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DISCUSSION PAPER

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Competition and Corporate Control in Partial Ownership Acquisitions

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February 2016

Abstract

Competition authorities have a growing interest in assessing the effects of partial ownership arrangements. We show that the effects of such agreements on competition and welfare depend on the intensity of competition in the market and on the firms' governance structure. When assessing the effects of partial ownership, competition policy has to consider both the financial interest and level of control of the acquiring firm in the target firm.

JEL Classification: L11, L13, L41
Keywords: Corporate control, merger, partial acquisition

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1 Introduction

Recent partial ownership acquisitions have led competition agencies to take a closer look at the effects of such acquisitions. For example, in 2006, the British Sky Broadcasting Group (BSkyB) announced the acquisition of 17.9% of ITV. The UK Competition Commission concluded that such acquisition would lessen competition considerably, and ordered BSkyB to reduce its shareholding to below 7.5%. Comparably, in 2010, the UK competition authority was re-opening a merger investigation into the acquisition of the minority shareholding of Ryanair in Aer Lingus. It concluded that the shareholding of approximately 30% would give Ryanair a "material influence" on Aer Lingus's commercial policy. The authority considered that an effective remedy which would address their concerns would require a partial divestment of the shareholding down to 5%. These are just two of many examples where competition authorities assessed the effects of partial ownership acquisitions on competition in the markets.

Scholars have discussed the extent to which a minority ownership can cause similar negative effects on competition to those associated with mergers. Reynolds and Snapp (1986) and Bresnahan and Salop (1986) first demonstrated that financial interest among competing firms may lead to less vigorous competition. Similarly, O'Brian and Salop (2000) point out that the welfare effects of a partial acquisition may be worse than those of a merger if the acquiring firm obtains control over the pricing decision of the target firm. The key to their result is that when the acquiring firm has only a small financial interest in the acquired firm, it benefits from reduced competition when the acquired firm charges high prices.

Hence, merger regulations are typically not applied exclusively to mergers, but also to so-called "concentrations." These arise where there is a change in control of a target firm on a lasting basis, for example, because of a merger or where one or more undertakings acquire control over the whole or part of a previously independent firm. By Article 3(2) of the EU Merger Regulation, control is defined as the possibility of exercising decisive influence on an undertaking and can be acquired through purchase of securities or assets or by rights, contracts, or any other means. There is no prescribed minimum level of shareholding above which minority shareholding acquisitions will necessarily be prohibited. It is a question of law and fact in each case.[1]

[1] In the European Union, it is moreover discussed whether or not to extend the scope of the merger regulation to consider non-controlling minority acquisitions; See http://ec.europa.eu/competition/consultations/2013_merger_control/index_en.html.

Theoretically and empirically, it is moreover still not well understood when exactly firms prefer partial acquisitions to mergers. Ouimet (2013) reports merger and acquisitions data of US public firms from 1994 to 2006. The study documents that minority acquisitions, that is, acquisitions of less than 50% of the target firm, involve a transfer with a mean purchase of 12%, whereas most majority acquisitions (of more than 50%) involve an ownership stake of 90% and more. Ouimet (2013) reports that minority acquisitions are more common when, for instance, keeping target managerial incentives intact is important. Majority acquisitions are more likely in acquisitions of the same industry.

In the merger literature, it is usually assumed that it is jointly beneficial for firms to merge. Whereas in most of the economic literature, the ownership structure is assumed to be exogenous, Foros *et al.* (2011) allow the acquiring firm and the target firm to decide endogenously on their preferred ownership stake. In a spatial model similar to Salop (1979) with three firms, they find that both firms have a joint interest in a partial acquisition rather than in a merger. The main reason for their result is the favorable reaction of the independent firm. The present paper complements their analysis and shows that this conclusion is sensitive to the intensity of competition in the market. In a Salop setup with four or more firms, the present analysis shows that firms prefer a merger to a partial acquisition, because both neighbors to the entity respond differently to the acquisition. In an alternative product differentiation model, it is shown that firms prefer a merger if product differentiation is high. Otherwise, if products are close substitutes, they prefer a partial acquisition. The reason for this result is that firms balance two effects. They benefit from reduced competition under partial acquisition, otherwise, they are best off internalizing the externality of pricing under a merger.

The preferred ownership stake also depends on the internal governance structure of the firms, because the acquiring firm and the target firm individually, have different preferences as to the best strategy. For the target firm, it pays to give some control to the acquiring firm, such that it internalizes the externality of its pricing decision with respect to the target firm. From a joint profit perspective, it turns out that the acquiring firm should exert full corporate control over the target. Conclusions with respect to welfare thus both depend on the financial interest and on the level of corporate control. We conclude that a divesture of control more effectively addresses the concerns of competition policy than a divesture of financial assets.

The paper is organized as follows. Section 2 provides the base model and Section 3 allows for endogenous corporate control. Section 4 confirms the main results in a different product differentiation model. Finally, section 5 discusses and concludes.

2 Ownership acquisition

There are $n \geq 4$ firms in the market, equidistantly located on a Salop circle with a perimeter of one, and located clockwise from firm 1 to firm n. Consumers with unitary density are uniformly distributed on the circle. We assume full market coverage and that each consumer buys exactly one unit of the product. A consumer located at position x is indifferent between buying from firm i or $i+1$ if

$$R - tx^2 - p_i = R - t\left(x - \frac{1}{n}\right)^2 - p_{i+1}, \tag{1}$$

where R denotes the gross utility from consuming the ideal product, tx^2 denotes the quadratic transportation cost when not consuming the ideal product weighted with a parameter of t, and p denotes the price of the products. Each firm receives a market share of s_i with

$$s_i = \frac{1}{n} + \frac{n\left[(p_{i+1} - p_i) + (p_{i-1} - p_i)\right]}{2t} \tag{2}$$

for $i-1$ and $i+1$ the neighbors of firm i to the left and to the right.

The profit of firm i is then given as

$$\Pi_i = s_i p_i \tag{3}$$

where we ignore any fixed and marginal cost of production to focus solely on strategic effects. In the symmetric Nash equilibrium, firms set a price of $p_i^*(n) = \frac{t}{n^2}$ and earn a profit of $\Pi_i^*(n) = \frac{t}{n^3}$.

Assume that Firm 1 acquires an ownership stake of β in its neighbor to the right, Firm 2, which enables it to control the price of the target firm.[2] We motivate the assumption in Section 3 and discuss different control scenarios. We assume that the stake β is larger than some threshold $\underline{\beta}$.[3] Intuitively, for a low ownership stake, it is unlikely that the acquiring firm has corporate control over the pricing decision of the target firm. One might expect that $\underline{\beta} > 50\%$, but, in competition policy practise, it is also assumed that a thresh-

[2] We only consider acquisitions of neighboring firms because in case of non-neighboring acquisitions the result is clear. Since prices of non-neighboring firms do not affect the own demand, there is no strategic effect on pricing. Therefore, if firms simultaneously choose prices, a merger is always more profitable than a partial acquisition. This may differ is other settings, for example, where the new entity takes a price-leader position.

[3] We also assume full corporate control in order to compare our result to the results obtained by Foros *et al.* (2011).

old of below 50% may ensure corporate control. In the UK, for example, the relevant test is the ability to exercise "material influence". There is a presumption of material influence above a 25% shareholding, and the UK competition authorities will examine whether material influence arises in shareholdings above 15% and, in exceptional cases, even below 15%. In its working document "Towards more effective EU merger control", the European Commission acknowledges that "[i]n special cases, even a relatively small financial interest may yet confer material influence on the minority shareholder. This may, for example, occur if the minority shareholder has been given special corporate rights or if the minority owner may form a coalition with other shareholders, thereby obtaining more influence than suggested by the joint financial interest."[4] In the model, $\underline{\beta}$ is chosen as such, so as to leave the acquired firm with a positive demand, i.e., $s_2 > 0$. Otherwise, if Firm 1 only owns a low stake in Firm 2, it sets a high price for the target firm in order to boost demand for its product at cost of the demand for the target firm.

Assumption 1 *The ownership stake β in the acquired Firm 2 is larger than a threshold $\underline{\beta}$, where $\underline{\beta}$ solves $s_2 > 0$.*

We assume that all other firms remain independent. The timing of the game is the following. In the first stage, Firm 1 and Firm 2 jointly decide on their preferred ownership stake β. In the second stage, Firm 1 and the firms 3 to n simultaneously choose prices according to

$$\max_{p_1,p_2} \left(\Pi_1 + \beta\Pi_2\right), \tag{4}$$

$$\max_{p_j} \Pi_j \tag{5}$$

for $j = 3, ..., n$.

The first-order conditions for Firms 1 and 2 yield

$$\begin{aligned} p_1 &= \frac{t}{2n^2} + \frac{1}{4}\left((1+\beta)p_2 + p_n\right) \\ p_2 &= \frac{t}{2n^2} + \frac{1}{4}\left((1+\frac{1}{\beta})p_1 + p_3\right) \end{aligned} \tag{6}$$

and for the independent firms $j = 3, ..., n$

$$p_j = \frac{t}{2n^2} + \frac{1}{4}\left(p_{j-1} + p_{j+1}\right). \tag{7}$$

[4] Annex I to the Commission staff working document "Towards more effective EU merger control", p. 8; http://ec.europa.eu/competition/consultations/2013_merger_control/.

Given the pricing decision in the second stage, Firms 1 and 2 decide on the ownership stake by maximizing joint profits of

$$\max_{\beta} (\Pi_1 + \Pi_2) \tag{8}$$

in the first stage.[5] Technically,

$$\frac{\partial p_1}{\partial \beta}\left(\frac{\partial \Pi_1}{\partial p_1} + \frac{\partial \Pi_2}{\partial p_1}\right) + \frac{\partial p_2}{\partial \beta}\left(\frac{\partial \Pi_1}{\partial p_2} + \frac{\partial \Pi_2}{\partial p_2}\right) + \frac{\partial \Pi_2}{\partial p_3}\frac{\partial p_3}{\partial \beta} + \frac{\partial \Pi_1}{\partial p_n}\frac{\partial p_n}{\partial \beta}. \tag{9}$$

Given the first-order conditions in the pricing stage, this can be written as

$$(1-\beta)\left(\frac{\partial \Pi_2}{\partial p_1}\frac{\partial p_1}{\partial \beta} + \frac{\partial \Pi_2}{\partial p_2}\frac{\partial p_2}{\partial \beta}\right) + \frac{\partial \Pi_2}{\partial p_3}\frac{\partial p_3}{\partial \beta} + \frac{\partial \Pi_1}{\partial p_n}\frac{\partial p_n}{\partial \beta}. \tag{10}$$

Foros *et al.* (2011) show that the firms prefer partial ownership to a merger in a market comprised three firms. The key to their result is the favorable reaction of the independent Firm 3, i.e., $\frac{\partial p_3}{\partial \beta} < 0$, thus reducing overall competition in the market. We show that the opposite is true in a market with four or more firms, because two neighboring firms prefer a merger to a partial acquisition. When evaluated at $\beta = 1$, i.e., in a merger, the first part of the above condition is clearly zero. The second and third parts depend on the behavior of the neighbors to the firms in the acquisition, Firms 3 and n, which are affected by the pricing of firms in the acquisition (see equation (7)). The last two terms sum to zero if

$$p_2 \frac{\partial p_3}{\partial \beta} = -p_1 \frac{\partial p_n}{\partial \beta}. \tag{11}$$

That is, the preferred ownership stake is crucially determined by its effect on the pricing of the neighboring firms. As already formulated by O'Brian and Salop (2000), it follows that for firms in the acquisition, it holds that $\frac{\partial p_1}{\partial \beta} > 0|_{\beta=1}$ and $\frac{\partial p_2}{\partial \beta} < 0|_{\beta=1}$. Holding the reactions of the rivals constant, if the acquiring firm 1 only owns a small stake in the target firm 2 (but can control its price) it will set a high p_2 in order to boost demand for its own product. The higher the stake in Firm 2, though, the larger its financial interest in that firm, and the more Firm 1 will internalize the negative effect on Firm 2's profit. Therefore, it follows that $\frac{\partial p_2}{\partial \beta} < 0$. Firm 1 faces countervailing incentives. For a larger

[5] In line with Foros *et al.* (2011), we assume that firms choose the best offer to maximize profits of $\max_{\beta} (\Pi_1 + \Pi_2)$ rather than $\max_{\beta} (\Pi_1 + \beta\Pi_2)$. Thus, we also assume firms to choose an ownership stake to maximize joint profits, where the shareholders of Firm 2 will be compensated if the individual profit of Firm 2 decreases. We follow the assumption by Foros *et al.* (2011) to compare our result to their results.

financial interest in Firm 2, it is more inclined to increase its own price p_1 in order to increase demand for the acquired firm, i.e., $\frac{\partial p_1}{\partial \beta} > 0$ above some threshold value of β because Π_2 is increasing in p_1, otherwise, for a smaller financial interest, it holds that $\frac{\partial p_1}{\partial \beta} < 0$.

In a merger, the entities' reaction functions in equation (6) are symmetric if $p_3 = p_n$, i.e., if the two neighbors to the acquisition charge the same price. Then, the merged entity would charge $p_1 = p_2$. Given the merger, the two outside firms' best-response function are symmetric with respect to the prices of neighboring firms. Levy and Reitzes (1992) show that by recursive application of the first order conditions, firms equidistantly located from the merger charge the same price. It thus remains to show that for $\beta = 1$, it holds that $\frac{\partial p_3}{\partial \beta}|_{\beta=1} = -\frac{\partial p_n}{\partial \beta}|_{\beta=1}$.

From $\frac{\partial p_2}{\partial \beta} < 0$ we can conclude that $\frac{\partial p_3}{\partial \beta} < 0$. This follows directly from the best-response function of equation (7) with $\frac{\partial p_3}{\partial p_2} > 0$. The neighbor to the acquiring firm, Firm n, faces countervailing incentives. On the one hand, it is inclined to follow the other outside firms by $\frac{\partial p_n}{\partial \beta} < 0$, on the other hand, it is inclined to follow the acquiring firm 1 with $\frac{\partial p_n}{\partial \beta} > 0$ if β is sufficiently large. Thus, the two outside firms respond differently to partial ownership. A favorable response by the neighbor of the acquired firm, Firm 3, is opposed by an unfavorable response by the neighbor of the acquiring firm, Firm n. At $\beta = 1$, the two effects are fully offset and thus, the above considerations imply that

$$\frac{\partial p_3}{\partial \beta}|_{\beta=1} = -\frac{\partial p_n}{\partial \beta}|_{\beta=1} \tag{12}$$

and thus that (10) is locally maximized at $\beta^* = 1$.

Proposition 1 *In a Salop setup with four or more firms, two neighboring firms prefer a merger to a partial acquisition.*

A merger also globally maximizes joint profits. Absent the reaction of the outside firms, the firms in the merger cannot do better than fully internalize the externality of pricing, i.e., the first part of equation (10) is necessarily always positive for any $\beta < 1$. The second part of equation (10) is always negative for any $\beta < 1$. As previously stated, the two neighbors respond differently to a partial ownership arrangement, with Firm 3 marginally increasing its price and Firm n marginally decreasing its price when marginally decreasing the ownership stake.[6]

[6]Technically, $\frac{\partial p_3}{\partial \beta} < 0$ and $\frac{\partial p_n}{\partial \beta} > 0$ for β not too small.

Now, in a partial ownership arrangement, Firm 1 raises the price of Firm 2 above the joint profit maximizing level, because it only partially participates in Firm 2's profit, which implies that $|\frac{\partial p_2}{\partial \beta}| > |\frac{\partial p_1}{\partial \beta}|$ for any $\beta < 1$, but it benefits from overall reduced competition.[7] Hence, on aggregate, the outside firms respond favorably to a partial ownership arrangement between Firms 1 and 2. Therefore, when deciding on the preferred ownership stake, Firms 1 and 2 balance two effects: an internalizing effect and a competition reduction effect.

In a market with only three firms, the latter effect dominates, because both Firms 1 and 2 are direct neighbors to Firm 3 and thus, Firm 1 has an incentive to choose a stake of $\beta < 1$, because it can *directly* benefit from reduced competition from the outside Firm 3 via its own profits. In larger markets, the positive effect on Firm 1 is weaker, because Firm 1 only *indirectly* benefits via Firm 2's profit (see equations (6) and (7)), in which it only holds a partial ownership.

It turns out that in a market with four firms, the competition reduction effect is offset totally by the internalizing effect. This is necessarily also true in any larger market of $n > 4$ firms because the competition reduction effect is necessarily weaker the more distantly the outside firms are located from the entity in the acquisition.

We briefly depict the above findings in a market with four firms. Solving for the equilibrium prices, given (partial) ownership of Firm 1 in 2 in the first stage gives

$$p_1(\beta) = \frac{1}{2}\frac{t\beta(24+5\beta)}{\Gamma} \tag{13}$$

$$p_2(\beta) = \frac{1}{2}\frac{t(5+24\beta)}{\Gamma} \tag{14}$$

$$p_3(\beta) = \frac{1}{8}\frac{t\beta(91-4\beta)}{\Gamma} \tag{15}$$

$$p_4(\beta) = \frac{1}{8}\frac{t(91\beta-4)}{\Gamma} \tag{16}$$

with $\Gamma = 177\beta - 16(1+\beta^2) > 0$ in the relevant range of $\beta \in (0.3534, 1)$ (see Assumption 1).

Inspection of the prices shows that $p_2(\beta) > p_1(\beta) > p_3(\beta) > p_4(\beta)$ for $\beta < 1$. The firms respond differently to the ownership arrangement with $\frac{\partial p_1}{\partial \beta} < 0$ if $\beta \in (0.3534, 0.617)$ and $\frac{\partial p_1}{\partial \beta} \geq 0$ if $\beta \in [0.617, 1]$, $\frac{\partial p_2}{\partial \beta} < 0$, $\frac{\partial p_3}{\partial \beta} < 0$, and $\frac{\partial p_4}{\partial \beta} < 0$ if $\beta \in (0.3534, 0.76204)$ and

[7] Together with the best-response function of (7) this implies that $|\frac{\partial p_3}{\partial \beta}| > |\frac{\partial p_n}{\partial \beta}|$ because $\frac{\partial p_3}{\partial p_2} = \frac{\partial p_n}{\partial p_1} = \frac{1}{4}$ (see equation (7)).

$\frac{\partial p_4}{\partial \beta} \geq 0$ if $\beta \in [0.76204, 1]$. In sum, it turns out that the beneficial effect of $\frac{\partial p_3}{\partial \beta} < 0$ is too weak, so that Firms 1 and 2 prefer a merger to a partial acquisition, i.e.,

$$\frac{\partial(\Pi_1 + \Pi_2)}{\partial \beta} = \frac{t}{2} \frac{(1-\beta)(1+\beta)(26716(1+\beta^2) - 49111\beta)}{(177\beta - 16(1+\beta^2))^3}, \tag{17}$$

is positive for any $\beta < 1$ and zero for $\beta = 1$.

These results also have direct implications for competition policy which is already acknowledged by Foros *et al.* (2011). Since consumer surplus is an inverse measure of the industry profit, a partial ownership arrangement makes consumers in aggregate worse off than they would have been under a merger because of the competition reduction effect. This also implies that merger obligations to reduce shareholding in the target firm, as illustrated in the introduction, may even harm consumers, as long as the acquiring firm has corporate control over the target (see also O'Brian and Salop, 2000). We therefore conclude in the next section that a divesture of control more effectively addresses the concerns of competition policy than a divesture of financial assets.

3 Corporate Control

Partial ownership arrangements can be divided into those involving a sole financial interest and those involving corporate control. Different governance structures also have different implications for competition in the market. O'Brian and Salop (2000) argue "[i]n analyzing the competitive effects of partial ownership, it is necessary to distinguish between two aspects of partial ownership, financial interest and corporate control. These two factors have separate and distinct impacts on the competitive incentives of the acquired and acquiring firm. Financial interest affects the incentives of the acquiring firm, while corporate control affects the incentives of the acquired firm. [...] In this situation, where the owners have conflicting views on the best strategy to pursue, the question arises as to how the objective of the manager is determined. Ultimately, the answer turns on the corporate-control structure of the firm, which determines each shareholder's influence over decision-making within the firm. [...] The degree of control also is significantly affected by the governance structure of the acquired firm and the constraints imposed by corporate law in the relevant jurisdiction. Therefore, analysis of partial ownership transactions and joint ventures must pay close attention to the governance structure." (pages 568-609)

In order to capture the two distinct elements of financial interest and corporate control, we separate the financial interest of Firm 1 in Firm 2 from its influence over the strategic decision in that firm. Consider, for example, Firm 2's total stock is composed of voting stock and of non-voting stock (preferred stock), where the latter gives the holder a share of the profits but no influence in corporate matters, such as election of the board of directors. Then, the financial interest of Firm 1 in Firm 2 (β) is a function of its holding in total stock, regardless of whether it be voting or non-voting stock, whereas the level of control over the decision of the target firm is only a function of its holding in voting stock which does not necessarily correspond to its holding in total stock. The larger the shareholding in the target, the greater the degree of control over the decision making will typically be. However the relationship may not necessarily be linear (see also Brito *et al.*, 2014, page 24). For example, a founding family of a company often keeps a percentage of voting stock in order to secure its influence over strategic decisions of the external management. Then, an external shareholder may acquire a great percentage of financial shares, which, however, does not correspond to proportional voting rights. In other occasions, even a small holding of stock may give effective corporate control over the strategy of the firm if the rest of stock is dispersed over many small shareholders. Such distinction of voting and non-voting stock also matters in competition law. In anticompetitive mergers, competition authorities often impose structural and behavioral remedies on the parties. Such remedy can be an organizational separation with separate assets and management within a single undertaking ("holding structure") where the acquiring firm may not determine directly or indirectly the strategic commercial conduct of the controlled undertaking.[8]

We denote the degree of corporate control of Firm 1 over Firm 2 as γ that does not necessarily correspond to the corresponding holding in stock, because some of the assets are non-voting stock. We do not impose any further assumption of how exactly γ relates to β but analyze how the optimal choice of ownership depends on the level of corporate control. Therefore, we introduce a manager of the target firm who maximizes a weighted average of the profit streams with

$$\max_{p_2} \gamma \left(\Pi_1 + \beta \Pi_2\right) + \left(1 - \gamma\right) \Pi_2. \tag{18}$$

The weight γ reflects the influence of the acquiring firm in the pricing decision of the target firm, with higher values corresponding to a higher degree of corporate control,

[8] See, e.g., Unilever/Sara Lee (Case COMP/M.5658 Unilever/Sara Lee Body Care).

e.g., more votes in the board.[9] Thus, the manager maximizes the combined interests of the shareholders. The formulation of equation (18) thus captures a range of possible control scenarios.[10] We make some comments on the preferred ownership under the assumption that corporate control is proportional to the financial interest ($\gamma = \beta$) in the remainder.

Irrespective of the exact specification of γ we can make some general comment. Consider a market comprised three firms and consider the two polar cases of no control ($\gamma = 0$) and full control ($\gamma = 1$). If Firm 1 has a sole financial interest in Firm 2, it competes less aggressively against the target, the higher its stake in Firm 2, i.e., $\frac{\partial p_1}{\partial \beta} > 0$. Firms 2 and 3 solve the same maximization problem and from the complementarity of prices, its follows that also $\frac{\partial p_2}{\partial \beta} > 0$ and $\frac{\partial p_3}{\partial \beta} > 0$. Thus, Firm 1's and Firm 2's profits are strictly increasing in β. Otherwise, if Firm 1 has full corporate control over Firm 2, it will internalize the effect of Firm 2's pricing on its own profits and thus, $\frac{\partial p_2}{\partial \beta} < 0$ and $\frac{\partial p_3}{\partial \beta} < 0$ for β not too small.[11]

We already know from the analysis of Foros *et al.* (2011, proposition 2) that a sufficient condition for partial ownership to be preferred to a merger is that $\frac{\partial p_3}{\partial \beta} < 0|_{\beta=1}$ and a necessary condition is that $\frac{\partial p_3}{\partial \beta} < 0$ for some $\beta \leq 1$. The above consideration show that this can only be true if Firm 1's influence over decision making of Firm 2 is high and the beneficial response by Firm 3 is the weaker, the larger corporate control by Firm 2.

Lemma 1 *There is an intermediate value of $\tilde{\gamma}$ for which it follows that $\frac{\partial p_3}{\partial \beta} > 0$ if $\gamma < \tilde{\gamma}$ and $\frac{\partial p_3}{\partial \beta} < 0$ if $\gamma > \tilde{\gamma}$ with*

$$\frac{\partial p_3}{\partial \beta} < 0 \quad \text{if} \quad \gamma > \tilde{\gamma} = \frac{5}{9 - 4\beta}. \tag{19}$$

Thus, partial ownership is jointly preferred to a merger, only if Firm 1 has a high level of corporate control. Consider, for example, a linear relation between financial interest and corporate control, i.e., consider $\gamma = \beta$. Then, the necessary condition of $\frac{\partial p_3}{\partial \beta} < 0$ for some $\beta \leq 1$ cannot be true and thus, the firms prefer a merger. It turns out that Firm 1

[9] The case of $\gamma = 1$ replicates the previous analysis of Section 2.

[10] Implicitly, we assume that $\gamma(\beta) = 0|_{\beta=0}$. This assumption seems reasonable because when Firm 1 does not own any stake in Firm 2, it should also have no control over Firm 2. As argued above, we do not necessarily assume that $\gamma(\beta) = 1|_{\beta=1}$ because not all assets might come with voting rights.

[11] In a market with three firms, Firm 3 faces countervailing incentives. On the one hand, it follows that $\frac{\partial p_3}{\partial \beta} > 0$ for small β because of $\frac{\partial p_1}{\partial \beta} > 0$, but on the other hand, it follows that $\frac{\partial p_3}{\partial \beta} < 0$ because of $\frac{\partial p_2}{\partial \beta} < 0$. The latter effect dominates for a sufficiently large β.

and Firm 2 only prefer partial ownership if $\gamma > 0.913$.[12]

This has implications for competition policy when, for example, setting out obligations on the level of voting and of non-voting stake. The larger the control of Firm 2, the lower is the commitment to reduce competition. Therefore, converting voting stock into non-voting stock might serve as a remedy to the concerns of partial ownership acquisitions.

4 A non-spatial approach

In the Salop model of Section 2, it was shown that partial ownership is only profitable in a market with three firms. In markets with more firms, two neighboring firms prefer to merge, given that the acquiring firm has corporate control over the target. This is because the neighbors to Firms 1 and 2 respond differently to the ownership arrangement. In this section, we check whether our results are also valid in a non-spatial product differentiation model. Therefore, we very briefly present a model in the style of Singh and Vives (1984) and Häckner (2000) and confirm that the preference for a merger as opposed to partial ownership depends crucially on the intensity of market competition.

Assume that there is a continuum of consumers of the same type and with the utility function of a representative consumer given as

$$U = \sum_{i=1}^{n} q_i - \frac{1}{2}\left(q_i^2 + 2\alpha \sum_{i=1}^{n}\sum_{j>i}^{n} q_i q_j\right) + I \tag{20}$$

with $0 < \alpha < 1$ representing the degree of product differentiation. The goods are perfect substitutes if $\alpha = 1$, and independent if $\alpha = 0$.[13] The consumer maximizes the utility function subject to the budget constraint $\sum_i p_i q_i \leq I$, where I denotes the income and q_i the quantity purchased from Firm i. The first-order condition determining the optimal consumption of good k is then

$$\frac{\partial U}{\partial q_k} = 1 - q_k - \alpha \sum_{j \neq k} q_j - p_k = 0. \tag{21}$$

[12] For details see Appendix. Joint profit of $\Pi_1^* + \Pi_2^*$ are maximized for $\beta < 1$ only if $\gamma > 0.913$, otherwise, joint profit is maximized at $\beta = 1$.

[13] If $\alpha < 0$, the goods are strategic substitutes. It is then well known from the literature that neither a merger nor partial ownership may be profitable, see, e.g., Salant *et al.* (1983) and Kamien and Zhang (1990).

yielding a demand function for Firm k as

$$q_k(p_k, p_{-k}) = \frac{(1-p_k)(\alpha(n-2)+1) + \alpha\sum_{j\neq k}((n-1)-p_j)}{(1-\alpha)(\alpha(n-1)+1)}. \tag{22}$$

Firms compete on price and maximize profits according to $\max_{p_i} p_i q_i$, which implies a best-response function for Firm k of

$$p_k(p_{-k}) = \frac{1}{2} - \frac{\alpha\sum_{j\neq k}(n-1-p_j)}{2(\alpha(n-2)+1)}. \tag{23}$$

Again assume that Firm 1 acquires a stake of β in Firm 2 and exerts corporate control over Firm 2's pricing. The optimal level of β is then analogous to equation (10) given by

$$(1-\beta)\left(\frac{\partial\Pi_2}{\partial p_1}\frac{\partial p_1}{\partial\beta} + \frac{\partial\Pi_2}{\partial p_2}\frac{\partial p_2}{\partial\beta}\right) + (n-2)\frac{\partial p_j}{\partial\beta}\left(\frac{\partial\Pi_1}{\partial p_j} + \frac{\partial\Pi_2}{\partial p_j}\right), \tag{24}$$

for $j \neq 1, 2$. In contrast to the Salop model, each firm has more than just two rivals because firms' profits are affected not only by the direct neighbors' prices, but by all prices in the market (see equation (22)).

According to condition (24), a sufficient condition for partial ownership to be preferred to a merger is $\frac{\partial p_k}{\partial\beta}|_{\beta=1} < 0$ for $k \neq 1, 2$. We first state that it always holds that $\frac{\partial p_k}{\partial\beta} = 0|_{\beta=1}$. In the non-spatial setup, for any Firm k, the products of Firms 1 and 2 are differentiated equally at a rate of α. Therefore, a firm's best-response function is symmetric with respect to prices of Firms 1 and 2. We further know that, when evaluated at $\beta = 1$, it follows that

$$\frac{\partial p_1}{\partial\beta}|_{\beta=1} = -\frac{\partial p_2}{\partial\beta}|_{\beta=1}. \tag{25}$$

Hence, it always holds that $\frac{\partial p_k}{\partial\beta}|_{\beta=1} = 0$ for any $n \geq 3$, that is, the sufficient condition for partial ownership to be preferred to a merger cannot be fulfilled. A necessary condition for such arrangement to be preferred is that $\frac{\partial p_k}{\partial\beta}|_{\beta=1} < 0$ for some $\beta \leq 1$. This is always true. Firm 1 raises the price of Firm 2 above the profit maximizing level, benefits from reduced competition, but only partially carries the cost of the reduced profits by Firm 2. Therefore, $|-\frac{\partial p_2}{\partial\beta}| > |\frac{\partial p_1}{\partial\beta}|$, which, together with the best-response functions of equation (23), implies that $\frac{\partial p_k}{\partial\beta} < 0$ for any $k \neq 1, 2$. Whether this effect is strong enough, depends on the degree of product differentiation (see equation (23)) which is illustrated in table 1.

If product differentiation is high (i.e., if α is low), firms have market power in their

α	β^*		
	$n = 3$	$n = 4$	$n = 6$
0.50	1	1	0.668
0.75	1	0.665	0.521
0.85	0.813	0.593	0.492
0.90	0.722	0.567	0.481
0.95	0.663	0.544	0.470

Table 1: Optimal ownership stake depending on product differentiation.

segment and the intensity of competition is low. Otherwise, if product differentiation is low, competition is intense and converges to Bertrand competition if $\alpha = 1$. Therefore, the competition reduction effect dominates for larger values of α and thus, Firms 1 and 2 prefer a partial acquisition to a merger, otherwise, for lower values of α, the reduction in competition is less intense, so that firms prefer a merger to partial acquisition. Table 1 contains the optimal level of β for different levels of product differentiation α. For low values of α, the firms always prefer to merge, for larger values, they prefer partial ownership. Thus, we can confirm that the preferred ownership stake depends crucially on the intensity of market competition.

5 Conclusion

Competition authorities have an increased interest in assessing the competitive effects of partial ownership acquisitions. Our paper contributes to the discussion. The effects of mergers are well understood, merger control is a standard task for any competition authority. What is less understood is the competitive effects of partial ownership acquisitions, which is the starting point of our analysis. At first sight, one might suspect that anticompetitive effects of partial ownership acquisitions are less severe than the effects of full acquisitions (i.e., mergers). We show that such conclusion generally depends on the degree of competition in the market and on the governance structure of the entity.

In the merger literature, it is usually assumed that it is jointly profitable for firms to merge. This assumption has recently been challenged by Foros *et al.* (2011), who show that an acquiring firm and a target firm may jointly benefit from a partial ownership arrangement rather than from a merger. In this situation, the acquiring firm can commit to increasing the price of the target firm above the price which would maximize joint profits, thereby, reducing competition in the market even more than under a merger. When

deciding on a merger or partial ownership, the firms face two countervailing incentives. The externality of pricing is fully internalized in a merger, otherwise, competition may be reduced more under partial ownership.

The present paper shows that which of the two effects ultimately dominates depends on the intensity of competition. In a model of price competition following Salop (1979), a merger is preferred in a market with four or more firms. In a non-spatial setup, it is evident that firms prefer a merger if product differentiation is high, otherwise, if competition is more intense, they prefer partial ownership. The preference for partial ownership also depends on the firms' governance structure, because the acquiring firm and the target firm have conflicting views on the best strategy. The total effect on joint profits, and thus also on consumer welfare, depends sensitively on both the financial stake and on the level of corporate control of the acquiring firm in the target.

In cases where there is a change in control over an undertaking on a lasting basis such partial acquisitions may be subject to the EU Merger Regulation. A frequent remedy in merger cases is to mandate some divesture of assets, often to a competitor to the new entity, in order to restore competition in the market. Our paper can guide competition policy when setting out such obligations. The model offers two key insights into such remedy.

First, it shows that a sole divesture of financial assets (without a divesture of control) may make consumers in aggregate worse off than they would have been under a merger. The distortion in prices under partial ownership may dampen competition to a larger extent than under a merger. This is especially true if competition in the market is weak and the acquiring firm has market power to distort prices. Otherwise, if competition is intense, a divesture of assets may lead to the anticipated beneficial effects for consumers because prices will be less distorted. Thus, as in merger cases, a crucial task for a competition authority is to assess to degree of competition in the market when deciding whether or not to clear the acquisition or imposing remedies on the firms.

Second, we can conclude that a divesture of control more effectively addresses the concerns of competition policy. There, the acquiring firm has fewer ability to distort the price of the target firm to the detriment of consumers because it cannot internalize consumer substitution following increased prices. The question of whether such non-controlling minority acquisitions should be subject to merger control is currently debated in Europe. There is certainly much scope for future work on the anticompetitive effects of partial ownership acquisitions that do or do not confer control.

A Appendix

A.1 Corporate control

In stage 2, the firms maximize prices according to

$$\max_{p_1} \Pi_1 + \beta\Pi_2 \tag{A1}$$

$$\max_{p_2} \gamma\left(\Pi_1 + \beta\Pi_2\right) + (1-\gamma)\,\Pi_2 \tag{A2}$$

$$\max_{p_3} \Pi_3 \tag{A3}$$

yielding equilibrium prices of

$$p_1^* = \frac{10t(\beta\gamma(4+\gamma)+\beta+5(1-\gamma))}{\Omega} \tag{A4}$$

$$p_2^* = \frac{10t(5(1+\beta\gamma)-4\gamma)}{\Omega} \tag{A5}$$

$$p_3^* = \frac{2t(25(1-\gamma)+24\beta\gamma)}{\Omega} \tag{A6}$$

with $\Omega = 50 - 55\gamma - 5\beta + \beta\gamma(51 - 5\beta)$.

Lemma 1 follows from the observation that $\frac{\partial p_3}{\partial \beta} < 0$ only if $\gamma > \tilde{\gamma} = \frac{5}{9-4\beta}$.

Inserting equilibrium prices, in stage 1 the firms decide on the optimal ownership stake in order to maximize joint profits of

$$\Pi_1^*+\Pi_2^* = \frac{50(\gamma^2(102-3\beta^4+98\beta^2-201\beta)-\gamma(205+6\beta^3+5\beta^2-200\beta)-3\beta^2-5\beta+100)}{27(\gamma(5\beta^2-51\beta+55)+5\beta-50)^2}. \tag{A7}$$

It turns out that joint profits are maximized under partial ownership only if $\gamma > 0.913$, i.e., $\frac{\partial(\Pi_1^*+\Pi_2^*)}{\partial\beta} = 0$ for $\beta^* < 1$ only if $\gamma > 0.913$, otherwise, the firms prefer a merger.

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