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Merge or Concentrate? Some Insights for Antitrust Policy

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Merge or concentrate? Some insights for antitrust policy

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Abstract

Why do some firm acquisitions give rise to a single brand name, and why, following others, all brands subsist? What are the welfare consequences of each option upon joining firms, rivals, and consumers from each of these groups? How do the choice of the strategic variable (price or quantity) and the demand cross effects influence the results? This paper addresses these issues.

Keywords: Acquisitions; Brand differentiation; Welfare

JEL classification: D60; L12; L41

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1 Introduction

Firm acquisition has become an increasingly important phenomenon in many industrial countries in the last one or two decades. Following acquisition two different outcomes may be observed: either the acquirer keeps both firms operating and both brands, or merges them and only one brand appears thereafter before consumers. Most bank acquisitions are examples of the former strategy, which I call a concentration movement; Pinkse and Slade (2002) refer to the UK brewing industry, in which acquisitions have reduced the number of firms from six to four, although keeping the number of brands fairly constant. In turn, the suppression of a brand (e.g. the recent decision of DaimlerChrysler to end the Plymouth brand) is part of the latter strategy. Motivation and welfare effects are not invariant, and hence an analysis on these issues is relevant. This is exactly the aim of this paper: to find out causes and welfare consequences of each option, and to compare them.

I consider an industry with product differentiation, where brand names play a role in the level of demand. I perform the analysis both for price and for quantity as strategic variables. Following a concentration movement both brands subsist and the new owner maximizes a profit function corresponding to the sum of the profits before acquisition. If the firms merge, one of the brands is suppressed - the new common name has a value somewhere in between the two pre-merger values; optimization is performed for the sum of profits with this new brand equity. Each option has different consequences upon rivals' behavior and payoffs, and upon the surplus of consumers, which is also studied.

This paper is related with the literature on mergers with product differentiation, with the literature on brand names (e.g. Wiggins and Raboy, 1996; Tadelis, 1999), and with the literature on the welfare effects of variety (e.g. Spence, 1976; Dixit and Stiglitz, 1977; Mankiw and Whinston, 1986; Klemperer and Padilla, 1997). Product differentiation reverses the private unprofitability result of horizontal agreements under Cournot competition (Salant et al, 1983; Granero, 1997) and thus makes it more attractive to join. Under price competition horizontal agreements are always profitable in a differentiated product market (Deneckere and Davidson, 1985). In this paper brand names work as an instrument of differentiation.[1]

The paper is organized as follows. The model is presented in section 2. Section 3 presents the results for two competing firms. Section 4 introduces post-acquisition rivalry and distinguishes between price and quantity competition. Section 5 concludes.

[1] The value of a brand to a firm, called brand equity, includes customer loyalty toward the brand, the brand's name awareness, perceived quality, and brand associations.

2 Model

Following Dixit (1979) and Singh and Vives (1984), I consider the following inverse demand structure:

$$p_i = \alpha_i - \beta q_i - \gamma \sum_{j \neq i} q_j \qquad i = 1, ...n, \text{ with } \alpha_i,\ \beta,\ \gamma > 0 \tag{1}$$

In this general formulation there are n brands, each produced by a different firm. They are substitutes ($\gamma > 0$). Different intercepts capture different brand values: the higher the value of the brand, the more consumers are willing to pay (because they obtain more utility), so the higher α_i.[2] This is an absolute demand advantage for firm i. Goods are thus differentiated both through their technical characteristics ($\gamma \neq \beta$) and through their names ($\alpha_1 \neq \alpha_2$).[3]

To begin with, I consider the two-brand case. Since this case, although simple to deal with, does not capture rivalry nor differentiation after acquisition (because the industry becomes a "monopoly"), I then generalize by admitting a third party, that stays out of the acquisition process. Still, the two-brand case does not allow a separate analysis of the effects upon consumers buying from the joining firms and upon those buying from outside firms (which are already captured in a three-brand environment), neither to distinguish between price and quantity competition after acquisition. However, it provides conclusions that are robust to more players.

3 Two competing brands

Consider an industry with two firms, each producing its own brand, with inverse demands given by

$$\begin{aligned} p_1 &= \alpha_1 - \beta q_1 - \gamma q_2 \\ p_2 &= \alpha_2 - \beta q_2 - \gamma q_1 \quad \text{with } \alpha_1,\, \alpha_2,\, \beta,\ \gamma > 0,\, \beta^2 > \gamma^2 \end{aligned} \tag{2}$$

When $\alpha_1 = \alpha_2$ and $\beta = \gamma$ these goods are perfect substitutes. The assumption of $\beta^2 > \gamma^2$, equivalent to $\beta > \gamma$ given that $\gamma > 0$, implies that the own effect of quantity on price is larger than the cross effect. Without loss of generality, assume that $\alpha_1 > \alpha_2$ (brand

[2] Note that the exogenous demand parameter may include more than just brand value (willingness to pay connected with other factors), but for simplicity we normalize these factors to zero.

[3] As Dixit (1979) states after proving the different impacts of the two types of differentiation, "industrial organization economists should keep these two aspects distinct".

1's value is higher than 2's).[4]

System (1) gives rise to the following direct demand functions:

$$q_i = \frac{\alpha_i\beta - \alpha_j\gamma}{\beta^2-\gamma^2} - \frac{\beta}{\beta^2-\gamma^2}p_i + \frac{\gamma}{\beta^2-\gamma^2}p_j \qquad i=1,2 \tag{3}$$

If firms compete in prices, then, assuming zero production costs,[5] they choose p_i ($i = 1,2$) so as to maximize

$$\pi_i = \left(\frac{\alpha_i\beta - \alpha_j\gamma}{\beta^2-\gamma^2} - \frac{\beta}{\beta^2-\gamma^2}p_i + \frac{\gamma}{\beta^2-\gamma^2}p_j\right)p_i \tag{4}$$

Notice that p_1 and p_2 are strategic complements (Bulow et al, 1985) if and only if $\gamma > 0$. Actually, when p_1 increases demand directed to firm 2 rises if 1 and 2 are substitutes, so p_2 increases as well.

Before acquisition, production is given by

$$q_i^* = \frac{\beta((\alpha_i(2\beta^2-\gamma^2) - \alpha_j\beta\gamma)}{(\beta^2-\gamma^2)(4\beta^2-\gamma^2)} \tag{4.1}$$

and prices are

$$p_i^* = \frac{\alpha_i(2\beta^2-\gamma^2) - \alpha_j\beta\gamma}{4\beta^2-\gamma^2} \tag{4.2}$$

Profit is equal to

$$\pi_i^* = \frac{\beta(\alpha_i(2\beta^2-\gamma^2) - \alpha_j\beta\gamma)^2}{(\beta^2-\gamma^2)(4\beta^2-\gamma^2)^2} \tag{4.3}$$

and surplus of consumers buying to i

$$CS_i^* = \frac{\beta^3(\alpha_i(2\beta^2-\gamma^2) - \alpha_j\beta\gamma)^2}{2(\beta^2-\gamma^2)^2(4\beta^2-\gamma^2)^2} \tag{4.4}$$

Total producer surplus is

$$PS^* = \pi_1^* + \pi_2^* = \frac{\beta((\alpha_1^2+\alpha_2^2)(4\beta^4-3\beta^2\gamma^2+\gamma^4) - 4\alpha_1\alpha_2\beta\gamma(2\beta^2-\gamma^2))}{(\beta^2-\gamma^2)(4\beta^2-\gamma^2)^2} \tag{4.5}$$

and total consumer surplus

$$CS^* = \frac{\beta^3((\alpha_1^2+\alpha_2^2)(4\beta^4-3\beta^2\gamma^2+\gamma^4) - 4\alpha_1\alpha_2\beta\gamma(2\beta^2-\gamma^2))}{2(\beta^2-\gamma^2)^2(4\beta^2-\gamma^2)^2} \tag{4.6}$$

So, social welfare can be written as

$$SW^* = PS^* + CS^* = \frac{\beta(3\beta^2-2\gamma^2)((\alpha_1^2+\alpha_2^2)(4\beta^4-3\beta^2\gamma^2+\gamma^4) - 4\alpha_1\alpha_2\beta\gamma(2\beta^2-\gamma^2))}{2(\beta^2-\gamma^2)^2(4\beta^2-\gamma^2)^2} \tag{4.7}$$

[4] This linear structure obtains from a quadratic and strictly concave utility function $U(q_1, q_2) = const + \alpha_1 q_1 + \alpha_2 q_2 - \frac{\beta(q_1^2+q_2^2)+2\gamma q_1 q_2}{2}$. Strict concavity requires $\beta > 0$ and $\beta^2 > \gamma^2$.

[5] Production costs are irrelevant in this analysis, as they do no change with the type of operation. The only situation in which they might appear, as fixed cost, is when one of the brands is suppressed and the firm needs to signal consumers, through a marketing campaign, that the surviving one has absorbed it, thus directing potential clients.

If firms compete in quantities, and again assuming zero production costs, q_i is chosen to maximize

$$\pi_i = (\alpha_i - \beta q_i - \gamma q_j) q_i \tag{5}$$

Quantities are strategic substitutes for $\gamma > 0$.

The Nash-Cournot equilibrium before acquisition is

$$q_i^* = \frac{2\alpha_i \beta - \alpha_j \gamma}{4\beta^2 - \gamma^2} \tag{5.1}$$

$$p_i^* = \frac{\beta(2\alpha_i \beta - \alpha_j \gamma)}{4\beta^2 - \gamma^2} \tag{5.2}$$

$$\pi_i^* = \frac{\beta(2\alpha_i \beta - \alpha_j \gamma)^2}{(4\beta^2 - \gamma^2)^2} \tag{5.3}$$

$$PS^* = \pi_1^* + \pi_2^* = \frac{\beta((\alpha_1^2 + \alpha_2^2)(4\beta^2 + \gamma^2) - 8\alpha_1\alpha_2\beta\gamma)}{(4\beta^2 - \gamma^2)^2} \tag{5.4}$$

$$CS_i^* = \frac{\beta(2\alpha_i \beta - \alpha_j \gamma)^2}{2(4\beta^2 - \gamma^2)^2} \tag{5.5}$$

$$CS^* = \frac{\beta((\alpha_1^2 + \alpha_2^2)(4\beta^2 + \gamma^2) - 8\alpha_1\alpha_2\beta\gamma)}{2(4\beta^2 - \gamma^2)^2} = \frac{1}{2} PS^* \tag{5.6}$$

$$SW^* = PS^* + CS^* = \frac{3\beta((\alpha_1^2 + \alpha_2^2)(4\beta^2 + \gamma^2) - 8\alpha_1\alpha_2\beta\gamma)}{2(4\beta^2 - \gamma^2)^2} \tag{5.7}$$

Notice that the more asymmetric α_1 and α_2 are (higher α_1 and lower α_2) the less clear it is that a rise in γ implies a decline in profits, as happens when product differentiation derives only from different own and cross-price effects ($\alpha_1 = \alpha_2$). This observation reinforces the importance of considering both types of differentiation.

3.1 Concentration

Results after acquisition are invariant to the strategic variable (because the industry becomes monopolized). If these firms concentrate, without merging, the new entity chooses p_1 and p_2 in order to maximize

$$\begin{aligned} \pi_1 + \pi_2 \quad = \quad & \left(\frac{\alpha_1 \beta - \alpha_2 \gamma}{\beta^2 - \gamma^2} - \frac{\beta}{\beta^2 - \gamma^2} p_1 + \frac{\gamma}{\beta^2 - \gamma^2} p_2 \right) p_1 + \\ & \left(\frac{\alpha_2 \beta - \alpha_1 \gamma}{\beta^2 - \gamma^2} - \frac{\beta}{\beta^2 - \gamma^2} p_2 + \frac{\gamma}{\beta^2 - \gamma^2} p_1 \right) p_2 \end{aligned} \tag{6.A}$$

or q_1 and q_2 to maximize

$$\pi_1 + \pi_2 = (\alpha_1 - \beta q_1 - \gamma q_2) q_1 + (\alpha_2 - \beta q_2 - \gamma q_1) q_2 \tag{6.B}$$

In any case the outcome is (where ac means "after concentration")

$$q^*_{iac} = \frac{\alpha_i\beta - \alpha_j\gamma}{2(\beta^2 - \gamma^2)} \tag{6.1}$$

$$p^*_{iac} = \frac{\alpha_i}{2} \tag{6.2}$$

$$\pi^*_{iac} = \frac{\alpha_i(\alpha_i\beta - \alpha_j\gamma)}{4(\beta^2 - \gamma^2)} \tag{6.3}$$

$$PS^*_{ac} = \pi^*_{1ac} + \pi^*_{2ac} = \frac{(\alpha_1^2 + \alpha_2^2)\beta - 2\alpha_1\alpha_2\gamma}{4(\beta^2 - \gamma^2)} \tag{6.4}$$

$$CS^*_{iac} = \frac{\beta(\alpha_i\beta - \alpha_j\gamma)^2}{8(\beta^2 - \gamma^2)^2} \tag{6.5}$$

$$CS^*_{ac} = \frac{\beta((\alpha_1^2 + \alpha_2^2)(\beta^2 + \gamma^2) - 4\alpha_1\alpha_2\beta\gamma)}{8(\beta^2 - \gamma^2)^2} \tag{6.6}$$

$$SW^*_{ac} = \frac{(\alpha_1^2 + \alpha_2^2)\beta(3\beta^2 - \gamma^2) - 4\alpha_1\alpha_2\gamma(2\beta^2 - \gamma^2)}{8(\beta^2 - \gamma^2)^2} \tag{6.7}$$

3.2 Merging

If firms merge there will be a single brand, with value $\alpha \in [\alpha_2, \alpha_1]$. I assume that the new brand's value may not be lower than the lowest pre-acquisition, nor rise above the highest pre-acquisition. If $\alpha = \frac{\alpha_1+\alpha_2}{2}$ (a particular case), consumers value the new brand exactly as the average of the pre-acquisition values.

There are still two demand curves, both with the same intercept: $p_i = \alpha - \beta q_i - \gamma q_j$ $(i = 1, 2)$. The new entity maximizes (in price or quantity) the sum of profits in markets 1 and 2 and obtains (where am means "after merger")

$$q^*_{iam} = \frac{\alpha}{2(\beta + \gamma)} \tag{7.1}$$

$$p^*_{iam} = \frac{\alpha}{2} \tag{7.2}$$

$$\pi^*_{iam} = \frac{\alpha^2}{4(\beta + \gamma)} \tag{7.3}$$

$$PS^*_{am} = \frac{\alpha^2}{2(\beta + \gamma)} \tag{7.4}$$

$$CS^*_{iam} = \frac{\alpha^2\beta}{8(\beta + \gamma)^2} \tag{7.5}$$

$$CS^*_{am} = \frac{\alpha^2\beta}{4(\beta + \gamma)^2} \tag{7.6}$$

$$SW^*_{am} = \frac{\alpha^2(3\beta + 2\gamma)}{4(\beta + \gamma)^2} \tag{7.7}$$

3.3 Merge or concentrate?

Based on previous literature results, I omit the discussion on the incentives for firms producing imperfectly substitute goods to join, either with price or quantity as actions, and go directly to the analysis of the preferred type of agreement.

In order to analyze firms' motivation, that is, their preference for concentration or merger, let us compare profits in both situations.

$$PS_{ac} - PS_{am} = \frac{(\alpha_1^2 + \alpha_2^2)\beta - 2\alpha_1\alpha_2\gamma - 2\alpha^2(\beta - \gamma)}{4(\beta^2 - \gamma^2)} \tag{8.1}$$

In turn, in order to analyze consumers' preferences for one option or the other, let us look at

$$CS_{ac} - CS_{am} = \frac{\beta((\alpha_1^2 + \alpha_2^2)(\beta^2 + \gamma^2) - 4\alpha_1\alpha_2\beta\gamma - 2\alpha^2(\beta - \gamma)^2)}{8(\beta - \gamma)^2(\beta + \gamma)^2} \tag{8.2}$$

Finally, in order to consider the regulatory authority's problem we look at $SW_{ac} - SW_{am}$.

Note that the expressions above are concave and always decreasing in α, and that for $\alpha = \frac{\alpha_1+\alpha_2}{2}$ (that is, when the new brand value equals the average of the pre-acquisition brand values) firms and consumers both prefer concentration to merger, contradicting the intuition according to which one would expect them to be indifferent. Indifference values are actually higher than $\frac{\alpha_1+\alpha_2}{2}$ and are not the same for consumers and firms. Indeed, $PS_{ac} - PS_{am} = \frac{(\alpha_1-\alpha_2)^2}{8(\beta-\gamma)} > 0$ and $CS_{ac} - CS_{am} = \frac{\beta(\alpha_1-\alpha_2)^2}{16(\beta-\gamma)^2} > 0$ for $\alpha = \frac{\alpha_1+\alpha_2}{2}$. The first roots are lower than α_2. Hence, for more than half the allowed range of α (the lower half) firms and consumers have the same preferences as to the type of agreement, and therefore the regulatory authority has no need to care about the firms' decision when there are no rivals. Since the new brand would have a "low" value, firms prefer to keep both brands, and that is also in the consumers' interest.

Consider now the transformation $\alpha = \frac{\alpha_1+\alpha_2}{2} + \Delta$, with $\frac{\alpha_2-\alpha_1}{2} \leq \Delta \leq \frac{\alpha_1-\alpha_2}{2}$. $\Delta > 0$ ($\Delta < 0$) means that reputation is improved (harmed) with merger as compared with the average reputation before acquisition. Then

$$PS_{ac} - PS_{am} = \frac{(\alpha_1 - \alpha_2)^2(\beta + \gamma) - 4(\beta - \gamma)((\alpha_1 + \alpha_2)\Delta + \Delta^2)}{8(\beta^2 - \gamma^2)} \tag{9.1}$$

$$CS_{ac} - CS_{am} = \frac{\beta((\alpha_1 - \alpha_2)^2(\beta + \gamma)^2 - 4(\beta - \gamma)^2((\alpha_1 + \alpha_2)\Delta + \Delta^2))}{16(\beta - \gamma)^2(\beta + \gamma)^2} \tag{9.2}$$

$$SW_{ac} - SW_{am} = \frac{(\alpha_1 - \alpha_2)^2(3\beta - 2\gamma)(\beta + \gamma)^2 - 4(3\beta + 2\gamma)(\beta - \gamma)^2((\alpha_1 + \alpha_2)^2\Delta + \Delta^2)}{16(\beta - \gamma)^2(\beta + \gamma)^2} \tag{9.3}$$

These expressions are concave in Δ. We restrict attention to $\Delta > 0$ (since it has been shown that $PS_{ac} > PS_{am}$ and $CS_{ac} > CS_{am}$ for all $\Delta \leq 0$). Depending on the values of the parameters, we may have one of the situations depicted in the figures below.

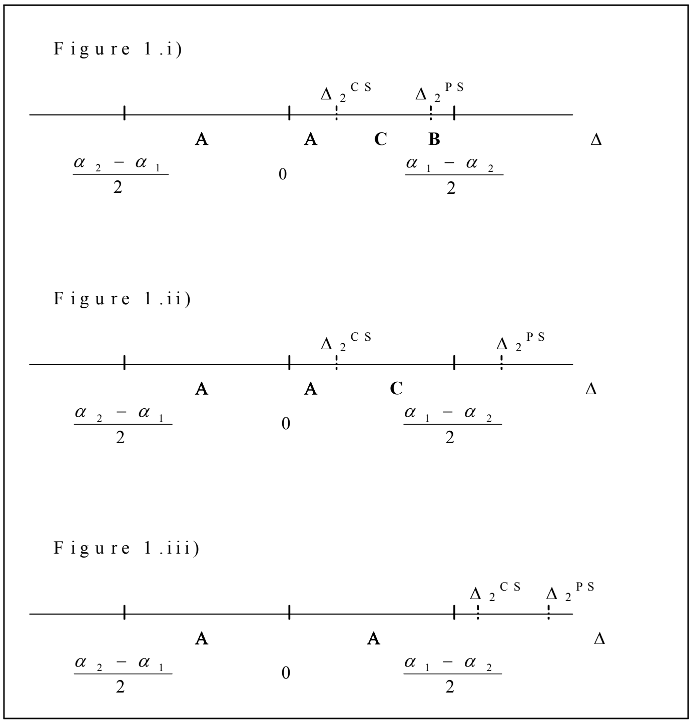

Figure 1: $\beta + \gamma > \frac{\alpha_1}{\alpha_2} + \frac{\alpha_2}{\alpha_1}$

No relationship can be established between $\frac{\alpha_1 - \alpha_2}{2}$, the upper bound of Δ, and the highest roots of $PS_{ac} - PS_{am}$ (Δ_2^{PS}) and $CS_{ac} - CS_{am}$ (Δ_2^{CS}). Hence, there are three possibilities for every case ($\Delta_2^{PS} > \Delta_2^{CS}$ or $\Delta_2^{PS} < \Delta_2^{CS}$), depending on the values of the parameters.[6] Note that $\Delta_2^{PS} > \Delta_2^{CS}$ if and only if $\beta + \gamma > \frac{\alpha_1}{\alpha_2} + \frac{\alpha_2}{\alpha_1}$.

The meaning of the depicted areas is the following:

Area A: firms and consumers both prefer concentration

Area B: firms and consumers both prefer merger

Area C: firms prefer concentration, consumers prefer merger

Area D: firms prefer merger, consumers prefer concentration

[6] Actually $\Delta_2^{PS} > \frac{\alpha_1 - \alpha_2}{2} \iff \gamma > \frac{(\alpha_1 + \alpha_2)\beta}{2\alpha_1}$ and $\Delta_2^{CS} > \frac{\alpha_1 - \alpha_2}{2} \iff \gamma > \frac{(\alpha_1 + \alpha_2)(\beta^2 + \gamma^2)}{4\alpha_1 \beta}$, which may be true or not.

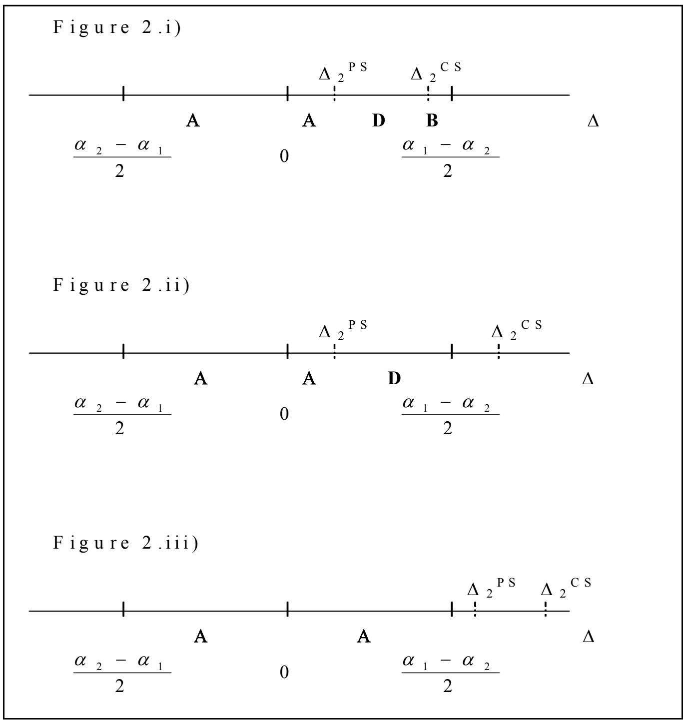

Figure 2: $\beta + \gamma < \frac{\alpha_1}{\alpha_2} + \frac{\alpha_2}{\alpha_1}$

Therefore, there may actually exist some divergence between firms' and consumers' interests, which gives room for policy intervention. This corresponds to areas C and D (figures 1i and ii and 2i and ii). If it exists, this divergence area may be larger (figures 1ii and 2ii) or smaller (figures 1i and 2i).

The more close brands 1 and 2 are in terms of reputation, and the more important are direct and cross price effects (higher β and γ), the more likely that the divergence will be of type C, that is, with firms preferring concentration, but consumers being better off if they would merge instead. This is intuitive, given that brands are substitutes. On the contrary, the more asymmetric are brands' reputations (higher α_1 and lower α_2), and the less important are price effects (lower β and γ), the more likely that the divergence is of type D, with firms choosing to merge, but consumers preferring them to maintain both brands.[7] [8]

[7] These results are in general consistent with the acquisitions observed in the Portuguese banking system. Note that when γ is high firms 1 and 2 are operating in the same market (for example, retail), since their products are close substitutes to each other. On the contrary, when γ is low (in the limit, zero) markets 1 and 2 are independent (for example, retail and investment).

[8] It can also be seen that as asymmetry ($\alpha_1 - \alpha_2$) increases the interval in which firms prefer to merge enlarges, but its relative size to the whole allowed range of Δ declines.

So, as α rises firms are the first to prefer merger when brand values differ much, and consumers are the first when they are similar. Only for very high α is it possible that both groups prefer merger.[9]

Proposition 1 *The type of agreement -concentration or merger- is not irrelevant in terms of social welfare. There is room for policy intervention when joining firms' interests and consumers' interests differ, which may happen for some non-empty range of α, the value of the new common brand. When joining brands have quite different reputations, there may exist a non-empty interval for α where firms choose to merge but consumers would prefer both brands to be maintained. The reverse is true when pre-acquisition brands are similar in terms of value. Price effects matter, too: when they are small (large) there may exit a non-empty range of α where consumers prefer firms to concentrate (merge), but these are more likely to choose merger (concentration).*

Proof. Derives directly from $\Delta_2^{PS} = \frac{-(\alpha_1+\alpha_2)(\beta-\gamma)+\sqrt{2}\sqrt{\beta-\gamma}\sqrt{(\alpha_1^2+\alpha_2^2)\beta-2\alpha_1\alpha_2\gamma}}{2(\beta-\gamma)}$ and $\Delta_2^{CS} = \frac{-(\alpha_1+\alpha_2)(\beta-\gamma)+\sqrt{2}\sqrt{(\alpha_1^2+\alpha_2^2)(\beta^2+\gamma^2)-4\alpha_1\alpha_2\beta\gamma}}{2(\beta-\gamma)}$, where Δ_2^{PS}, for instance, denotes the second root of $PS_{ac} - PS_{am}$.
$\Delta_2^{PS} - \Delta_2^{CS} > 0 \Longleftrightarrow \beta + \gamma - \frac{\alpha_1^2+\alpha_2^2}{\alpha_1\alpha_2} > 0$. The expression $\beta + \gamma - \frac{\alpha_1^2+\alpha_2^2}{\alpha_1\alpha_2}$ rises with β, γ and α_2, and declines with α_1. ■

Looking at producer plus consumer surpluses (the problem of the authority), two situations may occur, depending on the parameter values: either concentration is better than merger for all Δ, or only up to Δ_2^{SW}, the higher root of $SW_{ac} - SW_{am}$. It is thus clear that the two types of acquisition are not indifferent as to their social effects.

Total quantity placed in the market with merger is higher than with concentration if and only if the new brand value rises above the average of α_1 and α_2.[10] The firm with the highest brand value, α_1, is more likely to prefer concentration than the firm with α_2. Consumers of firm 1 are also more likely to prefer concentration than consumers of 2.

4 Rivalry after acquisition

The above analysis is enriched, and still feasible, if the initial number of firms is raised to three. Then there is still rivalry after acquisition, and we can isolate the impact on outside

[9] If one admits that merging requires a strictly positive advertising investment, in order to direct consumers of the old brand to the surviving one, which concentration does not require, then preference for merger becomes less likely.

[10] Note that, although I am using the terminology "new brand", this may actually be one of the old brands (the surviving one). It need not be a newly created one.

firms, as well as the differentiated impact on consumers buying from inside and from outside the agreement. In this subsection I only present the results that are new relative to the two-brand case.

4.1 Price competition

With $n = 3$ in (1), production before acquisition when firms compete in prices is given by $(i = 1, 2, 3)$

$$q_i^* = \frac{(\beta+\gamma)(\alpha_i(2\beta^2+3\beta\gamma-\gamma^2)-(\alpha_j+\alpha_k)\gamma(\beta+\gamma))}{2\beta(\beta-\gamma)(\beta+2\gamma)(2\beta+3\gamma)} \tag{10.1}$$

and prices are

$$p_i^* = \frac{\alpha_i(2\beta^2+3\beta\gamma-\gamma^2)-(\alpha_j+\alpha_k)\gamma(\beta+\gamma)}{2\beta(2\beta+3\gamma)} \tag{10.2}$$

If two of these firms concentrate, say for instance firms 1 and 2, the choice of p_1 and p_2 is performed in order to maximize

$$\pi_1+\pi_2 = \left(\frac{\alpha_1(\beta+\gamma)-(\alpha_2+\alpha_3)\gamma}{(\beta-\gamma)(\beta+2\gamma)} - \frac{\beta+\gamma}{(\beta-\gamma)(\beta+2\gamma)}p_1 + \frac{\gamma}{(\beta-\gamma)(\beta+2\gamma)}(p_2+p_3)\right)p_1 +$$
$$\left(\frac{\alpha_2(\beta+\gamma)-(\alpha_1+\alpha_3)\gamma}{(\beta-\gamma)(\beta+2\gamma)} - \frac{\beta+\gamma}{(\beta-\gamma)(\beta+2\gamma)}p_2 + \frac{\gamma}{(\beta-\gamma)(\beta+2\gamma)}(p_1+p_3)\right)p_2 \tag{11.A}$$

while firm 3 chooses p_3 that maximizes

$$\pi_3 = \left(\frac{\alpha_3(\beta+\gamma)-(\alpha_1+\alpha_2)\gamma}{(\beta-\gamma)(\beta+2\gamma)} - \frac{\beta+\gamma}{(\beta-\gamma)(\beta+2\gamma)}p_3 + \frac{\gamma}{(\beta-\gamma)(\beta+2\gamma)}(p_1+p_2)\right)p_3 \tag{11.B}$$

The Nash equilibrium is (with $i, j = 1, 2$ and $j \neq i$)

$$q_i^* = \frac{\alpha_i(4\beta^3+8\beta^2\gamma+\beta\gamma^2-2\gamma^3)-\alpha_j\gamma(4\beta^2+5\beta\gamma-2\gamma^2)-2\alpha_k\beta\gamma(\beta+\gamma)}{4(\beta-\gamma)(\beta+2\gamma)(2\beta^2+2\beta\gamma-\gamma^2)} \tag{11.1.A}$$

$$q_3^* = \frac{(\beta+\gamma)(2\alpha_3(\beta^2+\beta\gamma-\gamma^2)-(\alpha_1+\alpha_2)\beta\gamma)}{2(\beta-\gamma)(\beta+2\gamma)(2\beta^2+2\beta\gamma-\gamma^2)} \tag{11.1.B}$$

$$p_i^* = \frac{\alpha_i(2\beta-\gamma)(2\beta+3\gamma)-\gamma^2\alpha_j-2\alpha_k\gamma(\beta+\gamma)}{4(2\beta^2+2\beta\gamma-\gamma^2)} \tag{11.2.A}$$

$$p_3^* = \frac{2\alpha_3(\beta^2+\beta\gamma-\gamma^2)-(\alpha_1+\alpha_2)\beta\gamma}{2(2\beta^2+2\beta\gamma-\gamma^2)} \tag{11.2.B}$$

If firms 1 and 2 merge, the new owner maximizes the sum of profits arising from demand curves $p_1 = \alpha - \beta q_1 - \gamma(q_2+q_3)$ and $p_2 = \alpha - \beta q_2 - \gamma(q_1+q_3)$ with $\alpha \in [\alpha_2, \alpha_1]$. For firm

3 demand is still $p_3 = \alpha_3 - \beta q_3 - \gamma(q_1 + q_2)$. The equilibrium becomes

$$q_1^* = q_2^* = \frac{\beta(2\alpha(\beta^2 + \beta\gamma - \gamma^2) - \alpha_3\gamma(\beta + \gamma))}{2(\beta - \gamma)(\beta + 2\gamma)(2\beta^2 + 2\beta\gamma - \gamma^2)} \tag{12.1.A}$$

$$q_3^* = \frac{(\beta + \gamma)(\alpha_3(\beta^2 + \beta\gamma - \gamma^2) - \alpha\beta\gamma)}{(\beta - \gamma)(\beta + 2\gamma)(2\beta^2 + 2\beta\gamma - \gamma^2)} \tag{12.1.B}$$

$$p_1^* = p_2^* = \frac{2\alpha(\beta^2 + \beta\gamma - \gamma^2) - \alpha_3\gamma(\beta + \gamma)}{2(2\beta^2 + 2\beta\gamma - \gamma^2)} \tag{12.2.A}$$

$$p_3^* = \frac{\alpha_3(\beta^2 + \beta\gamma - \gamma^2) - \alpha\beta\gamma}{2\beta^2 + 2\beta\gamma - \gamma^2} \tag{12.2.B}$$

4.2 Quantity competition

For a three-brand industry with Cournot competition the Nash equilibrium before acquisition is given by $(i = 1, 2, 3)$

$$q_i^* = \frac{\alpha_i(2\beta + \gamma) - (\alpha_j + \alpha_k)\gamma}{2(2\beta - \gamma)(\beta + \gamma)} \tag{13.1}$$

$$p_i^* = \frac{\beta(\alpha_i(2\beta + \gamma) - (\alpha_j + \alpha_k)\gamma)}{2(2\beta - \gamma)(\beta + \gamma)} \tag{13.2}$$

If firms 1 and 2 concentrate q_1 and q_2 are chosen to maximize

$$\pi_1 + \pi_2 = (\alpha_1 - \beta q_1 - \gamma(q_2 + q_3))\, q_1 + (\alpha_2 - \beta q_2 - \gamma(q_1 + q_3))\, q_2 \tag{14.A}$$

while firm 3 chooses q_3 that maximizes

$$\pi_3 = (\alpha_3 - \beta q_3 - \gamma(q_1 + q_2))\, q_3 \tag{14.B}$$

The Nash equilibrium is $(i, j = 1, 2$ and $j \neq i)$

$$q_i^* = \frac{\alpha_i(4\beta^2 - \gamma^2) - \alpha_j\gamma(4\beta - \gamma) - 2\alpha_k\gamma(\beta - \gamma)}{4(\beta - \gamma)(2\beta^2 + 2\beta\gamma - \gamma^2)} \tag{14.1.A}$$

$$q_3^* = \frac{2\alpha_3(\beta + \gamma) - (\alpha_1 + \alpha_2)\gamma}{2(2\beta^2 + 2\beta\gamma - \gamma^2)} \tag{14.1.B}$$

$$p_i^* = \frac{\alpha_i(4\beta^2 + 4\beta\gamma - \gamma^2) + \gamma^2\alpha_j - 2\alpha_k\gamma(\beta + \gamma)}{4(2\beta^2 + 2\beta\gamma - \gamma^2)} \tag{14.2.A}$$

$$p_3^* = \frac{\beta(2\alpha_3(\beta + \gamma) - (\alpha_1 + \alpha_2)\gamma)}{2(2\beta^2 + 2\beta\gamma - \gamma^2)} \tag{14.2.B}$$

If 1 and 2 merge the equilibrium is

$$q_1^* = q_2^* = \frac{2\alpha\beta - \alpha_3\gamma}{2(2\beta^2 + 2\beta\gamma - \gamma^2)} \tag{15.1.A}$$

$$q_3^* = \frac{\alpha_3(\beta+\gamma) - \alpha\gamma}{2\beta^2 + 2\beta\gamma - \gamma^2} \tag{15.1.B}$$

$$p_1^* = p_2^* = \frac{(\beta+\gamma)(2\alpha\beta - \alpha_3\gamma)}{2(2\beta^2 + 2\beta\gamma - \gamma^2)} \tag{15.2.A}$$

$$p_3^* = \frac{\beta(\alpha_3(\beta+\gamma) - \alpha\gamma)}{2\beta^2 + 2\beta\gamma - \gamma^2} \tag{15.2.B}$$

The result that follows is valid both for price and quantity competition.

When the value of the brand arising from merger is equal to the average of the values of the pre-merger brands ($\alpha = \frac{\alpha_1+\alpha_2}{2}$), the non-participating firm is indifferent between concentration and merger of the rivals, and so are its customers.[11] Firm 3 is better off if firms 1 and 2 concentrate than if they merge if and only if $\alpha > \frac{\alpha_1+\alpha_2}{2}$, the same being true for its clients.

Proposition 2 *If merging rises the surviving brand value above the average of the pre-acquisition values, the profit of the outside firm and the surplus of its clients are higher if rivals concentrate than if they merge. The reverse is true if the new brand value is lower than the average.*

Proof. $\pi_{3ac}^* - \pi_{3am}^* = \frac{(2\alpha-\alpha_1-\alpha_2)\beta\gamma(4\alpha_3(\beta+\gamma)-(2\alpha-\alpha_1-\alpha_2)\gamma)}{4(2\beta^2+2\beta\gamma-\gamma^2)^2}$. If $q_{3am}^* > 0$, the sign of $\pi_{3ac}^* - \pi_{3am}^*$ depends only on the sign of $2\alpha - \alpha_1 - \alpha_2$, and so is positive for all $\alpha > \frac{\alpha_1+\alpha_2}{2}$. $CS_{3ac}^* - CS_{3am}^* = \frac{1}{2}(\pi_{3ac}^* - \pi_{3am}^*)$, so the same conclusions apply. ■

Rivalry thus implies a much narrower range of α where the regulatory authority has no need to care about the joining firms' decision, since outsiders have conflicting interests with participants as to the preferred type of agreement for all $\alpha < \frac{\alpha_1+\alpha_2}{2}$ or $\alpha > \frac{\alpha_1+\alpha_2}{2} + \Delta_2^{PS}$. The "surviving" interval where there is coincidence of preferences for all agents is only $\frac{\alpha_1+\alpha_2}{2} < \alpha < \frac{\alpha_1+\alpha_2}{2} + \min\{\Delta_2^{PS}, \Delta_2^{CS}\}$. The values of Δ_2^{PS} and Δ_2^{CS} now vary with the type of rivalry: there is an expression for price competition and a different one for quantity competition (whose magnitudes are hardly comparable).

Lemma 3 *If merging rises the surviving brand value (α) above the average of the pre-acquisition values (α_1 and α_2) and firms still prefer to concentrate, the regulatory authority*

[11] Participating firms, as well as their clients, prefer concentration, which is in accordance with the results obtained in section 3.

only needs to intervene if customers of the joining parties are severely harmed by the agreement, since every other agent (outsiders and their clients, as well as participants) benefits. Formally this situation occurs for $\frac{\alpha_1+\alpha_2}{2} < \alpha < \frac{\alpha_1+\alpha_2}{2} + \Delta_2^{PS}$*, where the upper bound denotes the value of* α *above which firms decide to merge, and which depends on the strategic variable chosen. In the interval* $\frac{\alpha_1+\alpha_2}{2} < \alpha < \frac{\alpha_1+\alpha_2}{2} + \min\{\Delta_2^{PS}, \Delta_2^{CS}\}$ *there is surely no need for policy intervention; however, for every other* α*, that is, for most of the cases, including every merging situation, there may be room for the authority to intervene, directing firms to the socially optimal type of agreement.*

4.3 Does the type of rivalry matter?

As we have just seen, the choice of the strategic variable - price or quantity - influences the magnitude of the interval for α in which every agent's interests are in accordance. However, the type of rivalry matters also for the difference between concentration and merger whenever $\alpha \neq \frac{\alpha_1+\alpha_2}{2}$, that is, for the relevance of intervention when this is advisable. Hence, it must be taken into account by the regulatory authority when considering the consequences of a non-intervention. Actually, one type of competition or the other may induce higher differences between concentration and merger for participating firms, outsiders and clients, therefore changing joining incentives and their consequences. This is clear from the expression below, which refers to industry profits.

$$(PS_{ac}^{qc} - PS_{am}^{qc}) - (PS_{ac}^{pc} - PS_{am}^{pc}) = \frac{4\beta\gamma^3\Delta(\gamma(\alpha_1+\alpha_2+\Delta)-\alpha_3(\beta+\gamma))}{(\beta-\gamma)(\beta+2\gamma)(2\beta^2+2\beta\gamma-\gamma^2)^2} \neq 0 \ \forall\Delta \neq 0$$

The same conclusion applies to $(PS_{1ac}^{qc} + PS_{2ac}^{qc} - PS_{1am}^{qc} - PS_{2am}^{qc}) - (PS_{1ac}^{pc} + PS_{2ac}^{pc} - PS_{1am}^{pc} - PS_{2am}^{pc})$, $(PS_{3ac}^{qc} - PS_{3am}^{qc}) - (PS_{3ac}^{pc} - PS_{3am}^{pc})$, $(CS_{ac}^{qc} - CS_{am}^{qc}) - (CS_{ac}^{pc} - CS_{am}^{pc})$, $(CS_{1ac}^{qc} + CS_{2ac}^{qc} - CS_{1am}^{qc} - CS_{2am}^{qc}) - (CS_{1ac}^{pc} + CS_{2ac}^{pc} - CS_{1am}^{pc} - CS_{2am}^{pc})$, and $(CS_{3ac}^{qc} - CS_{3am}^{qc}) - (CS_{3ac}^{pc} - CS_{3am}^{pc})$.

Hence, the strategic variable is relevant for the authority when considering the compared effects of the two possible types of agreement and deciding when its intervention, if to take place, is more needed. The analysis of the above expressions allows the following conclusions.

Proposition 4 *The type of strategic rivalry matters for the relevance of policy intervention, if this is to occur (which also depends on the strategic variable chosen). When the value of the brand deriving from merger is higher (lower) than the average of the values of the two brands before acquisition, the higher the brand value of the firm that stays out of the operation and the lower the brand values of those participating, the more likely that price* *competition induces a larger (smaller) difference between concentration and merger than quantity competition in terms of profits and consumer surplus, for participants, outsiders and respective customers, thus making the authority's intervention more (less) important.*

Proof. Directly from computing the expressions above and taking derivatives. ■

5 Concluding remarks

Firm acquisition may give rise to a single brand name, or joining parties may decide to keep both names in the market. This choice is based on the level of differentiation: own and cross price effects and brand values. The paper has also shown that the two possibilities for the acquirer are not indifferent in terms of their effects upon profits (of participants and rivals) and consumers' surpluses, thus stressing the opportunity for policy intervention. Depending on the value of the new common brand (and on the strategic variable chosen), there may actually exist some divergence between the various agents' interests. When policy intervention is advisable, the type of rivalry (price or quantity) makes it more or less needed.

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