger. We show in section 4 that when collusion is relatively easy the same merger neutrality results occur as before. However, the fact that non-merging firms always have an incentive to redistribute profits to themselves will typically lead to a reduction in industry profits when collusion in market A is not as easy. It remains true that up to a critical mass conglomerate mergers have no effects. The pivotal merger identified in section 3 then is the merger with the largest impact on price in market B and further mergers have smaller and smaller impact. In fact, mergers will typically not lead to a pure conglomerate structure because the joint profits of independent firms are larger than those of conglomerate firms.

In section 5 we then turn to the question whether there is a systematic difference between mergers between asymmetric markets and those between markets with asymmetric firms. In this section we study models in which full collusion is impossible in either market, but where some collusion can always be maintained. In such a framework, we show that mergers between asymmetric markets always lead to a decrease in the price in the market in which collusion is easier to obtain. Essentially in that market the marginal loss from decreasing the price is relatively small. However, when the price is reduced this creates slack in the incentive constraint of a conglomerate firm which allows such a firm to credibly raise the price in the second market. This contrasts with markets that are symmetric, but in which firms are asymmetric. Such markets exhibit complementary asymmetries in the sense that matching the large firm in one market and the small in the other can create a much more symmetric aggregate market structure. In such a case early mergers have little effect, but any mergers with a systematic effect will raise prices in all markets.

We conclude with some ideas concerning the implications for policy towards coordinated effects of conglomerate mergers.

2 The Analytical Framework

2.1 The Model

We consider two markets, A and B , with n plants in each market. We assume that every plant in a market J is owned by a different firm. Let \mathbb{A} be the set of firms owning a plant in market A and define \mathbb{B} analogously. We call firm i an “ A firm” if $i \in \mathbb{A}$ and $i \notin \mathbb{B}$. It is called a “ B firm” if the opposite is true. A *conglomerate firm* i owns one plant in each market, i.e. $i \in \mathbb{C} = \mathbb{A} \cap \mathbb{B}$. All firms have zero marginal costs of production up to some capacity constraint K_i . In each market firms produce a homogeneous goods with market demand given by $D(p)$, which is downward sloping and log-concave. The total capacity in market J is given by $K^J = \sum_{k \in \mathbb{J}} K_k$ and $K_{-i}^J = K^J - K_i$. When a consumer is rationed at a given price in the market we adopt the efficient rationing rule to determine the residual demand faced by firms with higher prices. A firm i that sets price p_i^J and is allocated a market share s_i^J when it sets the same price as others in the market faces the residual demand function:

$$D_i^J(p_i^J, p_{-i}^J, s_i^J) = \begin{cases} \max\{0, D(p_i^J) - K_{-i}^J\} & \text{if } p_i^J > \min_{k \in \mathbb{J} \setminus i} \{p_k^J\} \\ s_i^J D(p_i^J) & \text{if } p_i^J = \min_{k \in \mathbb{J} \setminus i} \{p_k^J\} \\ D(p_i^J) & \text{if } p_i^J < \min_{k \in \mathbb{J} \setminus i} \{p_k^J\} \end{cases},$$

in market J . The expression p_{-i}^J is the vector of prices for all firms in market J except for firm i . These shares will be determined as part of a collusive agreement. Profits for firm i in a single period are given by $\pi_i^J(p_i^J, p_{-i}^J, K_i) = p_i^J \min\{D_i^J(p_i^J, p_{-i}^J), K_i\}$. A *conglomerate merger* brings together one A firm with one B firm. The profits of a conglomerate firm i are given by the sum of its profits in the two markets.

In every period, each firm sets a price and the maximal share of demand it is willing to serve at that price for each market in which it is active. Then the firm receives the corresponding profits from that period. This game is infinitely often repeated. A collusive agreement for the game specifies a price p^J for each market and a market share α_i in market A for firm i and β_k in market B for firm k . A strategy is a mapping from histories of the game to prices. Payoffs for a firm i from market J are given by:

$$\sum_{t=0}^{\infty} (\delta^J)^t (p_{it}^J - c) D_i^J(p_{it}^J, p_{-it}^J, s_{it}^J)$$

where δ^J is a market specific discount factor. The potential asymmetry between markets due to the discount factor δ^J can be interpreted as different rates of demand growth across the two markets. Our model thus allows for two different sources of asymmetry through the discount factor and the distribution of capacity.

2.2 Incentive Neutral and Bargaining Neutral Mergers

In this paper we study the comparative statics of collusion resulting from conglomerate mergers. Usually when we perform comparative statics on some parameter in a collusion model, the effects on the incentives to collude are captured by the change in the equilibrium value set that can be generated. Sometimes such comparative statics give unambiguous results because the equilibrium value set is nested

when we vary the parameter (see Abreu, Pearce, and Stacchetti 1990, Kühn and Rimler 2006). However, in the context of this paper, the identity of the players changes with every merger. To have a consistent way of comparing pay-off ranges that can be obtained, we partition the plants into pairs of A and B plants. For any set of conglomerate mergers we can then look at the payoff distributions achievable for any such pairs. We call these “bilateral payoff distributions”. We will call a conglomerate merger “*incentive neutral*” when the set of bilateral payoff distribution associated with the equilibrium value set does not change after the merger.

The fact that a merger is “incentive neutral” does not necessarily mean that it has no competitive effect. The reason is that different equilibria on the Pareto frontier of the equilibrium value set may generate different prices. Which equilibrium will be played should be considered the result of some kind of bargaining process between the firms (see Harrington 1991 or Kühn and Rimler 2006 for such an approach).¹ However, for almost any bargaining model a change in ownership structure changes the relative bargaining power of firms.

To see this point consider a simplified version of our model with $K_i = \infty$ for all i and $\delta_i^J = \delta > \frac{1}{2}$ for all i and J , and let $n = 2$. In this model setting price equal to marginal cost forever is clearly an equilibrium and generates the lowest equilibrium value achievable. It is straightforward to show that on the Pareto frontier of the equilibrium value set the monopoly price is set, $\alpha_i \geq (1 - \delta)$ for all i , $\beta_i \geq (1 - \delta)$ for single market firms and $\alpha_i + \beta_i \geq 2(1 - \delta)$ if both firms are conglomerates. Hence, the range of profit distributions for two pairs of firms is the same whatever the the number of conglomerates in the market and any conglomerate mergers are incentive neutral. In this sense there are no multimarket contact effects assuggested by Bernheim and Whinston.

But this analysis ignores the bargaining effect from a unilateral conglomerate merger, which is an effect not present in the analysis of Bernheim and Whinston (1990). Such bargaining issues can be safely ignored in their analysis because they do not look at *incremental* mergers. To see this note that any symmetric bargaining model will lead to $\alpha_i = \beta_i = \frac{1}{2}$ for all i when there are no conglomerates and $\alpha_i + \beta_i = 1$ when there are only conglomerates. But when market structures are asymmetric, most bargaining solutions will generate differences in relative bargaining power between conglomerate and single market firms. Consider a simple Nash bargaining solution in which the threat point is no collusion in any of the markets. In the absence of a conglomerate firm the problem is one of bargaining between four firms: $\max_{\alpha, \beta} (1 - \alpha)\alpha\beta(1 - \beta)$. However, when there is one conglomerate, this is reduced to bargaining between only three firms:

$$\max_{\alpha, \beta} (1 - \alpha) (\alpha + \beta) (1 - \beta)$$

subject to:

$$\begin{aligned} 1 - \alpha &\geq 1 - \delta \\ 1 - \beta &\geq (1 - \delta) \\ \alpha + \beta &\geq 2(1 - \delta) \end{aligned}$$

where setting the collusive price at p^m and imposing the three incentive constraints guarantees that the selected solution must lie on the Pareto frontier of the equilibrium value set. The bargaining solution

¹Modelling equilibrium selection as bargaining over the equilibrium value set appears to capture the idea of explicit collusion. It is much less clear that tacit collusion can be captured in this way. Tacitly colluding firm may not even be likely to achieve an outcome on the Pareto frontier of the equilibrium value set. We do not address this issue in this paper.

then sets $\alpha + \beta = \max\{2(1 - \delta), \frac{2}{3}\}$ and $(1 - \alpha) = (1 - \beta) = \min\{\frac{2}{3}, \delta\}$. Unless $\delta \geq \frac{2}{3}$, the bargaining solution will make the incentive constraint of the conglomerate firm bind, leaving it with profits $2(1 - \delta) < 1$. Hence, the joint profits for the merging firms are lower after a conglomerate merger than before. Similarly, firms would lose profit shares in a catch-up merger because they lose the bargaining power arising from the asymmetric ownership structure. Modelling the bargaining effect of conglomerate mergers with the Nash Bargaining solution as above, we would therefore strictly predict that no merger can take place when the merger is incentive neutral. On the other extreme we can allocate all the bargaining power to the conglomerate firms. This generates the greatest incentive for conglomerate mergers so that all conglomerate mergers would take place even when they are competitively neutral.

To separate the contributions of incentive effects and bargaining effects on the total coordinated effect of a conglomerate merger we will separate the two in the analysis of the next two sections. We first discuss incentive neutrality as defined in the early part of this section. We then go on to study the bargaining effects and to what extent the assessment of mergers has to be modified in their light.

3 When are Conglomerate Mergers Competitively Neutral?

In the literature it often appears that a necessary condition for multimarket effects under collusion is that the same firms meet in several markets. Indeed, in the empirical literature (see Parker and Roeller,) an index for multimarket contact is usually created based on a measure of the number of markets in which the same firms interact. A policy consequence of this approach is that multimarket contact issues arise in conglomerate mergers only when there are pre-existing conglomerates in the markets affected by the merger. In this section we show that the presence of a single conglomerate may realize most of the gains from coordinated conduct. In the simplest version of our model this leads to the result that catch-up mergers, i.e. the mergers that usually come under scrutiny, are competitively neutral. To build intuition about this result we consider the simplest version of our model in which there are no capacity constraints but where there is an asymmetry between the discount factors in the two markets. This can be interpreted as modelling differential growth rates of demand across the two markets. When there are n independent entities acting in each market it is straightforward to see that for any conglomerate structure, collusion is impossible when $\delta^A \leq \frac{n-1}{n}$ and $\delta^B \leq \frac{n-1}{n}$ and one of the inequalities is strict. Similarly there can be no incentive effects from conglomerate mergers when these inequalities are reversed because full collusion is possible even when there are no ownership links across markets. To make multimarket effects relevant we therefore assume $\delta^A > \frac{n-1}{n} > \delta^B$. Then full collusion is feasible in market A but not in market B in the absence of conglomerate links.

Let $\pi^J = (p^J - c)D(p^J)$ denote industry profits in market J , where p^J is the lowest price set in this market. For ease of exposition we normalize monopoly profits to 1 so that $\pi^J \leq 1$. Then for any conglomerate market structure a collusive equilibrium has to satisfy the incentive constraints:

$$\begin{aligned} \alpha_i \pi^A &\geq (1 - \delta^A) \pi^A \text{ for } i \in \mathbb{A} \setminus \mathbb{C} \\ \beta_i \pi^B &\geq (1 - \delta^B) \pi^B \text{ for } i \in \mathbb{B} \setminus \mathbb{C} \\ \alpha_i \frac{\pi^A}{(1 - \delta^A)} + \beta_i \frac{\pi^B}{(1 - \delta^B)} &\geq \pi^A + \pi^B \text{ for } i \in \mathbb{C} \end{aligned} \tag{1}$$

It greatly simplifies the problem that firms can never gain from reducing the price in market A :

Lemma 1 *For any conglomerate ownership structure all equilibria on the Pareto frontier of the equilibrium value set have the property that the monopoly price is set in market A so that $\pi^A = 1$.*

Proof. See the Appendix. ■

To see the intuition for this result, add up over all of the incentive constraints for all i . This implies

$$\frac{\pi^A}{1 - \delta^A} + \frac{\pi^B}{1 - \delta^B} \geq n(\pi^A + \pi^B) \quad (2)$$

Since $\delta^A > \frac{n-1}{n}$ by assumption, this aggregate incentive constraint is relaxed when π^A is increased. The proof simply shows that this slack in the aggregate incentive constraints can be redistributed in market A making every A firm better off. What is critical for this result is that collusion in market A is feasible and that it is also necessary to sustain collusion in any market.

Now consider a market structure with m conglomerate firms and $n - m$ single market firms in each market. First, note that the multimarket presence of the m conglomerate firms can only facilitate collusion in market B if collusion were possible if only $n - m$ B firms were present. This means that $\delta^B \geq \frac{n-m-1}{n-m}$. To see this, note that for collusion to work in the B market, the incentive constraint of the B firm has to be satisfied, i.e. $\beta_i \pi^B \geq (1 - \delta^B) \pi^B$. Hence, such a firm needs at least a market share of $(1 - \delta^B)$. Suppose $\delta^B < \frac{n-m-1}{n-m}$. Then $(1 - \delta^B) > \frac{1}{n-m}$, so that it is impossible to give each B firm a market share exceeding $(1 - \delta^B)$. Proposition 1 immediately follows:

Lemma 2 *Suppose $\delta^B < \frac{n-m-1}{n-m}$. Then an incremental conglomerate merger is competition neutral if there are $m - 1$ or less conglomerate firms in the market.*

Proof. Follows immediately from the argument in the text. ■

Assume that $\delta^B \geq \frac{n-m-1}{n-m}$ so that the $n - m$ firms could fully collude if the conglomerate firms were to withdraw from the market. We now show that under this condition collusion is always possible and the scope for collusion is independent of the number of conglomerate firms. We do this by characterizing the Pareto frontier of the equilibrium value set. Our first step is to determine the maximal profits that a conglomerate firm can obtain in any collusive equilibrium. Clearly, the highest profits for a conglomerate firm can be obtained by selecting market shares in both markets that make the incentive constraints (1) binding for all other firms. This means that any other conglomerate firm and any pair of A firm and B firm earn a net present value of exactly $1 + \pi^B$. By taking the complementary market shares, the remaining conglomerate firm, call it firm 1, can extract

$$\frac{1}{1 - \delta^A} + \frac{\pi^B}{(1 - \delta^B)} - (n - 1)[1 + \pi^B] \quad (3)$$

from the market.

If $\delta^B > \frac{n-2}{n-1}$, i.e. if $n - 1$ firms could perfectly collude in market B, the profit of firm 1 (3) strictly increases in π^B . This result can be understood intuitively: even if firm 1 gives all other firms a share of $(1 - \delta^B)$ in the market it still obtains a positive market share in market B. This stake in the profitability

of market B means that profits increase in π^B .² On the other hand, since (3) is derived by keeping all other firms at the incentive constraint, an increase in π^B does not affect the incentive compatibility constraint for any other firm i , $i \neq 1$. Hence, on the Pareto frontier π^B must be the highest value that is consistent with satisfying firm 1's incentive constraint:

$$\frac{1}{(1-\delta^A)} - n + \frac{\pi^B}{(1-\delta^B)} - n\pi^B \geq 0. \quad (5)$$

By the assumption that $\delta^B < \frac{n-1}{n}$ it follows that the incentive constraint tightens when π^B is increased. When $\frac{1}{1-\delta^B} \geq 2n - \frac{1}{1-\delta^A}$ this constraint is satisfied at $\pi^B = 1$. Otherwise, the incentive constraint for firm 1 binds and a Pareto optimal equilibrium satisfies $\pi^B = \frac{\frac{1}{(1-\delta^A)} - n}{n - \frac{1}{(1-\delta^B)}} = \pi^*$.

If $\delta^B \leq \frac{n-2}{n-1}$, firm 1's profit (3) is (weakly) decreasing in π^B . In this case it is impossible to give $n-1$ firms a stake $(1-\beta)$ in market B . Therefore, we cannot guarantee incentive compatibility in market B for $n-1$ firms and still give firm 1 a positive stake. Hence, firm 1 can extract more profits in market A when the incentive constraint with respect to market B is relaxed for other conglomerate firms. Its highest profit on the Pareto frontier of the equilibrium value set is then $1 - n(1-\delta^A)$ at $\pi^B = 0$. In this case it is better for a firm to extract all the benefits from collusion in market A through a higher market share instead of inducing collusion in market B . Note that the highest profit in market B that can be sustained in an equilibrium on the Pareto frontier of the equilibrium value set remains $\pi^B = 1$ when $\frac{1}{1-\delta^B} \geq 2n - \frac{1}{1-\delta^A}$ and $\delta_B \geq \frac{(2n-1)(1-\delta^A)-1}{2n(1-\delta^A)-1}$ and $\pi^B = \pi^*$ otherwise. Since the incentive constraint is binding for all firms in the latter case, all conglomerates and all pairs of A firms and B firms make the same profit.

Finally note, that the largest profit that a conglomerate can have at an equilibrium on the Pareto frontier is the same as the largest profit that a pair of independent A and B firms can generate. This

²To see this intuition more formally, consider any distribution of profits $\alpha_i + \beta_i\pi$ for $i \in \mathbb{C}$, which satisfies the incentive constraint for conglomerate firms in (1). For any such distribution we can change the market shares of $m-1$ conglomerates to

$$\begin{aligned} \hat{\beta}_i &= \min\left\{\frac{[1-(n-m)(1-\delta^B)]}{m-1}, 1 - \delta_B\right\} \\ \hat{\alpha}_i &= \alpha_i - (\beta_i - \hat{\beta}_i)\pi. \end{aligned} \quad (4)$$

The market shares of the remaining conglomerate, call it firm 1, are $\hat{\beta}_1 = 1 - (n-1)\hat{\beta}_i$ and $\hat{\alpha}_1 = 1 - \sum_{i \neq 1} \hat{\alpha}_i$. Note that this redistribution of market shares among the conglomerate firms leaves profits (and the slack in the incentive condition) unchanged. What this distribution of market shares does is to maximally relax the incentives to cheat generated from market B for $m-1$ conglomerate firms. This then generates the minimal need for these firms to have slack in their incentive condition for market A . Clearly such a distribution of shares will allow the remaining conglomerate to extract the maximal rent possible through increasing its share in market A . While this construction is without loss of generality for determining Pareto efficient payoffs, it allows us to think about the market share in market A as the instrument of the remaining conglomerate to extract the rent from collusion in both markets.

First note, that there are two cases to consider: $\delta^B \geq \frac{n-2}{n-1}$ and $\delta_B < \frac{n-2}{n-1}$. If $\delta^B \geq \frac{n-2}{n-1}$, then full collusion can be obtained in market B with $n-1$ firms. Then the $m-1$ conglomerate firms can be given a market share of $(1-\delta^B)$ and a strictly positive share of $1 - (n-1)(1-\delta^B)$ in market B remains for firm 1. Given that the $\beta_i = (1-\delta^B)$ for all $i \neq 1$, firm 1 can also extract up to $1 - (n-1)(1-\delta^A)$ from market A without violating the incentive constraints (1). If $\delta^B < \frac{n-2}{n-1}$, collusion cannot be generated by $n-1$ firms and no such share is left for firm 1. Then it has no stake in market B . One can then increase the scope for extracting profits for firm 1 in market A by relaxing the incentive constraint for the remaining conglomerate firms. Thus reducing π^B increases firm 1's profits on the Pareto frontier.

simply involves yielding to an A firm sufficient market share in market A so that the conglomerate's incentive constraint becomes binding. Since at binding incentive constraints the total profits of the two single market firms are the same as those of the conglomerate that extracts all of the residual profits, this yields the same profits without violating incentive compatibility. It follows that the complete range of bilateral payoff distributions among $A - B$ plant pairs is not affected by the number of conglomerates as long as there is a sufficient number of conglomerates to satisfy the condition $\delta^B \geq \frac{n-m-1}{n-m}$. Let \underline{m} be the smallest number of conglomerates such that this condition holds. Then our discussion directly leads to the result:

Proposition 3 (a) *Any conglomerate merger leading to a number $m < \underline{m}$ conglomerate firms is incentive neutral.*

(b) *Any conglomerate merger starting from $m \geq \underline{m}$ is incentive neutral.*

(c) *A conglomerate merger from $\underline{m} - 1$ to \underline{m} realizes all collusive opportunities generated by multi-market contact.*

Proof. Follows directly from discussion in the text. ■

The intuition for this proposition is fairly straightforward. Any incremental merger means that the new conglomerate can use the slack in the A market incentive constraint to relax the B market incentive constraint on its B unit. But it cannot relax the incentive constraint of the remaining B firms. So collusion is possible in the B market only if the remaining B firms could collude if they were the only firms in the market. Conglomerate mergers into market B therefore have exactly the same effect as horizontal mergers in market B in the absence of conglomerate activity. The ability to collude only depends on the number of independent firms $n - m$.

The result that only the pivotal merger to \underline{m} has coordinated effects has to be seen in that perspective. For example, if we looked only at horizontal mergers in market B in the absence of conglomerates, again only the \underline{m}^{th} merger would have coordinated effects. This results from the extreme structure of homogeneous goods models in which either full collusion is achieved or not. Only in this extreme case is there a pivotal merger that makes collusion possible. We relax this extreme feature of the model when we introduce capacity constraints in section 5.

4 The Bargaining Effect of Conglomerate Mergers

We have derived merger neutrality results only in the sense that the sets of bilateral equilibrium payoff distributions before and after the merger coincide. This is a convenient benchmark to focus on the incentive effects of conglomerate mergers. However, it is a very weak notion of conglomerate merger neutrality because it ignores the changes in bargaining power that are generated from a merger. In this section, we focus on identifying merger incentives when firms bargain over the set of equilibria before they play the collusion game.

There are many different bargaining games we could assume. As a benchmark let us first consider a bargaining game that gives maximal bargaining power to the conglomerate firms. We assume that

conglomerate firms make a take it or leave it collusive offer to all of the remaining firms. This means that merging firms do not only generate the benefit of potentially enabling collusion in market B but also can potentially redistribute market share in market A . Suppose that $\delta^B < \frac{n-m-1}{n-m}$. Then a merger from $m-1 > 0$ to m conglomerate firms can never generate collusion in market B . Hence, $\pi^B = 0$ in equilibrium. However, an A -firm- B -firm pair will still want to merge because without the merger it earns $(1 - \delta_A)$ and with the merger it earns

$$\frac{1}{m} \left[\frac{1}{1 - \delta^A} - (n - m) \right] = 1 + \frac{\frac{1}{1 - \delta^A} - n}{m} > 1$$

where the last inequality follows from $\delta^A > \frac{n-1}{n}$. The firms will merge simply to increase bargaining power relative to A -firms. The argument is similar for a merger from m to $m+1$ if $\delta^B > \frac{n-m-1}{n-m}$. When there are m conglomerate firms symmetric bargaining between them will maximize their residual profits when single market firms just satisfy their incentive constraint. This means the conglomerate firms maximize:

$$\frac{1}{1 - \delta^B} + \frac{\pi^B}{1 - \delta^B} - (n - m) [1 + \pi^B]$$

Since $\delta > \frac{n-m-1}{n-m}$ conglomerates want to make π^B as large as possible. Since each conglomerate receives a share $\frac{1}{m}$ of the joint profit, each conglomerate faces the incentive constraint:

$$\frac{1}{(1 - \delta^A)} + \frac{\pi^B}{(1 - \delta^B)} - (n - m) [1 + \pi^B] \geq m [1 + \pi^B]$$

which simplifies to:

$$\frac{1}{1 - \delta^A} + \frac{\pi^B}{1 - \delta^B} \geq n [1 + \pi^B]$$

Hence, $\pi^B = 1$ can be sustained if and only if $\frac{1}{1 - \delta^B} \geq 2n - \frac{1}{1 - \delta^A}$. Otherwise the firms induce collusive profit $\pi^B = \pi^*$. This immediately yields:

Proposition 4 *If conglomerate firms can make joint take it or leave it collusive offers to the remaining firms there is a coordinated effect of the merger if and only if the merger is not incentive neutral. However, all conglomerate mergers are profitable.*

Proof. Follows directly from the discussion in the text. ■

If bargaining power is symmetrically distributed, single market firms will be able to extract some of the benefits created from a conglomerate merger in the bargaining over the optimal collusive scheme. However, single market firms can gain from having bargaining power only if they are not too incentive constrained. Otherwise, the such firms will already gain a share exceeding an equal share in total collusive profits. Note that the firms with the tightest incentive constraint are the B market firms. For this reason we have chosen to directly analyze a bargaining game in which the conglomerate firms and A firms bargain out a collusive agreement and make a joint take it or leave it offer to the B -firms. Bargaining between the A and B firms is modelled as a Nash bargaining solution that has to satisfy the incentive constraints of all firms in the market.

Given that B firms face take it or leave it offers they will obtain market share $(1 - \delta^B)$ in market B . As before collusion is only possible if $\delta^B \geq \frac{n-m-1}{n-m}$. A Nash bargaining solution between the remaining n firms then splits the remaining surplus evenly among all firms if incentive compatibility constraints are not binding. Hence, A firms and C firms jointly maximize the available surplus

$$\frac{1}{1 - \delta^A} + \frac{\pi^B}{1 - \delta^B} - (n - m)\pi^B,$$

which is strictly increasing in π^B whenever $\delta^B > \frac{n-m-1}{n-m}$. Note that an equal share of this residual surplus exceeds $\frac{1}{n}$. This means that an A firm's incentive constraint is always satisfied because $(1 - \delta^A) < \frac{1}{n}$. However, the incentive constraint may not be satisfied for a conglomerate firm. The reason is that collusion is difficult in market B so that it is impossible for every firm to take a market share of at least $(1 - \delta^B)$. To guarantee incentive compatibility, conglomerate firms need to put a stake in market A at risk to maintain incentive compatibility in market B . This means that the share of a conglomerate firm in market A has to strictly exceed the share $(1 - \delta^A)$. In fact, the harder collusion is, the greater the share of a conglomerate firm in market A has to be in order to allow collusion in market B . But then the need for a sufficient market share can come in conflict with an equal sharing rule. In order for equal sharing to satisfy the conglomerate incentive constraint we need:

$$\frac{1}{1 - \delta^A} + \frac{\pi^B}{1 - \delta^B} - (n - m)\pi^B - n - n\pi^B \geq 0 \quad (6)$$

Hence, the highest profit that can be sustained in market B is given by

$$\hat{\pi} = \min\left\{1, \frac{\frac{1}{1-\delta^A} - n}{(2n - m) - \frac{1}{(1-\delta^B)}}\right\} \leq \min\left\{1, \frac{\frac{1}{(1-\delta^A)} - n}{n - \frac{1}{(1-\delta^B)}}\right\} = \pi^* \quad (7)$$

The incentive constraint for the conglomerate is therefore binding unless

$$\frac{1}{(1 - \delta^A)} - n \geq (2n - m) - \frac{1}{(1 - \delta^B)} \quad (8)$$

or

$$\frac{1}{1 - \delta_B} \geq \left[2n - \frac{1}{1 - \delta^A}\right] + (n - m) \quad (9)$$

Note that the critical average discount factor necessary with symmetric bargaining to achieve the monopoly profit outcome in market B is strictly higher than if there is no restriction imposed on the distribution of profits among the A firms and conglomerates. This implies directly:

Proposition 5 *Let \underline{m} be the smallest number m such that $\delta^B \geq \frac{n-m-1}{n-m}$ and assume $\frac{1}{1-\delta_B} \geq \left[2n - \frac{1}{1-\delta^A}\right] + (n - m)$. Then:*

(a) *Only a merger from $\underline{m} - 1$ to \underline{m} has coordinated effects*

(b) *Independent firms strictly prefer to remain independent when $m \geq \underline{m}$, so there are never more conglomerate firms than \underline{m}*

If condition (9) does not hold, Nash bargaining still enforces equal payoffs within the group of A firms and within the group of conglomerate firms, but conglomerates can now extract a higher profit because their incentive constraint becomes binding. The A firms then are residual claimants to the profits in the market and each receive a share of $\frac{1}{n-m}$ of:

$$\frac{1}{1-\delta^A} + \frac{\pi^B}{1-\delta^B} - m - n\hat{\pi}. \quad (10)$$

It remains true that conglomerate mergers have no effect when after the merger $m < \underline{m}$. But beyond \underline{m} it is not the case anymore that there are no coordinated effects of conglomerate mergers:

Proposition 6 *Let \underline{m} be the smallest number m such that $\delta^B \geq \frac{n-m-1}{n-m}$.*

If $\frac{1}{1-\delta^B} < \left[2n - \frac{1}{1-\delta^A}\right] + (n-m)$ and $m \geq \underline{m}$ after the merger, then the conglomerate merger increases the price in market B . Furthermore, the marginal price increase declines in every sequential merger for which this inequality holds.

Importantly, it will not be the case that every one of the price increasing mergers is consummated. Since firms outside the merger earn higher profits than firms inside the merger, industry profit enhancing mergers will often not occur and mergers get less likely the smaller the number of residual independent firms.

5 Market Asymmetries vs. Asymmetries Between Firms

In the previous section we analyzed a simple model with fairly stark predictions that are due to assuming a homogeneous goods model without capacity constraints. In that context it is always necessary that full collusion in one market is possible in order to generate coordinated effects of mergers. In more general settings collusion at the monopoly price is typically not possible in either market. In this section we discuss the coordinated effects of mergers on price in such conglomerate markets. Instead of generating asymmetries from the discount factor we assume $\delta_A = \delta_B = \delta$, and generate asymmetries from differences in capacity distributions.

The price effects we uncover are very different depending on the type of asymmetry considered. We contrast markets that are symmetric within, but different from each other. In this case market A has greater capacity than market B , *i.e.* $K^A > K^B$, but within each market firms are symmetric $K_i^J = \frac{1}{n}$. This contrasts with markets that look symmetric at the aggregate level, *i.e.* $K^A = K^B$, but the capacity within the market is asymmetrically distributed. In the first case we show that the coordinated effect of a merger is always that the price falls in the higher priced market and increases in the lower priced market. In contrast, where there is between market symmetry all prices tend to increase as a consequence of a conglomerate merger. However, early mergers are never profitable, only catch-up mergers are.

5.1 The Ambiguous Price Effects of Conglomerate Mergers in Asymmetric Markets

Assume that $\delta^J = \delta$ for all J and $K^B > K^A$ and in each market J a firm i has capacity $\frac{K^J}{n}$. To simplify the analysis we assume that there is enough total capacity in the market so that $n - 1$ firms can serve the total market at the marginal cost price 0. However, a single firm cannot serve the whole market at the monopoly price: $nD(p^m) > K^J > \frac{1}{n-1}D(0)$. In the absence of conglomerate firms the incentive condition then becomes:

$$s_i^J n\pi(p^J) \geq (1 - \delta)p^J K^J \quad (11)$$

We assume that $\delta < 1 - \frac{D(p^m)}{K^J}$, which implies that there is no distribution of market shares that yields the monopoly price as a feasible collusive outcome. Notice that the incentive constraints are most relaxed with setting all $s_i^J = \frac{1}{n}$, so this would be the outcome of Nash bargaining over the collusive outcome and the best collusive price solves $D(p^{J*}) = (1 - \delta)K^J > D(p^m)$. We assume that $\delta > 1 - \frac{D(0)}{K^J}$, so that there exists such a price p^{J*} . Note that this implies that some collusion above the competitive price $p = 0$ is always possible. Clearly the highest sustainable collusive price falls in the total capacity in the market. This implies that $p^{A*} > p^{B*}$ in the absence of conglomerate firms.

We start with a bargaining setting in which the conglomerate firms make take it or leave it offers to all other firms. Consider market structures with m conglomerate firms. The conglomerate firms will have symmetric shares in any Nash bargaining solution, so their incentive constraint would be:

$$\frac{n}{m} [(1 - (n - m)\alpha)\pi(p^A) + (1 - (n - m)\beta)\pi(p^B)] \geq (1 - \delta)[p^A K^A + p^B K^B]$$

Let us assume that the conglomerate firms first bargain among themselves so they can jointly make a take it or leave it offer to the remaining firms in the two markets. The A and B firms will then be pushed to their incentive constraints and the conglomerate firms maximize:

$$\pi(p^A) + \pi(p^B) - \frac{(n - m)}{n}(1 - \delta) [p^A K^A + p^B K^B] \quad (12)$$

subject to their joint incentive constraint:

$$[\pi(p^A) + \pi(p^B)] \geq (1 - \delta)[p^A K^A + p^B K^B] \quad (13)$$

Note that it is not guaranteed that the incentive constraint remains binding when there are m conglomerate firms. The reason is that the gain in bargaining power from becoming a merged firm gives an incentive to decrease the market share of single market firms. By reducing the price, the incentive constraint of single market firms will be relaxed allowing a greater redistribution of market share. For this reason a conglomerate firm may have an interest to collude at generally lower prices. If such an equilibrium exists, prices are characterized by the first order conditions:

$$\pi'(\hat{p}^J) = \frac{n - m}{n}(1 - \delta)K^J \quad J = A, B \quad (14)$$

Note that p^{J*} is strictly decreasing in m for both prices and that these prices are on the locus:

$$\frac{\pi'(p^A)}{\pi'(p^B)} = \frac{K^A}{K^B} \quad (15)$$

This locus is described as the upward sloping locus in Figure 1. If m is increased and the incentive constraint for conglomerate firms remains non-binding, prices both increase along this locus. Note that by strict concavity of $\pi(p)$, $p^A > p^B$. Furthermore, as m goes to n , we must have that $\lim_{m \rightarrow n} p^A = \lim_{m \rightarrow n} p^B = p^m$, where p^A must be going to p^m at a faster rate than p^B . But this means that there exists some $\underline{m} < n$ such that for every $m \geq \underline{m}$ the incentive constraint is binding.

When the incentive constraint is binding the first order conditions for the conglomerate firms become:

$$\pi'(p^J)(1 - \lambda) - \left(\frac{n - m}{n} + \lambda \right) (1 - \delta)K^J = 0 \quad J = A, B \quad (16)$$

where $\lambda > 0$ is the multiplier on the incentive constraint. Taking the ratio of the two first order conditions yields condition (15). The optimal choice of collusive prices is therefore on the intersection between the locus (15) and the downward sloping locus of the incentive constraint in Figure 1. From this we can almost directly obtain the following result:

Proposition 7 (a) Suppose $\varepsilon(p) > \frac{1}{n}D(p)$. Then, $\underline{m} > 1$ and the first conglomerate merger reduces all prices in the market. Every merger up to the $\underline{m}^{\text{th}}$ merger increases both prices.

(b) For any market structure with $m \geq \underline{m}$ firms the collusive prices are the same. The price in market A is lower than in the absence of conglomerates, the price in market B is higher than in the absence of conglomerates, and all pairs of A-B firms make the same profits as the conglomerate firms.

Proof. Part (a): Under the assumption of the proposition the first merger does not make the incentive constraint binding. Then the first order condition for market J is given by:

$$p^J D'(p^J) + D(p^J) = \frac{n - 1}{n} (1 - \delta) K^J$$

or

$$D(p^J)[1 - \varepsilon(p^J)] = \frac{n - 1}{n} (1 - \delta) K^J$$

Suppose for contradiction that $p^J \geq p^{J*}$. Then $\frac{(1 - \delta)K^J}{D(p^J)} \geq 1$ and therefore $[1 - \varepsilon(p^J)] \geq \frac{n - 1}{n}$. This implies $\varepsilon(p^J) \leq \frac{1}{n}$, a contradiction. This means that both prices that are optimal for the conglomerate firm are lower than the prices without conglomerates. Hence, the incentive constraint is strictly slack at this point and $\underline{m} > 1$. We show in the proof to Part (b) that the price p^B must be above p^{B*} . This directly implies that a merger from a market structure $m < \underline{m}$ to a market structure $m \geq \underline{m}$, must have strictly increasing prices.

Part (b) since both the incentive constraint and (15) have to hold and neither equation depends on m , the prices charged are independent of m . Now note that

$$\begin{aligned} \frac{\pi'(p^{A*})}{\pi'(p^{B*})} &= \frac{D(p^{A*}) + p^{A*} D'(p^{A*})}{D(p^{B*}) + p^{B*} D'(p^{B*})} \\ &< \frac{D(p^{A*}) + p^{B*} D'(p^{B*})}{D(p^{B*}) + p^{B*} D'(p^{B*})} \\ &< \frac{D(p^{A*})}{D(p^{B*})} = \frac{K^A}{K^B} \end{aligned}$$

where the first inequality follows because $pD'(p)$ is decreasing in p and $p^{A^*} > p^{B^*}$. The second inequality holds because $D(p^{A^*}) < D(p^{B^*})$ and $p^{B^*}D'(p^{B^*}) < 0$, and the last equality holds by definition of p^{A^*} and p^{B^*} . It follows that at the optimal choice $\frac{\pi'(p^A)}{\pi'(p^B)} > \frac{\pi'(p^{A^*})}{\pi'(p^{B^*})}$. By concavity of $\pi(p)$ and the fact that along the incentive constraint p^A can only be increased if p^B is reduced, it follows that p^A must be lowered to achieve this. ■

Note first, that we again have the feature of the simpler model that from a given number of conglomerate firms onward. There are no coordinated effects of further mergers. In fact, when there are at least \underline{m} conglomerates then all firms make the same profits and there are no incentives for further conglomeration. In particular, there will be many cases in which the first conglomerate merger achieves all the coordinated effects from multimarket contact that can be achieved. At the same time, it will be true that the last conglomerate merger *never* generates coordinated effects.

The second feature of the model is that typically conglomerate mergers in asymmetric markets have countervailing coordinated effects on the two markets. The price in one market rises while the price in the other market falls. This effect is slightly obscured in the current treatment because we have given conglomerate firms all the bargaining power in settings in which there are conglomerate effects. More even distributions of bargaining power will make the conglomerate firms always incentive constrained, leading robustly to countervailing price movements. However, reducing the bargaining power of the conglomerate firms will also mean that there is not one critical merger that achieves all of the benefits from conglomeration for collusion.

Overall the countervailing coordinated effects of conglomerate mergers on the two markets makes it infeasible to design an antitrust policy that can evaluate properly coordinated effects in the case of asymmetric markets. There is therefore a strong argument not to intervene in such a case.

5.2 The Effects of “Complementary Asymmetries” between Firms

6 Conclusions

7 Literature

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