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IN-MARKET VS. CROSS-BORDER MERGING; THE IMPACT OF MERGER POLICY¹

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1. INTRODUCTION

Mergers, particularly in network industries such as energy and telecommunications, are currently a popular subject. In a changing economic environment impacted by liberalization and digitalization, firms currently evaluate merger opportunities not only in the respective domestic markets, but also across borders. The telecommunications sector in the European Union illustrates the interplay between in-market and cross-border mergers. While telecommunications companies regularly question the severity of merger policy towards in-market mergers, the European Commission has expressed its desire for the emergence of pan-European telecommunications

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firms, preferably through cross-border mergers.² Therefore, the firms' choice between an in-market and a cross-border merger is relevant to merger policy. In this context, we examine how merger policy impacts the trade-off between in-market and cross-border merging.

An in-market merger is assessed based on a trade-off between efficiency gains and market power (Williamson, 1968). Depending on whether a merger's net impact on consumer welfare is positive or negative, an in-market merger is cleared or not, respectively, and if cleared, it can be subject to merger remedies (Perry and Porter, 1985; Farrell and Shapiro, 1992; McAfee and Williams, 1992). This differs from a cross-border merger, which is a priori less prone to issues arising from increased market power. Moreover, it does not directly affect the number of firms in either the home or a foreign market.

Then, if merger policy gives priority on market power issues, one could argue that it should rather focus on in-market mergers. In such a case, one could expect that it would merely impact the decision to merge in-market. However, this reasoning misses that after a failed cross-border merger, a firm may wish to exit by an in-market merger. Indeed, due to the presence of asymmetric information on the foreign market (Qiu and Zhou, 2006), a firm merging cross-border faces uncertainty in its post-merger profitability. If ex post the cross-border merger happens to be unprofitable, the firm would be willing to exit the foreign market.³ This would involve having to sell its foreign subsidiary to another competitor, hence involve an in-market merger if it were sold to a firm from the foreign market. In such a case, the possibility of exiting the foreign market will rest on the leniency of merger policy (Mason and Weeds, 2013).⁴ Hence, we study the trade-off

2 According to the *Financial Times* on 22 October 2015, "While regulators at the European Commission are turning up their noses at in-country consolidation, they have signalled that cross-border consolidation to create pan-European networks would be welcomed".

3 An interesting example is that of Orange and Deutsche Telekom in the UK with their foreign company EE that was sold to BT. An exit occurred for several reasons, including, as stated in *Le Monde* on 16 December 2014, the difficulty of identifying synergies.

4 In this respect, Uber-Grab deal is a relevant example. In fact, Uber's exit from Southeast Asia is under scrutiny from Competition Commission of Singapore (CCS). The regulator suspects that Uber's exit-by-merger (with Grab, which is Singapore-based) could hamper competition (see Grab-Uber deal).

between in-market and cross-border merging by focusing on the ex ante effect of merger policy on exit possibility.

To this end, we build a simple model with four firms competing in a regional market. The latter is composed of two markets: a home market and a foreign market. Such markets are segmented and of same size, with two firms in each. In the beginning, firms earn identical profits. The merger policy, set at the regional level, is defined by the probability of merging in-market. After observing the merger policy, a firm chooses between cross-border or in-market merging. Thereafter, it may decide to demerge depending on the merger outcome. It is assumed that an in-market merger is always profitable and efficient (but still subject to anti-competitive concerns). On the other hand, a cross-border merger has a certain probability of being profitable but is initially not subject to merger policy. In fact, if the firm demerges after a cross-border merger, undoing the merger may involve an exit through an in-market merger, contingent on merger policy. In what follows, we elaborate on the results under this framework.

First, we determine that when no exit possibilities exist, a more lenient merger policy incentivizes in-market mergers at the expense of cross-border mergers. This is explained by the merger policy only impacting the expected payoff from in-market merging; all things being equal, a firm would rather choose the in-market option. In contrast, when an exit is possible, a more lenient merger policy also impacts positively the payoff from cross-border merging. We show this to be due to lowering of exit barriers. The trade-off between both merger types is therefore altered insofar as merger policy affects the incentives for in-market and cross-border mergers differently. From a policy point of view, our results suggest that the merger policy should consider subsequent mergers triggered by an initial decision to merge. In our framework, this corresponds to the scenario of an exit-by-merger after a failed cross-border merger. Finally, our results are still robust to asymmetric markets, although there is slightly less scope for cross-border compared to in-market merging.

1.1. Relation to Literature

We contribute to the industrial organization literature dealing with entry and merger policy. Marino and Zabochnik (2006) address the impact of entry on merger policy, whereas we focus on the impact of merger

policy on entry (a cross-border merger is also as an “entry” in the foreign market). Closer to our approach, Mason and Weeds (2013) explore the extent to which merger policy can act as an entry barrier. Using a failing firm defence standard, the researchers show that if *ex post*, a more lenient merger policy may increase concentration and decrease consumer surplus, future merger prospects increase the expected value of entry. Jaunaux, Lefouili and Sand-Zantman (2017) generalize the analysis of Mason and Weeds (2013). The authors derive a measure that characterizes the design of the optimal merger policy upon entry by relying on state dependency. Our analysis differs from the two previous studies insofar as we scrutinize a firm’s incentives to merge cross-border vs. in-market in the presence of merger policy. Our paper contributes to the discussion on the contestable market theory (Baumol, Panzar and Willig, 1982) that states the idea that a firm enters a market if entry and exit barriers are not too high.

Our paper is also related to the industrial organization literature considering endogenous antitrust authorities. Nocke and Whinston (2013) explore the optimal merger policy when the antitrust authority observes the characteristics of proposed mergers but cannot observe the characteristics nor the feasibility of mergers that are not proposed. Motta and Vasconcelos (2005) model a sequential merger formation game with endogenous efficiency gains characterized by scale economies. In their model, a myopic antitrust authority evaluates a given merger without taking into account potential subsequent mergers contrary to a forward-looking antitrust authority. In the same vein, Brito (2005) explores, by the mean of revealed preferences, how an antitrust authority may accept or reject an initial merger based on subsequent alternative mergers arising from this initial merger. In our paper, we examine how the decision to merge cross-border or in-market may trigger subsequent mergers decisions such as an exit via a merger.

Other approaches can be found in Haufler and Nielsen (2007). The researchers develop a comparative analysis of cross-border and in-market mergers. They compare mergers from private and social perspectives. Firms from the producing countries compete only in the third market. The study suggests that while the merger policy on in-market mergers tends to be too restrictive for global efficiency, a *laissez-faire* approach is globally efficient for cross-border mergers. Our paper differs from Haufler and Nielsen

(2007) in that all firms compete in the regional market, while cross-border mergers are subject to the uncertainty of their profitability.

In the international economics literature, Horn and Persson (2001) focus on cross-border versus in-market mergers in the presence of trade costs. They show that an increase in trade costs can increase the profitability of in-market compared to cross-border mergers.⁵ Our analysis differs in that we assume segmented markets (i.e., no exports); consequently, merger decisions are not impacted by trade costs.

In the next section, we present the model framework. In Section 3, we solve for a firm's decision to merge cross-border or in-market, if exit by merger is not possible. In Section 4, we determine how the possibility of exit by merger modifies the firm's merger choice. In Section 5, we provide a short welfare analysis. In Section 6, we present an extension to the main model. In Section 7, the framework is discussed. Section 8 concludes. All proofs are in the appendix.

2. MODEL

We build a model to study how merger policy affects a firm's trade-off between in-market and cross-border merging.⁶

Market characteristics. Consider two countries, defined as “home” and “foreign” markets. Markets are segmented (i.e., we ignore the possibility of exports) and duopolistic; firms 1 and 2 compete in the home market, while firms 3 and 4 do so in the foreign market. The firms are originally symmetric, i.e., characterized by the same constant marginal cost c of

5 Recent studies have examined the determinants and welfare effects of endogenous cross-border mergers (Bjorvatn, 2004; Norback and Persson, 2008; Chaudhuri, 2014), while other papers consider labour market effects (Lommerud, Straume and Sorgard, 2006).

6 Such mergers are assumed to be mutually exclusive. While debatable, this assumption can be realistic in that when a firm merges, it needs cash, and additional costs (coordination, etc.) could also arise. For instance, in the telecommunications market, Orange sold EE and exited the UK market to obtain more cash and to engage in acquisitions in other European countries, among other reasons.

production. As demands (in the home and foreign markets) are also symmetric, the firms earn identical profits, $\Pi(c)$.^{7,8}

Merger control is exerted on both the home and foreign markets.⁹ We assume that an in-market merger is cleared with probability $\alpha \in (0,1)$, assumed exogenous.

Agents. Among the four firms, we assume that in the beginning, only firm 1 makes a merger decision, i.e., choosing between an in-market merger (IMM), a cross-border merger (CBM), or no merger at all (status quo). Any subsequent merger decisions by remaining firms would be made conditionally on firm 1 deciding on post-merger bargaining. Figure 1 represents the market structure with merger options of firm 1.

Figure 1. The market structure

7 The symmetric Cournot model with constant marginal costs satisfies our model assumptions. A brief Cournot version of the model is presented in Appendix B.

8 We use a duopoly framework to simplify the analysis. This approach does not incur any serious loss of generality compared to the oligopoly case with n firms in each market.

9 Merger policy is defined at the regional level. An example close to this idea is in the European Union, where the European Commission (EC) is in charge of merger cases with a “community dimension”. An increasing convergence between national and European authorities is in fact underway (see the White Paper on merger control (July 9, 2014) presented by the former VP of the EC, J. Almunia). In this respect, we abstract from conflicts between national regulators or international merger policy coordination. For more information on this, see the survey of Breinlich, Nocke, and Schutz (2016).

In-market merger. Let Π_{ij} be the profit after a merger of firms i and j , with $i \neq j$. With probability α , the IMM is cleared, and the new merged entity earns a profit $\Pi_{12}(\underline{c})$ with marginal cost $\underline{c} < c$, i.e., the merger leads to efficiency gains. With probability $1 - \alpha$, the IMM is rejected, and firm 1 obtains its original duopoly profit $\Pi(c)$.

Cross-border merger. A CBM has an uncertain outcome. Let $\beta \in (0,1)$ be the probability that the CBM entails *market-level synergies*.¹⁰ If firm 1 merges with firm 3, a good outcome occurs with probability β , i.e., the merged entity earns a profit $\Pi_{13}(\underline{c})$ with marginal cost $\underline{c} < c$, whereas a bad outcome occurs with probability $1 - \beta$, i.e., the merged entity earns a profit $\Pi_{13}(\bar{c})$ with marginal cost $\bar{c} > c$. If the CBM is efficient, efficiency gains apply to both home and foreign markets. Similarly, if the CBM is inefficient, negative spillovers apply to both markets.¹¹ Due to market segmentation, the CBM's profit Π_{13} is in fact the sum of profits earned separately in two countries. Finally, we assume for the sake of analysis that $\Pi_{12}(\underline{c}) \geq \Pi_{13}(\underline{c})$, i.e., it is weakly more profitable to engage in an IMM than in an efficient CBM.¹²

In this framework, a CBM is assumed to raise no anti-competitive concerns, because it does not affect the number of competitors and in expectation it is not price increasing (we provide the condition under which this is true in Lemma 3 of Section 5). A CBM is thus always cleared.

¹⁰ CBMs are primarily undertaken to gain access to complementary firm-specific assets (Nocke and Yeaple, 2008), capabilities that are non-mobile across countries (Nocke and Yeaple, 2007), or country-specific assets (Norback and Persson, 2007). Therefore, an unprofitable CBM could be due to the absence of complementarity between firms' technologies, know-how or very high coordination costs. We presume that such issues have a larger chance of occurring with a CBM due to a higher degree of information asymmetry in the foreign market.

¹¹ For instance, an unprofitable CBM can induce a negative organizational shock for the acquiring firm. This leads the management of the firm to make efforts in order to address these organizational issues, thereby generating coordination costs and lowering the firm's productivity in both markets.

¹² This condition states that the monopoly profit in the home market is (weakly) greater than the sum of duopoly profits for the merged entity in the home and foreign markets. It can be explained by the fact that the merged entity has more market power in the former case than in the latter. Brito (2005) proposes a model of sequential mergers, where a merger that increases market power is also more likely to be profitable than an alternative merger where market power increases less.

However, if there is a bad outcome after firms 1 and 3 enter into a CBM, firm 1 may decide to exit the foreign market, i.e., to separate from its foreign partner, firm 3, by selling it either to firm 4 (the foreign competitor) or to firm 2 (the home competitor). Still, firm 2 would not be willing to acquire firm 3. Firm 2 in fact learns from the failed CBM the presence of negative market-level synergies, making a CBM unattractive. Therefore, an exit-by-merger can occur if firm 4 acquires firm 3 via an IMM accepted with probability α .¹³ Therefore, if firm 1 finally manages to exit the foreign market, the new merged entity's profit is $\Pi_{34}(\underline{c})$; we assume firm 1 obtains its ex ante profit $\Pi(c)$ in the home market.

Payoffs. Denote V_i^s as the expected payoff of firm i from making the merger choice $s = im, cb, e$, where *im* means in-market, *cb* denotes a cross-border merger without the possibility of exit, and *e* represents a cross-border merger with the possibility of exit. In what follows, we compare the choice of firm 1 between an IMM with firm 2 ($s = im$) or a CBM with firm 3 ($s = cb$ or e).¹⁴

As a merger is in fact an acquisition of one firm by another, we model an acquisition price, assumed to be the present value of future payoffs of the acquired firm if it had not merged.

Timing. We consider the following sequence of events. First, the merger policy α is announced. Second, firm 1 observes α and decides whether to merge cross-border or in-market.¹⁵ If it merges in-market, the merger is accepted with probability α . If it merges cross-border, the uncertainty of the merger's cost-efficiency is realized. Firm 1 pays the acquisition costs, and first-period payoffs are subsequently realized. Third, (i) if firm 1 has merged in-market, it decides whether to demerge from firm 2 and, (ii) if

¹³ Outside investors (e.g., vertical competitors) may also make offers to acquire firm 3. However, such transaction raises potential challenges, as outside investors may suffer from information asymmetry on the targeted market, undermining their ability to profitably acquire firm 3 (affected by the price of acquiring firm 3 from firm 1 and the expected efficiency of such acquisition). For simplicity, we ignore this possibility.

¹⁴ As firms are initially symmetric, it does not matter whether firm 1 enters into a CBM with firm 3 or 4.

¹⁵ One way to justify this observability would be to include a pre-merger competition phase as in Mason and Weeds (2013).

firm 1 has merged cross-border, firm 1 decides on exiting the foreign market by an in-market merger. Fourth, second-period payoffs are realized with a discount factor $\delta \in (0,1)$. We examine the subgame perfect equilibrium of this game.

3. BENCHMARK CASE: NO POSSIBILITY OF EXIT

In this section, we consider the benchmark case with no possibility of exit by merger after a CBM. We study firm 1's trade-off between the two types of mergers. In our model, merging in-market is always preferred to the status quo. The following lemma provides the condition for ensuring that firm 1 also prefers a CBM to the status quo.

Lemma 1. Merging cross-border is preferred to the status quo if and only if $\beta > \beta^{ne}$, where

$$\beta^{ne} = \frac{2\Pi(c) - \Pi_{13}(\bar{c})}{\Pi_{13}(\underline{c}) - \Pi_{13}(\bar{c})}.$$

The idea behind Lemma 1 is that firm 1 finds the option to merge cross-border profitable only if its expected probability to be profitable (β) is not too low. If this condition holds, both a CBM and an IMM are profitable for firm 1, and the firm then trades off between merging in-market and cross-border.

We make the following assumption to ensure that firm 1's decision is a choice between an IMM and a CBM:

Assumption 1. $\beta > \beta^{ne}$.

We now study firm 1's decision between an IMM and a CBM. Consider first an IMM. As it is efficient, and there is no uncertainty as to its profitability, firm 1 has no incentive to demerge from firm 2.¹⁶ Firm 1's expected payoff is:

¹⁶ As a result of timing, we do not consider the possibility that firm 1 engages in subsequent mergers after an IMM or a CBM. However, it could be shown that cross-border merging after a CBM is unattractive and that in-market merging after a profitable CBM should not be possible due to being too anti-competitive.

$$V_1^{im} = (1 + \delta) [\alpha(\Pi_{12}(\underline{c}) - \Pi(c)) + (1 - \alpha)\Pi(c)]. \quad (1)$$

The meaning of equation (1) is as follows. With probability α , the merger is cleared, and firm 1 obtains the merger profit $\Pi_{12}(\underline{c})$ minus the price $\Pi(c)$ of acquiring firm 2. With probability $1 - \alpha$, the merger is rejected, and firm 1 obtains the duopoly profit $\Pi(c)$.

Second, consider a CBM. Firm 1's expected payoff without an exit possibility is:

$$V_1^{cb} = (1 + \delta) [\beta\Pi_{13}(\underline{c}) + (1 - \beta)\Pi_{13}(\bar{c})] - (1 + \delta)\Pi(c). \quad (2)$$

Merging cross-border is efficient with probability β and inefficient with probability $1 - \beta$. The price of acquiring firm 3 is $(1 + \delta)\Pi(c)$.

Equations (1) and (2) show that the merger policy parameter α impacts only IMM payoffs. Equation (1) implies that $\partial V_1^{im} / \partial \alpha = (1 + \delta) [\Pi_{12}(\underline{c}) - 2\Pi(c)] > 0$, and therefore, a more lenient merger policy increases IMM payoffs while not impacting CBM payoffs. Thus, we can state the following proposition:

Proposition 1. If there is no possibility of exit by merger, a more lenient merger policy, i.e., a higher α , favours in-market mergers at the expense of cross-border mergers.

Under Assumption 1, we obtain $V_1^{cb} - V_1^{im} |_{\alpha=0} > 0$. Furthermore, as $\beta < 1$, $V_1^{cb} - V_1^{im} |_{\alpha=1} < 0$. From Proposition 1, it follows that there is a threshold $\alpha^{ne} \in (0, 1)$, such that firm 1 prefers merging in-market if $\alpha > \alpha^{ne}$ and prefers merging cross-border otherwise.

4. POSSIBILITY OF EXIT

In this section, we consider the possibility of exit by merger. As already explained, such possibility means that firm 1 would be able to sell firm 3 to the foreign company, firm 4. In this respect, we study firm 1's trade-off between both types of mergers. The following lemma provides the condition that ensures that if there is a possibility of exit, firm 1 prefers a CBM to the status quo.

Lemma 2. If there is a possibility of exit, cross-border merging is preferred to the status quo if and only if $\delta/(1+\delta) < [\Pi_{13}(\underline{c}) - \Pi_{13}(\bar{c})]/\alpha\Pi(c)$, and $\beta > 0$.

While the minimum β such that a CBM is preferred to the status quo is $\beta^{ne} > 0$ in the benchmark case (Lemma 1), we observe from Lemma 2 that this minimum β is now equal to zero. Therefore, firm 1 has more incentives to merge cross-border when it can exit by merger than when it cannot.

We make the following assumption to ensure that firm 1's trade-off is between an IMM and a CBM:

Assumption 2. $\delta/(1+\delta) < [\Pi_{13}(\underline{c}) - \Pi_{13}(\bar{c})]/\alpha\Pi(c)$.

We now examine the conditions under which an exit-by-merger can occur. Notably, if firm 1 has merged profitably cross-border with firm 3, it is better off than in the status quo and, hence, has no incentives to exit the foreign market. On the other hand, if the CBM was determined to be unprofitable, an exit may occur, in which case it would involve firm 1 as the seller and firm 4 as the buyer. Firm 1 bargains with firm 4 through a take-it-or-leave-it offer, making firm 4 indifferent between buying firm 3 and status quo. It therefore offers a selling price equal to $\Pi_{34}(\underline{c}) - \Pi_4(c, \bar{c})$, where $\Pi_4(c, \bar{c})$ is firm 4's profit in a scenario of firm 1 having entered into an unprofitable CBM. To ensure that exit is possible, we assume that firm 4 will accept firm 1's offer.¹⁷

IMM payoffs are the same as in the benchmark case (equation (1)). Consider firm 1's CBM payoffs if exit by merger is possible:

17 At the other extreme, we could assume that it is firm 4 that makes a take-it-or-leave-it offer to firm 1. Firm 4 would then set a price for firm 3 making firm 1 indifferent between staying in the foreign market and exiting the foreign market by selling firm 3. Firm 4 would thus offer a purchase price equal to $\Pi_{13}(\bar{c}) - \Pi(c)$. In this case, the merger policy α has no effect on the payoff from cross-border merging, V_1^e . A more general case would imply a bargaining power that is not fully in the hands of firm 1 or firm 4; in such an intermediate case, the merger policy would affect payoff from cross-border merging, V_1^e .

$$V_1^e = \beta \Pi_{13}(\underline{c}) + (1 - \beta) \Pi_{13}(\bar{c}) + \delta \left[\beta \Pi_{13}(\underline{c}) + (1 - \beta) (\alpha (\Pi(c) + \Pi_{34}(\underline{c}) - \Pi_4(c, \bar{c})) + (1 - \alpha) \Pi_{13}(\bar{c})) \right] - (1 + \delta) \Pi(c). \quad (3)$$

The first line in equation (3) represents the first-period payoff (net of the acquisition price). The second line corresponds to the second-period payoff, discounted with $\delta \in (0, 1)$. With probability β , firm 1 has profitably merged cross-border. With probability $1 - \beta$, it has not profitably merged cross-border and decides to exit the foreign market via a merger. With probability α , firm 4 acquires firm 3, and firm 1 obtains its ex ante profit $\Pi(c)$ plus the selling price $\Pi_{34}(\underline{c}) - \Pi_4(c, \bar{c})$. With probability $1 - \alpha$, the IMM between firms 3 and 4 is rejected, and firm 1 obtains the profit $\Pi_{13}(\bar{c})$. The third line corresponds to the CBM acquisition price. Let $\Delta E = \Pi(c) + \Pi_{34}(\underline{c}) - \Pi_4(c, \bar{c}) - \Pi_{13}(\bar{c}) > 0$ be firm 1's exit payoff.¹⁸ The payoff from cross-border merging can be simplified to:

$$V_1^e = V_1^{cb} + \delta \alpha (1 - \beta) \Delta E. \quad (4)$$

The merger policy α now impacts both IMM and CBM payoffs. Indeed, we obtain:

$$\frac{\partial V_1^{im}}{\partial \alpha} = (1 + \delta) [\Pi_{12}(\underline{c}) - 2\Pi(c)] > 0; \quad (5)$$

$$\frac{\partial V_1^e}{\partial \alpha} = \delta (1 - \beta) \Delta E > 0. \quad (6)$$

From equations (5-6), we observe that in addition to increasing IMM payoffs, the merger policy now positively affects CBM payoffs. The intuition is that a more lenient merger policy increases the profitability of exit by merger after an unprofitable CBM. Therefore, there are lower barriers to exit. An additional insight obtained from (6) is that if the probability of a profitable CBM decreases (i.e., β is lower), the positive effect of merger policy is more significant ($\partial^2 V_1^e / \partial \alpha \partial \beta = -\delta \Pi(c) < 0$). Hence, we can state the following proposition:

¹⁸ In a linear Cournot setting, ΔE is positive, except in the case where the IMM yields almost zero efficiency gains, while the CBM is extremely unprofitable.

Proposition 2. When an exit-by-merger is possible, a more lenient merger policy, i.e., a higher α , positively impacts the incentives to merge cross-border by lowering the exit barriers.

We now study the impact of merger policy on the decision to merge cross-border versus in-market. We compare the effects of merger policy and observe that:

$$\frac{\partial[V_1^e - V_1^{im}]}{\partial \alpha} \leq 0 \quad \text{if} \quad \frac{\delta}{1 + \delta} \leq \frac{\Pi_{12}(\underline{c}) - 2\Pi(c)}{(1 - \beta)\Delta E}; \quad (7)$$

$$\frac{\partial[V_1^e - V_1^{im}]}{\partial \alpha} > 0 \text{ otherwise.} \quad (8)$$

Equation (7) means that merger policy has a stronger effect on the decision to merge in-market than to merge cross-border, while equation (8) states the contrary. From equations (5-6), merger policy impacts the entire gain from merging in-market while impacting only the second-period CBM pay-off if firm 1 exits by merger. Hence, we assume that equation (7) holds for the rest of the analysis.

We can now analyse how the trade-off between both merger types is altered compared to the benchmark case. Under Assumption 1, we obtain $V_1^e - V_1^{im} |_{\alpha=0} > 0$. Furthermore, for $\delta/(1 + \delta) < [\Pi_{12}(\underline{c}) - (\beta\Pi_{13}(\underline{c}) + (1 - \beta)\Pi_{13}(\bar{c}))]/(1 - \beta)\Delta E$, $V_1^e - V_1^{im} |_{\alpha=1} < 0$. Hence, it follows that there is a threshold $\alpha^e \in (0, 1)$, such that firm 1 prefers in-market merging if $\alpha > \alpha^e$ and prefers cross-border merging otherwise. Comparing thresholds α^{ne} and α^e , we state the following proposition:

Proposition 3. Cross-border merging is preferred to in-market merging for higher values of α , i.e., $\alpha^e > \alpha^{ne}$.

Proposition 3 states that if an exit-by-merger is possible, there is more scope for cross-border merging. Figure 2 illustrates this idea. In the figure, we observe that as α increases, firm 1 is more inclined to merge in-market than cross-border in all cases. Nonetheless, when an exit-by-merger is possible, firm 1 merges cross-border rather than in-market for a larger range of values of α , since $\alpha^e > \alpha^{ne}$. This occurs because merger policy

now affects directly the CBM decision. If α is very high, firm 1 will always opt for an IMM, whereas if α is very low, firm 1 will always opt for a CBM. If α is between α^{ne} and α^e , the firm chooses an IMM when exit is not possible and a CBM if exit-by-merger is possible.

Finally, another interesting insight is that with exit-by-merger, a stricter merger policy, that is, a lower α , now makes both IMM and CBM less profitable in expectation, contrary to what has been determined in the benchmark case. If the merger policy is quite severe (very low α) and the expected profitability from merging cross-border is low (small β), a status quo may be preferred to any merger. Therefore, while the severity of merger policy would prevent those mergers which are possibly anti-competitive, this may also discourage potentially pro-competitive mergers, such as cross-border mergers.

Figure 2. Merger decision: with vs. without a possible exit

5. WELFARE ANALYSIS

In this section, we apply basic comparative statics to examine the impact of firm 1's merger choice on social welfare, defined as the sum of firms' profits and consumer surplus in both markets. Denote $W(\alpha)$ as the (expected) social welfare function.

Let $p(c, c)$ denote the status quo price, $p(\underline{c}, c)$ denote the price after a profitable CBM, and $p(\bar{c}, c)$ denote the price after an unprofitable CBM. We use the following lemma to ensure that a CBM is in expectation never price-increasing:¹⁹

¹⁹ Therefore, we focus only on the welfare impact of an exit-by-merger due to an unprofitable CBM.

Lemma 3. In expectation, a CBM is never price-increasing if

$$\beta \geq \beta_p \equiv \frac{p(c, c) - p(\bar{c}, c)}{p(\underline{c}, c) - p(\bar{c}, c)}.$$

We make the following assumption:

Assumption 3. $\beta \geq \beta_p$.

In the benchmark case, an exit-by-merger is not possible, and merger policy only affects IMMs. If firm 1 merges in-market, the merger is either welfare-increasing or decreasing, and $W(\alpha)$ is monotonic on $[\alpha^{ne}, 1)$. If firm 1 merges cross-border, $W(\alpha)$ does not depend on α . This means that for $\alpha \in (0, \alpha^{ne})$, $W(\alpha) = W^{cb}$, where the constant W^{cb} is the welfare level if an exit-by-merger is not possible.

When an exit-by-merger is possible, the merger policy also affects CBMs. If firm 1 merges in-market, $W(\alpha)$ is monotonic on $[\alpha^e, 1)$. If firm 1 merges cross-border, $W(\alpha)$ now depends on α and is monotonic on $(0, \alpha^e)$. Indeed, if an exit-by-merger occurs, it will be either welfare-increasing or decreasing.²⁰ We therefore state the following proposition:

Proposition 4. In the benchmark case, if $\alpha < \alpha^{ne}$, social welfare does not depend on α and a cross-border merger always has a positive impact on social welfare ($\beta \geq \beta_p$). If an exit-by-merger is possible, if $\alpha < \alpha^e$, social welfare depends on α and a cross-border merger decreases (increases) social welfare if the exit-by-merger is welfare-decreasing (increasing).

Figure 3 shows an example of differences between the benchmark case and that of a possible exit. Let $W(1^-)$ be the limit of $W(\alpha)$ when α goes to 1⁻ and $W(\alpha^{e-})$ be the limit of $W(\alpha)$ when α goes to α^{e-} . On the left graph (the benchmark case), a CBM occurs if $(0, \alpha^{ne})$ and $W(\alpha) = W^{cb}$, whereas an IMM occurs if $[\alpha^{ne}, 1)$ and is welfare-increasing. As α increases and approaches 1, social welfare becomes higher under an IMM (e.g., $W^{cb} < W(1^-)$). However, on the right graph (an exit is possible), a CBM occurs if $(0, \alpha^e)$ and is welfare-increasing in such scenario. As α increases and approaches α^e social welfare increases under a CBM (e.g., $W(\alpha^{e-}) > W(1^-)$). Therefore, a corollary from Proposition 4 welfare CBM is that considering the

²⁰ Mathematical details on welfare levels can be found in Appendix A.

possibility of an exit, we are better able to determine whether a CBM, an IMM, or no merger is most beneficial to social welfare.

Figure 3. Welfare: the benchmark scenario (left) vs. that of a possible exit (right).

6. ASYMMETRIC MARKETS

In this section, we assume asymmetric markets, with the home market being a duopoly, and the foreign market being an oligopoly of $n > 2$ firms.

Let us study the incentives for firm 1 to merge cross-border and in-market, as a function of the number of firms in the foreign market. If firm 1 merges in-market, its profits are unchanged, as the IMM benefits are independent of the foreign market structure. Thus, the incentives for IMM are unchanged. On the contrary, when firm 1 merges cross-border, its profits are $\Pi_{13}(\underline{c}) = \Pi_1(\underline{c}, 2) + \Pi_3(\underline{c}, n)$ with probability β and $\Pi_{13}(\bar{c}) = \Pi_1(\bar{c}, 2) + \Pi_3(\bar{c}, n)$ with probability $1 - \beta$ (where the second term in parentheses designates the number of firms in the market). As the foreign market is now less concentrated, CBM profits are lower than in the baseline model. In this case and independently from the merger policy, cross-border merging is less beneficial. Then, suppose that for β that is not too low, $V_1^{cb}(n) < V_1^{cb}$ and $V_1^e(n) < V_1^e$, and let $\alpha^{ne}(n)$ and $\alpha^e(n)$ designate the threshold values of α for asymmetric markets.²¹ We can state the following proposition:

²¹ A value of β that is not too low ensures the validity of assumptions on $V_1^s(n)$ and V_1^s .

Proposition 5. With $n > 2$ firms on the foreign market, there is slightly less scope for cross-border merging compared to in-market merging, i.e., $\alpha^{ne}(n) < \alpha^{ne}$, and $\alpha^e(n) < \alpha^e$.

Considering welfare, our analysis is the same as in the previous section, except that (i) the mergers' thresholds are changed, and (ii) an exit-by-merger is more likely to be welfare-increasing, as the foreign market is less concentrated. Therefore, despite the fact that CBMs appear less attractive, our conclusions regarding the trade-off between IMM and CBM still hold.

7. DISCUSSION

In this section, we review some elements of our framework and suggest future research directions.

In our framework, the home and foreign markets are concentrated *ex ante*. In practice, a competition authority would thus expect efficiency gains sufficiently high to compensate for the potential anti-competitive effects of the merger. This may entail merger remedies.²² Introducing merger remedies in our framework would affect the trade-off between an IMM and a CBM. Two types of merger remedies can be contemplated: structural remedies (e.g., allowing entry of a new market player) or behavioral ones (e.g., a price cap). Such remedies would have two main effects on merger prospects. On the one hand, merger remedies would mitigate potential anti-competitive effects, thereby increasing the probability of merger acceptance α for an IMM. On the other hand, the profitability of an in-market merger would be reduced, due to lower gains in market power. The former effect will tend to encourage the choice to merge in-market rather than cross-border. The latter effect will rather favor cross-market mergers.²³ In sum, we expect that merger remedies will impact the trade-off between an IMM and a CBM in an ambiguous way.

22 For an analysis along these lines, see Chone and Linnemer (2008) and Dertwinkel-Kalt and Wey (2016).

23 An example is the aborted merger project between TeliaSonera and Telenor in Denmark (2016). To be cleared, the European Commission required a structural

Moreover, in this framework we do not consider the presence of a potential outsider, neither in the home market nor in the foreign one. If we relax this assumption, a merger-to-monopoly in the home market may induce entry of an outside firm in the same market, provided that entry barriers are not too high. The post-merger entry of an outsider has the same (ambiguous) effect on the trade-off between an IMM and a CBM than (structural) merger remedies: on the one hand, it increases the probability that the competition authority clears the IM merger, favoring IMM over CBM; on the other hand, it decreases the profitability of an IM merger, leading the firm to favor CBM over IMM.

Finally, alternative scenarios could be explored. For instance, in a framework where in-market merging has an uncertain outcome, one aim of merger policy could be to protect local consumers from unprofitable IMM. One way to do so would be to encourage CBMs which generate market level synergies (e.g., know-how). However, if due to the severity of merger policy, exit barriers were higher, firms may be deterred from merging cross-border and local consumers may be damaged. Moreover, in the scenario where an IMM is found to be unprofitable, an exit by the mean of a cross-border merger may be considered, i.e., a domestic firm selling its domestic subsidiary to a foreign firm. In this case, exit prospects will depend on expected market level synergies of cross-border merging. The analysis of these scenarios is left to future research.

8. CONCLUSION

In this paper, we examine how merger policy impacts the trade-off between in-market and cross-border mergers. We first study a benchmark case where an exit-by-merger is impossible and hence that merger policy only affects in-market merger's profitability. We find that a stricter (more lenient) merger policy shifts firms' decisions towards cross-border mergers (in-market mergers). On the contrary, if it is possible to exit by merger, we find that the merger policy also affects the incentives to merge cross-border by lowering (or increasing) exit barriers. The trade-off between both merger types is therefore altered, as the merger policy affects the incentives to merge in-market

merger remedy, i.e., the entry of new firm. To this extent, the merging firms cancelled their merger project (*Les Échos* on 8 July 2016).

and cross-border differently. In this respect, we determine the thresholds values for which a firm chooses an IMM when exit is not possible while it chooses a CBM if exit-by-merger is possible. Our analysis then implies that if the merger policy were very strict and market-level synergies were low (i.e., the payoff from merging would be low), firms would ultimately not merge at all. Examining welfare, we find that if the possibility of exit is considered, the merger policy affects cross-border in addition to in-market mergers because a CBM may induce a subsequent merger (exit-by-merger). This suggests that a policy maker is therefore better able to determine whether a CBM, an IMM, or no merger at all is the most relevant scenario to social welfare.

9. APPENDIX A

Definition of α^{ne} .

Under Assumption 1, we have $V_1^{cb} - V_1^{im} |_{\alpha=0} > 0$. Furthermore, $V_1^{cb} - V_1^{im} |_{\alpha=1} < 0$ if $\beta < (\Pi_{12}(\underline{c}) - \Pi_{13}(\bar{c})) / (\Pi_{13}(\underline{c}) - \Pi_{13}(\bar{c}))$. Since $\Pi_{12}(\underline{c}) \geq \Pi_{13}(\underline{c})$, this inequality holds if $\beta < 1$.

Proof of Lemma 2

Firm 1 prefers cross-border merging to the status quo if $V_1^e \geq (1 + \delta)\Pi(c)$, or if

$$\underbrace{\beta[(1 + \delta)(\Pi_{13}(\underline{c}) - \Pi_{13}(\bar{c})) - \delta\alpha\Pi(c)]}_A \geq \underbrace{-[(1 + \delta)\Pi_{13}(\bar{c}) + \delta\alpha\Pi(c)]}_B.$$

While B is negative, A is either positive or negative. First, consider if $A > 0$. We have $A > 0 \Leftrightarrow \delta / (1 + \delta) < (\Pi_{13}(\underline{c}) - \Pi_{13}(\bar{c})) / \alpha\Pi(c)$, which means that $\beta \geq B / A$ where B / A is negative. In our setting, it means that the minimum β for which a CBM is preferred to the status quo is zero. Therefore, if $\delta / (1 + \delta) < (\Pi_{13}(\underline{c}) - \Pi_{13}(\bar{c})) / \alpha\Pi(c)$ and $\beta > 0$, a CBM is preferred to the status quo.

Consider if $A < 0$. We have $A < 0 \Leftrightarrow \delta / (1 + \delta) > (\Pi_{13}(\underline{c}) - \Pi_{13}(\bar{c})) / \alpha\Pi(c)$, which means that $\beta \leq B / A$ where B / A is positive. However, β being the probability of market level synergies, this case has no economic sense and is not considered.

Definition of α^e and proof of Proposition 3

Under Assumption 1, $V_1^{cb} - V_1^{im} |_{\alpha=0} > 0$.

$$V_1^e - V_1^{im} |_{\alpha=1} < 0 \text{ if } \delta / (1 + \delta) < [\Pi_{12}(\underline{c}) - (\beta \Pi_{13}(\underline{c}) + (1 - \beta) \Pi_{13}(\bar{c}))] / (1 - \beta) \Delta E$$

The numerator is positive as $\beta < 1$.

We show that $\alpha^e > \alpha^{ne}$. To this end, we compute the difference between cross-border and in-market merging payoffs with and without a possible exit.

$$\begin{aligned} [V_1^e(\alpha^e) - V^{im}(\alpha^e)] - [V_1^{cb} - V^{im}(\alpha^{ne})] &= 0 \\ \Leftrightarrow \delta \alpha^e (1 - \beta) \Delta E + (1 + \delta) (\alpha^{ne} - \alpha^e) [\Pi_{12}(\underline{c}) - 2\Pi(c)] &= 0 \\ \Leftrightarrow \alpha^e (\delta (1 - \beta) \Delta E - (1 + \delta) [\Pi_{12}(\underline{c}) - 2\Pi(c)]) + (1 + \delta) \alpha^{ne} [\Pi_{12}(\underline{c}) - 2\Pi(c)] &= 0 \\ \Leftrightarrow \alpha^e = \frac{-(1 + \delta) [\Pi_{12}(\underline{c}) - 2\Pi(c)] \alpha^{ne}}{\delta (1 - \beta) \Delta E - (1 + \delta) [\Pi_{12}(\underline{c}) - 2\Pi(c)]}. \end{aligned}$$

The numerator is negative and the denominator is also negative (by equation (7)). Therefore, $\alpha^e = k \alpha^{ne}$, where

$$k \equiv \frac{-(1 + \delta) [\Pi_{12}(\underline{c}) - 2\Pi(c)]}{\delta (1 - \beta) \Delta E - (1 + \delta) [\Pi_{12}(\underline{c}) - 2\Pi(c)]} > 1.$$

Therefore, $\alpha^e > \alpha^{ne}$.

Proof of Lemma 3

In expectation, a CBM is not price-increasing if

$$\begin{aligned} \beta p(\underline{c}, c) + (1 - \beta) p(\bar{c}, c) &\leq p(c, c) \\ \Leftrightarrow \beta &\geq \frac{p(c, c) - p(\bar{c}, c)}{p(\underline{c}, c) - p(\bar{c}, c)} \equiv \beta_p. \end{aligned}$$

Detailed welfare expressions

If firm 1 merges in-market, the expected welfare is as follows:

$$W^{im}(\alpha) = (1 + \delta)(\alpha w(\underline{c}) + (1 - \alpha)w(c, c)),$$

where $w(.,.)$ is the sum of producer and consumer surpluses, which depend on marginal costs.

If firm 1 merges cross-border, the expected welfare is:

$$W^{cb} = (1 + \delta)(\beta w(\underline{c}, c) + (1 - \beta)w(\bar{c}, c)),$$

$$W^e(\alpha) = W^{cb} + \delta\alpha(w^e - w(c, \bar{c})),$$

for the benchmark case (cb) and with a possibility of exit (e), respectively, where $w^e = w(c, c) + w(\underline{c})$ is the level of social welfare after an exit via a merger.

Therefore, we have $W(1^-) = W^{im}(1^-) = (1 + \delta)w(\underline{c})$

and $W(\alpha^{e-}) = W^e(\alpha^{e-}) = W^{cb} + \delta\alpha^{e-}(w^e - w(c, \bar{c}))$.

Proof of Proposition 5

We build the thresholds $\alpha^{ne}(n)$ and $\alpha^e(n)$ in the same way as in the baseline model. Given that:

$$\begin{cases} |V_1^{cb}(n) - V_1^{im}|_{|\alpha=0} < |V_1^{cb} - V_1^{im}|_{|\alpha=0}, \\ |V_1^{cb}(n) - V_1^{im}|_{|\alpha=1} > |V_1^{cb} - V_1^{im}|_{|\alpha=1}, \end{cases}$$

we deduce that $\alpha^{ne}(n) < \alpha^{ne}$. We proceed in a similar way if exit is possible to show that $\alpha^e(n) < \alpha^e$.

10. APPENDIX B

Cournot Example

Our model assumptions are satisfied for the symmetric Cournot model.

Let $D(p) = a - bp$ be the monopoly demand and $D(p_i, p_j) = a - b(p_i + p_j)$ be the duopoly demand. The monopoly maximizes its profit $(p - \underline{c})D(p)$

with respect to price p , whereas in a duopoly, firm i maximizes its profit $(p_i - c)D(p_i, p_j)$ with respect to p_i , taking p_j as given.

The equilibrium profits in the different scenarios (initial duopoly game, profits after an IMM and a CBM, profitable or unprofitable) are as follows:

$$\begin{aligned}\Pi(c) &= \frac{(a-c)^2}{9b}, \quad \Pi_{12}(\underline{c}) = \frac{(a-\underline{c})^2}{4b}, \quad \Pi_{13}(\underline{c}) = \frac{2(a-2\underline{c}+c)^2}{9b}, \\ \Pi_{13}(\bar{c}) &= \frac{2(a-2\bar{c}+c)^2}{9b},\end{aligned}$$

where we assume that $a > 2\bar{c} - c$. Note that Π_{34} , the IMM profit after an exit-by-merger, is equal to Π_{12} .

From Lemma 1, the minimum β such that a CBM is preferred to the status quo is:

$$\beta^{ne} = \frac{(a-\bar{c})(\bar{c}-\underline{c})}{(a+c-\bar{c}-\underline{c})(\bar{c}-c)}.$$

From Lemma 3, the minimum β such that, in expectation, a CBM is never price-increasing is

$$\beta_p = \frac{\bar{c}-c}{\bar{c}-\underline{c}},$$

where $\beta_p > \beta^{ne}$, meaning that in the Cournot framework, the minimum β such that a CBM is never price-increasing is higher than the minimum β making the CBM preferable to status quo.

Numerical example

As an illustration, let $a = b = 1$, $c = 0.5$, $\bar{c} = 0.6$, $\underline{c} = 0.35$, $\beta = 0.5$, and $\delta = 0.5$. In this case, $\beta^{ne} = 0.29$, $\beta_p = 0.4$, the exit payoff is $\Delta E = 0.07$ and $\alpha^{ne} \approx 0.51 < \alpha^e \approx 0.7$.

The figure below illustrates the trade-off between in-market and cross-border merger in this numerical example for the Cournot setting.

If the IMM yields very limited efficiencies and the CBM is highly unprofitable, the exit payoff can be negative (as mentionned in footnote 17): for example, if $\bar{c} = 0.88$ and $\underline{c} = 0.49$, then $\Delta E = -0.008$.

Figure 4. IMM vs CBM trade-off – Cournot example.