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ABSTRACT

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We introduce a simple oligopolistic trade model with international transportation costs, and analyze the profitability and the social desirability of national vs. international mergers in relation to three different issues, (i) the level of trade freeness, (ii) the possibility of rent appropriation on world markets, and (iii) direct "synergy" effects of mergers. Cross-border M&A is privately and socially more attractive than domestic mergers. National competition policy may be too permissive towards M&A, because it does not take into account the negative impact of decreasing competition on world consumer surplus. We also discuss the normative implications of "national champions". The promotion of national mergers can be in the interest of individual countries if rent extraction possibilities are strong enough, but global welfare is adversely affected.

JEL Classification: F12, F23, L13, L52

Keywords: mergers, national champions, international trade, economic integration

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1) Introduction

Cross-border mergers and acquisitions (M&A) account for the lion's share of foreign direct investment, particularly among developed countries. Their importance has even been growing in recent years, parallel to a general trend of ongoing economic integration. The share of cross-border mergers over total FDI inflows among developed countries has increased from roughly 77 per cent in the late 1980s to almost 90 per cent in the period 1998-2001. International mergers also account for a substantial and growing share among all M&A activities (UNCTAD, 2005; Bjorvatn, 2004; Straume, 2003).

At the same time, the "national champions" argument seems to gain prominence in many countries. For example, the French government has heavily opposed the announced acquisition of the electricity and gas company SUEZ by the Italian competitor ENEL, and instead advocated a merger with the national firm GAZ DE FRANCE, which would create one of the largest gas providers worldwide. Another example is the merger between the German energy firms EON and RUHRGAS in 2002. This merger was originally blocked by German competition authorities, on the grounds that it would lead to a dominant position on the domestic market. But this decision was overruled by the federal government ("*Ministererlaubnis*") which stated that the creation of a Germany-based global player on energy markets is in the interest of the society, despite the detrimental domestic effects, because the newly created "champion" would play a significant role on world markets.

There is a sizeable literature that addresses several aspects of mergers in the context of open economies. Barros/Cabral (1994) extend the concept of ´external merger effects on outsiders´ by Farrell/Shapiro (1990) to open economies, and Head/Ries (1997) analyze nationally vs. globally optimal policy towards cross-border mergers. Several papers (Saggi/Yildiz 2006, Huck/Konrad 2004, Horn/Levinsohn 2001 or Richardson 1999, among others) discuss the interrelation between competition policy and other instruments at the disposal of governments, e.g. the impact of mergers on optimal trade policy, whereas Forslid et al. (2005) study if countries of different size have different motives for introducing competition policy.

However, theoretical work on the pros and cons of national versus international M&A, particularly in relation to the degree of trade integration, is still very scant. The main aim of this paper is to introduce a simple framework that allows to jointly analyze the profitability and the social desirability of national vs. international mergers in relation to three different issues, (i) the level of trade freeness, (ii) the possibility of rent appropriation on world markets, and (iii) the impact of "merger synergies", i.e. a direct production cost reductions due to mergers (Williamson, 1968).[1]

We develop our results consecutively and start off with a two-country model where four firms compete in quantities on segmented markets subject to (iceberg) trade costs. This framework is a straightforward extension of the seminal "reciprocal dumping" model by Brander (1981), and is suited to address the first issue: Does the level of trade freeness affect the profitability and the welfare implications of national and cross-border mergers (among two firms) relative to the pre-merger situation and relative to each other?

[1] These "synergy effects" are also regarded as important by competition authorities (e.g. in the European Union) as they might induce an efficiency defence of merger cases. A recent development in the literature is to endogenize the source of these synergy effects, and to discuss related information asymmetries between firms, or between firms and competition authorities (see Qiu/Zhou 2006, Lagerlöf/Heidhues 2005). In this paper we take the potential production cost reductions as exogenous, although we highlight the trade cost saving aspect of international mergers explicitly.

We show that the trade cost saving aspect of international M&A is so strong that it always renders cross-border mergers more profitable and socially more desirable than national ones. Cross-border mergers are also generally profitable compared to the pre-merger situation, but they increase welfare only if trade freeness is sufficiently low. These results are consistent with the recent surge of international M&A, but also with the casual observation that competition authorities like the EU Commission had to deal with a vastly increasing number of merger regulation cases in recent years. This might reflect the fact that cross-border M&A are put under increased scrutiny as economic integration proceeds, since trade cost savings become less important as an efficiency defence argument.

Afterwards we extend the framework by adding a world market, and by allowing for direct "merger synergies". We show how this affects private and social incentives for different merger formations at different stages of trade integration, and we point at possible discrepancies between national and global welfare. National competition policy may be too permissive towards M&A, because it does not take into account the negative impact of decreasing competition on world consumer surplus. On the other hand, a hypothetical global competition authority would also not categorically reject any merger that increases rent extraction from the world market, even if synergy effects are absent. We also discuss the normative implications of "national champions" in this extended model. Such a policy can be in the interest of individual countries if rent extraction possibilities are strong enough, but from a global perspective it is a sub-optimal *beggar-thy-neighbour* policy.

Our model is most closely related to two pieces of work. Firstly, Haufler/Nielsen (2005) also compare national and international mergers from a private and social perspective while allowing for "synergies" and foreign rent appropriation. However, in their model firms from the two producing countries compete only on the third market, hence the formation of national mergers leads to domestic monopoly. In our approach firms compete on all markets, subject to trade costs. It turns out that this realistic feature of our model substantially changes results regarding the merits of different merger forms.

The second closely related reference is Horn/Persson (2001), who consider a two-country model with Cournot competition among four firms. They model endogenous merger formation as a cooperative game of coalition building and use a general dominance relation to compare different ownership structures.[2] In this paper we will use the more traditional profit comparison between pre-merger and merger scenarios, and we concentrate on mergers between two firms only. Our model differs in two main respects from the one by Horn/Persson (2001). Firstly, they do not consider the role of rent extraction from a third country, hence they do not discuss discrepancies between national and global welfare. Secondly, in their benchmark model without synergy effects they obtain the result that national mergers are more profitable than international ones if trade costs are *high*, despite the fact that only cross-border mergers can avoid trade costs (p. 319).[3] We discuss below why this result does not arise in our two-country model, since we find that cross-border mergers are generally more profitable.

The paper is structured as follows: We present our benchmark model in section 2, the extended model in section 3, and some concluding remarks in section 4.

[2] Straume (2003) and Lommerud et al. (forthcoming) extend this model by Horn/Persson (2001) to study the impact of unionized labor markets on the profitability of different endogenous merger structures.

[3] Starting from this result, Horn/Persson (2001) argue that a decline in trade costs can trigger increasing cross-border M&A activity. This is also the main theme in Bjorvatn (2004) who presents a unifying analysis of mergers and greenfield FDI. In our model cross-border M&A are always profitable, but we show that they decrease welfare and might, thus, be prevented by competition authorities if trade freeness is sufficiently low.

2) Benchmark two-country model

There are two countries, H and F, and four firms (i=1,2,3,4). Firms 1 and 2 are located in country H, whereas firms 3 and 4 are located in country F. All firms are symmetrical and produce a homogenous commodity. They compete à la Cournot on the two segmented markets H and F. Unit costs of production are constant and normalized to one. There are "iceberg" trade costs for international transport. From each unit shipped in country H only a fraction $0 < g < 1$ arrives in country F (and vice versa). The parameter g represents the level of trade freeness, capturing all sorts of transportation costs and other trade impediments. This setup closely resembles the seminal model by Brander (1981), but we consider two firms instead of one firm in either country. Demand in country H is given by

$$p_H = a - b \cdot H \qquad a > 1, b > 0 \tag{1}$$

where p_H denotes the price, and $H = x_1 + x_2 + g\left(y_3 + y_4\right)$ is total consumption of the commodity. This consists of the domestic production by firms 1 and 2 for their own market (x_1, x_2), and the production by the foreign firms 3 and 4 net of transport losses (gy_1, gy_2). Analogously, demand in country F is given by $F = x_3 + x_4 + g\left(y_1 + y_2\right)$.

2.1. Pre-merger equilibrium

Firm 1 solves the following profit maximization problem,

$$Max\ \pi_1 = \left(a - b\left(x_1 + x_2 + g(y_3 + y_4)\right)\right) \cdot x_1 + \left(a - b\left(x_3 + x_4 + g(y_1 + y_2)\right)\right) \cdot gy_1 - x_1 - y_1, \tag{2}$$

and chooses quantities x_1 and y_1. Firms 2, 3 and 4 consider analogous problems. In the initial situation with four independently acting firms, standard optimization yields the following Cournot-Nash equilibrium quantities, prices, profits and welfare. We omit firm and country subscripts due to symmetry.

$$x = \frac{ag - 3g + 2}{5bg} \qquad y = \frac{ag + 2g - 3}{5b(g)^2} \qquad p = \frac{ag + 2g + 2}{5g} \tag{3}$$

$$\pi = \frac{1}{25b(g)^2}\left[\left(ag - 3g + 2\right)^2 + \left(ag + 2g - 3\right)^2\right] \qquad \Omega = 2\pi + \frac{2}{25b(g)^2}\left[\left(g\left(2a - 1\right) - 1\right)^2\right]$$

x denotes output of any firm for its respective domestic market, y is the output that is exported to the other country (from which only the fraction g arrives), and π is the equilibrium profit level. We use a utilitarian welfare criterion, namely total national surplus Ω, which is defined as the sum of consumer surplus and profits of all national firms.

Before turning to the analysis of mergers, it is useful to recall some properties of this "reciprocal dumping" model. There is "dumping", because firms have a lower profit margin per unit on their export market, due to higher effective marginal cost. In order to warrant intra-industry trade in identical commodities, we need to require that trade freeness g is above a certain lower limit, namely

$$y > 0 \quad \Leftrightarrow \quad g_{trade} < g < 1, \quad g_{trade} = \frac{3}{2+a} \tag{4}$$

The market share of a foreign firm on the market of country H is given by

$$s_y \equiv \frac{gy}{H} = \frac{g(a+2)-3}{g(4a-2)-2} \tag{5}$$

This market share is increasing in g and approaches $s_y = \frac{1}{4}$ as $g \to 1$. The higher is trade freeness g, the stronger is competition on product markets. However, there is also a waste of resources for transporting identical commodities across countries. Hence the welfare implications of trade integration (a rise in trade freeness g) are ambiguous. By (3) we find

$$\frac{\partial \Omega}{\partial g} > 0 \quad \Leftrightarrow \quad \frac{14}{11+3a} < g < 1, \qquad \frac{\partial \Omega}{\partial g} < 0 \quad \Leftrightarrow \quad \frac{3}{2+a} < g < \frac{14}{11+3a} \tag{6}$$

2.2. National mergers

Consider the formation of a merger between the two firms from the same country. We rule out any reduction in the unit costs in this section. The first question to ask is whether this national merger is profitable for the participating firms, i.e. if the post-merger profit level is higher than the sum of individual profits prior to the merger.

For this profit comparison, it is important to note that we do not have to consider the case of an *isolated* national merger of *only* firms 1 and 2, or *only* firms 3 and 4. If a national merger formation is profitable, then – due to the symmetry of the model – it will be profitable in both countries. Furthermore, this simultaneity even strengthens the private incentives for national merger formation.

Suppose for the moment that $g = 1$, i.e. trade between the two countries is completely free. In this case our model is simply a standard Cournot oligopoly with four firms. It is well known that in this market structure a merger between two firms (i.e., a move from four to three firms) would not be profitable, because the market share of the two merging firms is below the 80% benchmark. This result is due to the seminal paper by Salant et al. (1983). However, it is straightforward to show that an instantaneous move from four to two firms (i.e., a simultaneous formation of two mergers) would be profitable. In fact, any single pair of firms does not have an incentive to merge in isolation, but a coordinated formation of two mergers is profitable. It seems reasonable to assume that such profit-raising coordination among firms across national borders is possible.[4] The introduction of trade costs does not change this basic result: If trade freeness is such that an isolated national merger would be profitable, then the other pair of firms has an incentive to merge as well. Furthermore, it can be shown that there is a range of g where a simultaneous merger is profitable, whereas an isolated merger is not.

[4] As long as we rule out synergy effects and consider only duopoly structures as alternatives to the pre-merger configuration the direct profit comparison is isomorphic to the more general "dominance relation" by Horn/Persson (2001) to compare different merger formations, see p. 319. In their terminology one can then say that the formation of an isolated national merger is never the "equilibrium ownership structure", whereas the simultaneous formation of mergers can be.

It remains to be analyzed under which circumstances the market structure with two national mergers is more profitable than the pre-merger equilibrium structure. Furthermore, we can compare total welfare in both scenarios.[5] The endogenous variables in the configuration with one firm in either country are as follows,

$$x_{nat} = \frac{ag - 2g + 1}{3bg} \qquad y_{nat} = \frac{ag + g - 2}{3b(g)^2} \qquad p_{nat} = \frac{ag + g + 1}{3g} \tag{7}$$

$$\pi_{nat} = \frac{1}{9b(g)^2}\left[(ag - 2g + 1)^2 + (ag + g - 2)^2\right] \qquad \Omega_{nat} = \pi_{nat} + \frac{1}{9b(g)^2}\left[\tfrac{1}{2}\left(g(2a-1)-1\right)^2\right]$$

Comparing (7) and (3) we can establish the following results

Proposition 1

(a) The simultaneous formation of national mergers is profitable if $g > \underline{g}$ *and unprofitable if* $g_{trade} < g < \underline{g}$.

(b) The simultaneous formation of national mergers always reduces welfare.

Proof:

(a) $$\Delta\pi_{nat} \equiv \pi_{nat} - 2 \cdot \pi = \frac{g\left(232 - 109g + 14a\left(g(a-1)-1\right)\right) - 109}{225b(g)^2}$$

It is readily verified that $\Delta\pi_{nat} > 0$ if $g > \underline{g} = \dfrac{109}{116 + 15(a-1)\sqrt{7} - 7a} \in \left[g_{trade}, 1\right]$ and $\Delta\pi_{nat} < 0$ if $g_{trade} < g < \underline{g}$.

(b) $$\Delta\Omega_{nat} \equiv \Omega_{nat} - \Omega = \frac{g\left(442 - 229g + 16a(1 + g - ag\right) - 229}{450b(g)^2} < 0 \quad \forall g \in \left[g_{trade}, 1\right]$$ □

Simultaneous national mergers are only profitable if trade is sufficiently free. The intuition is that the market share of the merged firm on its domestic market always decreases compared to the pre-merger configuration, whereas the market share on its foreign market increases. If trade freeness is low, the importance of the home market is high and the decreasing domestic market share renders the national merger unprofitable. Yet, even if a national merger is profitable, it is never in the interest of the society as a whole. The increase of the producer surplus is always lower than the decline of consumer surplus, hence national competition authorities would prevent this merger. This would of course change if we assume that the national merger brings about significant unit cost reductions. In the absence of these "synergies", which will be addressed in section 3, national mergers only increase market concentration and are therefore socially undesirable.

[5] In the two-country model, due to symmetry, national and global welfare can not differ.

2.3. International mergers

Consider now the case of mergers between firms from the home country and from the foreign country. Similar to national mergers, such a merger formation would only occur simultaneously, i.e. there are either two multi-national firms (e.g., 1+3 and 2+4), or none.

The difference between international and national mergers in this model is that the former are associated with trade cost reductions. We make the simplifying assumption that an internationally merged firms can service both markets without having to bear any iceberg trade costs g, although it is not critical to our results that trade cost vanish completely. The potential for multi-national firms to save on trade costs has been discussed intensively in the general literature on FDI, but hardly in the context of mergers.

The case with two international mergers comes down to a standard Cournot duopoly where firms compete on an integrated market. The endogenous variables are

$$x_{\text{int}} = \frac{a-1}{3b} \qquad y_{\text{int}} = \frac{a-1}{3b} \qquad p_{\text{int}} = \frac{2+a}{3}$$

$$\pi_{\text{int}} = \frac{2(a-1)^2}{9b} \qquad \Omega_{\text{int}} = \frac{2(a-1)^2}{9b} + \frac{2(a-1)^2}{9b} \tag{8}$$

Using (8), (7) and (3) we can establish the following results

Proposition 2

(a) The simultaneous formation of international mergers is more profitable than the simultaneous formation of national mergers.

(b) The simultaneous formation of international mergers is always profitable relative to the pre-merger configuration.

(c) The simultaneous formation of two international mergers increases welfare if $g_{trade} < g < \overline{g} \equiv \frac{21}{19+2a}$*, whereas it lowers welfare if* $g > \overline{g}$.

Proof:

(a) $$\Delta\pi'_{\text{int}} \equiv \pi_{\text{int}} - \pi_{nat} = \frac{(1-g)\left(g(3+2a)-5\right)}{9b(g)^2} > 0 \qquad \forall g \in \left[g_{trade}, 1\right]$$

(b) $$\Delta\pi_{\text{int}} \equiv \pi_{\text{int}} - 2\cdot\pi = \frac{2\left((2+a)g-3\right)\left(39+g\left(7a-46\right)\right)}{225b(g)^2} > 0 \qquad \forall g \in \left[g_{trade}, 1\right]$$

(c) $$\Delta\Omega_{\text{int}} \equiv \Omega_{\text{int}} - \Omega = \frac{4}{225b(g)^2}\left[\left(3-g(a+2)\right)\cdot\left(g(19+2a)-21\right)\right]. \tag{9}$$

$$\Delta\Omega_{\text{int}} > 0 \quad \Leftrightarrow \quad \tfrac{3}{2+a} = g_{trade} < g < \overline{g} = \tfrac{21}{19+2a}, \qquad \Delta\Omega_{\text{int}} < 0 \quad \Leftrightarrow \quad g > \overline{g}. \qquad \square$$

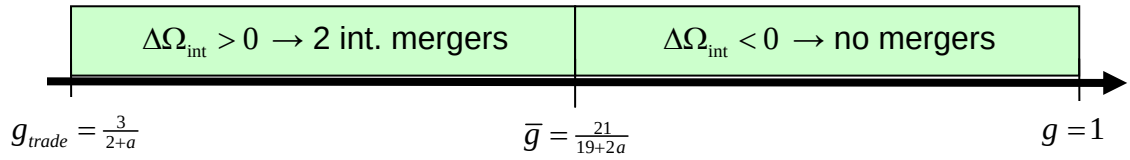
International mergers are always more attractive for the participating firms than national mergers, because they yield an identical change in market concentration but additionally imply trade costs savings. This intuitive result of our model, which might be labelled the "tariff jumping" motive for cross-border mergers, differs from the findings by Horn/Persson (2001). They argue that national mergers are in fact *more* profitable than international ones if

trade costs are *high* (p. 319). The reason is that a national merger then leads to a quasi-monopoly on the respective home market, which is more profitable than forgoing trade costs but being exposed to duopoly competition on both markets. Although this mechanism is also present in our model, it can never prevail over the "tariff jumping" force in the admissible range of g.[6] Furthermore, we have shown that national mergers always lower welfare, and are not even profitable compared to the pre-merger configuration if trade freeness is low.

On the contrary, simultaneous international mergers are always profitable compared to the pre-merger configuration. This is so for two reasons: They increase market concentration, and they avoid trade costs. Yet, international mergers are socially desirable only if trade freeness is low. The reason is that the increase in market concentration is not in the interest of consumers, whereas the reduction in trade costs implies lower prices and higher consumer surplus. This trade cost effect is stronger the lower is g. Put differently, if trade freeness is high enough, the trade cost saving aspect of international mergers becomes less important, and competition authorities would prefer to have stronger competition.

In sum, the benchmark model yields clear-cut results regarding the profitability and social desirability of mergers in different stages of trade integration. The only relevant possibilities are either a market structure with two internationally merged firms for $g_{trade} < g < \overline{g}$, or the un-concentrated market structure for $g > \overline{g}$ in which case competition authorities would not allow cross-border M&A. National mergers will never occur, for two reasons: They are less profitable than international mergers in the feasible range of g, and they would always be blocked by competition authorities. These results are illustrated in figure 1.

Figure 1: Socially most preferred market structure



As an interesting by-product we now obtain unambiguous results regarding the social desirability of trade integration. Recall that an increase in g might lead to a rise, or to a decline in social welfare *provided* the market structure remains un-concentrated (see eq. (6)). However, taking into account that the market structure will be characterized by two international mergers for $g_{trade} < g < \overline{g}$ we now find that higher trade freeness will never be socially harmful.[7]

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[6] We have assumed $g > g_{trade}$ to warrant $y > 0$ in the pre-merger situation. With national mergers a laxer restriction on g is sufficient to warrant $y_{nat} > 0$, namely $g > 2/(1+a)$. One can show that $\Delta\pi'_{int} < 0$ is possible in the range $2/(1+a) < g < g_{trade}$, for the reasons explained in Horn/Persson (2001). However, this result does not occur for relevant trade freeness levels that guarantee international trade also in the pre-merger situation. Furthermore, the result that national mergers reduce social welfare also holds for $2/(1+a) < g < g_{trade}$.

[7] For $g_{trade} < g < \overline{g}$, welfare is given by $\Omega_{int} = 4(a-1)^2/9 \cdot b$. Hence $\partial\Omega/\partial g = 0$. For $g > \overline{g}$, welfare is given by (3). Since $\overline{g} = 21/(19+2a) > 14/(11+3a)$, we have $\partial\Omega/\partial g > 0$ in this range of g.

3) Extended three-country model

In this section we extend the above model to include a world market, and the possibility that mergers involve direct production cost reductions (apart from the trade cost saving aspect of international mergers).

3.1. Pre-merger equilibrium

We start by describing the pre-merger situation with four independently acting firms. A third country, labelled W, is added to the picture. There is no production, but only consumption in this "world market". The four firms from H and F are symmetric Cournot competitors on the market W. Demand in the world market is given by

$$p_W = a - b_W \cdot W \qquad b_W > 0 \qquad W = \sum_{i=1}^{4} g_W w_i \tag{10}$$

We allow for size differences between W and either country H or F. With identical preferences of consumers, horizontal aggregation implies that $0 < b_W < b$ if the world market W is larger than country H, F (and vice versa). Iceberg trade costs for servicing market W might also be different from trade costs between countries H and F, i.e. $0 < g_W < 1$, $g_W \neq g$. Equilibrium prices and quantities on the markets H and F remain unchanged compared to (3), but profits and total national welfare increase. We can also analyze global welfare Ω^G, which includes welfare in H and F plus consumer surplus in W. Endogenous variables in the pre-merger configuration are given by

$$x = \frac{ag - 3g + 2}{5bg} \qquad y = \frac{ag + 2g - 3}{5b(g)^2} \qquad w = \frac{ag_W - 1}{5b_W g_W} \tag{11}$$

$$\pi = \frac{1}{25b(g)^2}\left[(ag - 3g + 2)^2 + (ag + 2g - 3)^2 + B \cdot G^2 \cdot (ag_W - 1)^2\right]$$

$$\Omega = 2\pi + \frac{2}{25b(g)^2}\left[(g(2a-1) - 1)^2\right] \qquad \Omega^G = 2\Omega + \frac{8}{25b(g)^2}\left[B \cdot G^2 \cdot (ag_W - 1)^2\right]$$

where $B \equiv b/b_W > 0$ is increasing in the relative size of the world market, and $G \equiv g/g_W > 0$ measures relative trade freeness. To warrant positive trade flows between H and F, condition (4) must still hold. In addition, we require $(1/a) < g_W < 1$ to have to positive production of any firm for the world market ($w > 0$).

3.2. National vs. international mergers

As in the previous section we could use this pre-merger equilibrium as a reference scenario and analyze the profitability and social desirability of national and international mergers separately. However, it turns out to be computationally more convenient to proceed slightly different. In this subsection we will start with the comparison of (simultaneous) national

mergers with (simultaneous) international mergers. Only afterwards we analyze if a merged configuration is more profitable and socially more desirable than the pre-merger situation.[8]

National mergers

There is one firm in country H and one firm in country F. Both firms are active on three markets (H, F and W) and have to bear iceberg trade cost g or g_W, respectively. In contrast to the previous section we allow for direct "synergies" of the merger by assuming that post-merger unit costs are equal to $c \leq 1$. Straightforward calculations yield the following results

$$x_{nat} = \frac{ag - 2gc + c}{3bg}, \qquad y_{nat} = \frac{ag + gc - 2c}{3b(g)^2}, \qquad w_{nat} = \frac{ag_W - c}{3b_W (g_W)^2} \tag{12}$$

$$\pi_{nat} = \frac{1}{9b(g)^2}\left[\left(ag - 2gc + c\right)^2 + \left(ag + gc - 2c\right)^2 + B \cdot G^2 \cdot \left(ag_W - c\right)^2\right]$$

$$\Omega_{nat} = \pi_{nat} + \frac{1}{9b(g)^2}\left[\tfrac{1}{2}\left(2ag - c(1+g)\right)^2\right] \qquad \Omega_{nat}^G = 2\Omega_{nat} + \frac{2}{9b(g)^2}\left[B \cdot G^2 \cdot \left(ag_W - c\right)^2\right]$$

International mergers

When two internationally merged firms are formed, both firms can avoid trade costs g but not g_W. Effectively, we move to a standard Cournot duopoly without trade costs on the joint market H+F, and from a configuration with four firms to a duopoly on the market W. The direct cost reductions $c \leq 1$ are assumed to be identical for international mergers. The endogenous variables are given by

$$x_{\text{int}} = \frac{a - c}{3b}, \qquad y_{\text{int}} = \frac{a - c}{3b}, \qquad w_{\text{int}} = \frac{ag_W - c}{3b_W (g_W)^2} \tag{13}$$

$$\pi_{\text{int}} = \frac{1}{9b}\left[2\left(a - c\right)^2 + B \cdot G^2 \cdot \left(ag_W - c\right)^2\right]$$

$$\Omega_{\text{int}} = \pi_{nat} + \frac{2\left(a - c\right)^2}{9b}, \qquad \Omega_{\text{int}}^G = 2\Omega_{nat} + \frac{2}{9b}\left[B \cdot G^2 \cdot \left(ag_W - c\right)^2\right]$$

A comparison of (13) and (12) yields the following result

Proposition 3

(a) The simultaneous formation of international mergers is always more profitable than the simultaneous formation of national mergers.

(b) The simultaneous formation of international mergers always yields higher national and global welfare than the simultaneous formation of national mergers.

[8] For the same reason as in the previous section, there are never isolated national or international mergers of only two firms.

Proof:

(a) $\Delta\pi'_{\text{int}} \equiv \pi_{\text{int}} - \pi_{nat} = \dfrac{(1-g)c\left(g(3c+2a)-5c\right)}{9b(g)^2} > 0$

(b) $\Delta\Omega'_{\text{int}} \equiv \Omega_{\text{int}} - \Omega_{nat} = \Omega^G_{\text{int}} - \Omega^G_{nat} = \dfrac{(1-g)c\left(8ag+c\left(3g-11\right)\right)}{225b(g)^2} > 0 \qquad \forall g \in \left[g_{trade},1\right]$ □

This proposition generalizes a result from the previous section, namely that international mergers are always better than national mergers from a private, and from a social perspective. Introducing "synergy effects" and a world market does not affect this basic insight. The intuition is that international mergers give rise to larger cost savings, namely trade cost savings, that come in addition to the general unit cost reductions that were assumed to be identical for both merger types. Moreover, the change in the competitive position on the world market is identical for both merger types, the profit difference and the welfare difference are both independent of B and g_W. In Haufler/Nielsen (2005) cross-border mergers are not necessarily more profitable than national ones in a setting where firms compete on the world market only, because national mergers lead to domestic monopoly in their framework whereas international mergers do not. Our model shows that the introduction of even modest trade between countries H and F overturns this result and yields a clear "dominance" of international over national mergers.

3.3. International mergers vs. no mergers

For the remaining analysis, we only have to compare the equilibrium with two international mergers and the pre-merger configuration. Comparing (13) and (11) we establish the following first result,

Proposition 4
The simultaneous formation of international mergers increases profits on all markets, hence it is always profitable relative to the pre-merger configuration.

Proof:

$$\Delta\pi_{\text{int}} \equiv \pi_{\text{int}} - 2\pi = \left(\pi^{H+F}_{\text{int}} - 2\pi^{H+F}\right) + \left(\pi^{Z}_{\text{int}} - 2\pi^{Z}\right) =$$

$$\underbrace{\frac{2\left[18g\left(12+a\right)+g^2\left(a(18+7a)+25c^2-50ac-117\right)-117\right]}{225b(g)^2}}_{(+)} + \underbrace{\frac{ag_W\left(36+7ag_W\right)+25c^2-50ag_Wc-18}{225b_W(g_W)^2}}_{(+)}$$

The first (second) term depicts the profit difference between the international merger and the pre-merger configuration that arises on the joint market H+F (the world market W). Both terms are positive under the imposed parameter restrictions $g_{trade} < g < 1$ and $1/a < g_W < 1$. Hence, $\Delta\pi_{\text{int}} > 0$. Note that $\left(\pi^{H+F}_{\text{int}} - 2\pi^{H+F}\right) > 0$ is hump-shaped in g, i.e. it is at first rising in g (until $g = \frac{13}{12+a}$) and then falling in g. □

The international merger raises profits on the joint market H+F, because it increases market concentration *and* it avoids trade costs g. On the market W, the merger is profitable for any admissible value of g_W, because there is an instantaneous switch from four to two firms. As argued above, this switch in market concentration is profitable for the participating firms even in the absence of any cost reduction. In effect, the merger formation allows firms from countries H and F to extract larger profits from the world market W.

Turning to a welfare comparison between the pre-merger and the international merger scenario, assume at first that $c=1$ (i.e. there are no synergy effects) and consider the role of the world market W only. Using (13) and (11) the national/regional welfare difference[9] is

$$\Delta\Omega_{\text{int}}\left(c=1\right) \equiv \Omega_{\text{int}} - \Omega = \frac{\left[4\left(3-g(a+2)\right)\cdot\left(g(2a+19)-21\right)\right]+7B\cdot G^2\left(ag_W-1\right)^2}{225b(g)^2} \qquad (14)$$

The first term in the numerator of (14) is identical to the respective welfare difference in the benchmark model without a world market (where $B\to 0$, see (9)). Introducing the market W yields the second term in squared parentheses in (14), which is positive and increasing in world market size B. If market W is large enough ($B>\tilde{B}$), $\Delta\Omega_{\text{int}}\left(c=1\right)>0$ will hold for all admissible values $g_{trade}<g<1$. When the world market is sufficiently small, trade freeness g must be low enough for social desirability, namely

$$\left\{\Delta\Omega\left(c=1\right)>0 \quad\wedge\quad B<\tilde{B}=\frac{8(a-1)^2(g_W)^2}{7(ag_W-1)^2}\right\} \quad\Leftrightarrow\quad g_{trade}<g<\tilde{g}\left(c=1\right)<1$$

$$\text{with} \qquad \tilde{g}\left(c=1\right)=\frac{42}{33+9a-5\sqrt{\left(a-1\right)^2+\frac{49}{25(g_W)^2}B\left(ag_W-1\right)^2}} \;>\; \overline{g}=\tfrac{21}{19+2a}$$

Otherwise, if $g>\tilde{g}(c=1)$ and $B<\tilde{B}$, the trade cost savings and the profit extraction from market W do not compensate the negative effects of the international merger on domestic consumer surplus, and the simultaneous international merger would be socially detrimental.

If we allow for direct unit cost reduction of a merger, its social desirability increases. The welfare difference $\Delta\Omega_{\text{int}}$ for general $c\le 1$ is given by

$$\Delta\Omega_{\text{int}}=\frac{1}{225b(g)^2}\left[\begin{array}{l}4\left(9g\left(3a+11\right)+g^2\left(25c^2+a(27-50c)-2a^2-63\right)-63\right)\\ +\;7B(G)^2\left(25c^2-50ag_Wc+ag_W\left(36+7ag_W\right)-18\right)\end{array}\right] \qquad (15)$$

One can show that $\partial\left(\Delta\Omega\right)/\partial c<0$ and $\partial^2\left(\Delta\Omega\right)/\partial c\,\partial g=0$: The stronger is the unit cost reductions (the lower is c), the more socially desirable is the merger irrespective of the current level of trade freeness between countries H and F. We can state the following proposition,

[9] With "regional welfare" we mean the joint welfare of countries H+F.

Proposition 5

(a) The simultaneous formation of two international mergers increases national/regional welfare if $g_{trade} < g < \tilde{g}(c,B,\cdot)$*, whereas it lowers welfare if* $g > \tilde{g}(c,B,\cdot)$.

(b) The critical trade freeness level $\tilde{g}(c,B,\cdot)$ *is decreasing in* c *and increasing in* B*. It is always larger than the respective critical trade freeness level in the benchmark model,* $\tilde{g}(c,B,\cdot) > \overline{g} = \frac{21}{19+2a}$ *(see prop. 2).*

Proof

See Appendix 1.

The assumption of unit cost reductions ($c \leq 1$), but also the introduction of the world market ($B > 0$) increase the parameter domain for which the simultaneous international merger is socially desirable for the country bloc H+F. This is due to the fact that firms in H and F can extract higher profits from market W if they merge (see prop. 4). This raises regional producer surplus, whereas it leaves regional consumer surplus unaffected.

3.4. Global welfare analysis

The possibility to appropriate rents from the world market increases the desirability of mergers from the point of view of the country bloc H+F. However, a global welfare analysis would also recognize the impact on consumer surplus in W. We can use (13) and (11) to compare the pre-merger configuration with the simultaneous international merger scenario from the point of view of global welfare. We again neglect direct cost reduction at first, i.e. we set $c = 1$. The welfare difference is then

$$\Delta\Omega^{G}_{\text{int}}(c=1) = \frac{8}{225b(g)^2}\left[(3-g(a+2))\cdot(g(2a+19)-21) - B\cdot G^2\cdot(ag_W - 1)^2\right] \qquad (16)$$

The first term in squared parentheses of (16) is identical to the national welfare difference in the benchmark model, see (9). It represents the social desirability of the international merger with respect to producer and consumer surplus on the joint market H+F only. The second term in (16) captures the net welfare difference with respect to consumer surplus and domestic profits realized on market W. This term is unambiguously negative, which states that the increase in profit extraction of the merged firms is always smaller than the loss of consumer surplus on market W. Hence if the world market is sufficiently large, global welfare would always decrease with simultaneous international mergers. However, global welfare might also increase. This result is covered in the following proposition

Proposition 6

Assume there are no direct cost reductions of mergers (i.e., $c = 1$*). Then,*

(a) The simultaneous international merger raises global welfare if two conditions are met: (i) $B < \tilde{B}'$*, and (ii)* $0 < g_1^G < g < g_2^G < 1$*. If either of these two conditions does not hold, the merger reduces global welfare.*

(b) There are always parameter ranges where the international merger raises domestic welfare but lowers global welfare.

Proof
Using (16), it is straightforward to show that

$$B > \tilde{B}' = \frac{25(a-1)^2 (g_W)^2}{28(ag_W - 1)^2} \qquad \Rightarrow \qquad \Delta\Omega^G (c=1) < 0 \quad \forall g \in [g_{trade}, 1],$$

If market W is not too large, i.e. provided $B < \tilde{B}'$, one can show that $\Delta\Omega^G (c=1) = 0$ if $g = g_1^G$ or if $g = g_2^G$. These two critical trade freeness levels are given by

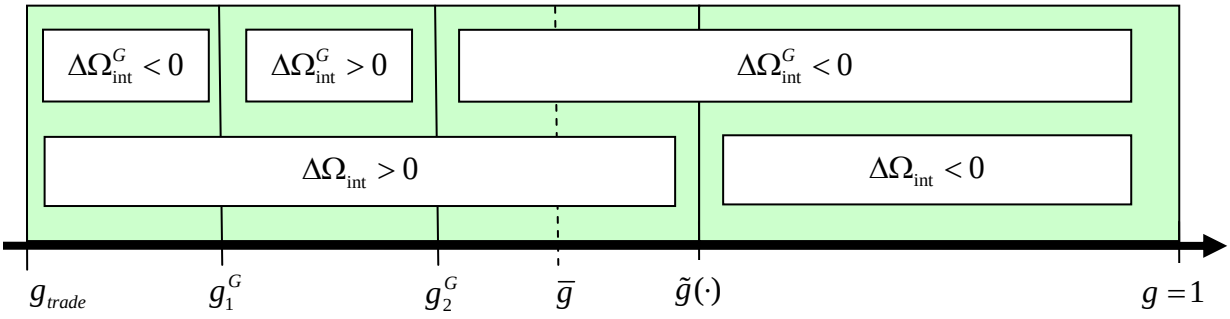
$$g_{1,2}^G (c=1) = \frac{42}{33 + 9a \pm 5\sqrt{(a-1)^2 - \frac{28}{25(g_W)^2} B(ag_W - 1)^2}},$$

With our parameter restrictions, it is always true that $g_{trade} < g_1^G < g_2^G < \bar{g} < \tilde{g}(c=1) < 1$. If $g_1^G < g < g_2^G$, we know from (14) and (16) that $\Delta\Omega^G > 0$ and $\Delta\Omega_{\text{int}} > 0$, hence the international merger would increase national and global welfare. With $g > \tilde{g}(c=1)$ we have $\Delta\Omega^G < 0$ and $\Delta\Omega_{\text{int}} < 0$. However, in the other admissible ranges of g, namely for $g_{trade} < g < g_1^G$ and $g_2^G < g < \tilde{g}(c=1)$, the merger increases national welfare but harms global welfare. In the limiting case with $B \to 0$ the critical level g_1^G reduces to g_{trade}, whereas g_2^G and $\tilde{g}(c=1)$ reduce to $\bar{g}$. □

To understand intuitively why international mergers raise global welfare in the range $g_1^G < g < g_2^G$, note that the net impact on consumer surplus and profits on market W can also be written as $\Delta\Omega_{\text{int}}^{G,W} = -(8/225 b_W g_W^2) \cdot (ag_W - 1)^2 < 0$, which is independent of g. The positive net impact on global welfare is due to the fact that the profit difference on the joint market H+F, $(\pi_{\text{int}}^{H+F} - 2\pi^{H+F})$, is hump-shaped in g (see the proof of proposition 4) and larger than the negative net impact on market W only for $g_1^G < g < g_2^G$.

Figure 2 summarizes the results of proposition 6. Except for the parameter ranges $g_1^G < g < g_2^G$ and $g > \tilde{g}$ regional competition authorities are too permissive with respect to merger formation, because they neglect the negative impact on world market consumers. A hypothetical global competition authority would be stricter with respect to international mergers, because it would internalize this negative impact. However, such a global agency would also not categorically reject any merger formation in countries H+F that allows for profit extraction from market W, even if there are no direct production cost reductions involved. If the mergers induce a sufficiently strong profit gain on the joint market H+F (as it is the case for $g_1^G < g < g_2^G$) the global competition authority would allow them, despite the fact that welfare on market W declines due to market concentration.

Figure 2: Welfare evaluation of international mergers



(Re-)introducing direct cost reductions, (11) and (13) can be used to compute the global welfare difference between the international merger scenario and the pre-merger configuration for general levels of $c \leq 1$. This reads as,

$$\Delta\Omega^G_{\text{int}} = \frac{4}{225b(g)^2}\left[\begin{array}{l} 2\left(9g\left(3a+11\right)+g^2\left(25c^2+a(27-50c)-2a^2-63\right)-63\right) \\ +\ B(G)^2\left(25c^2-50ag_Wc-2ag_W\left(ag_W-27\right)-27\right) \end{array}\right] \qquad (17)$$

A first important observation is that cost reductions raise the social desirability of mergers also from the standpoint of global welfare. This can be seen by considering

$$\frac{\partial\left(\Delta\Omega^G_{\text{int}}\right)}{\partial c} = -\frac{8\left(2b_W(g_W)^2(a-c)+b(ag_W-c)\right)}{9b\ b_W\ (g_W)^2} < 0$$

The merger formation is tolerable over a larger parameter domain the stronger are the cost reduction effects (the lower is c). In appendix 2 we show that the qualitative results from the case with $c = 1$ carry over to the general case with $c \leq 1$. In particular, there is always a range where international mergers enhance welfare in countries H+F but reduce global welfare.

3.5. "National champions"

There is a lively current policy discussion if countries should promote "national champions". One underlying motive seems to be that governments are willing to permit large scale national mergers, even if this harms domestic competition and welfare, because they expect a more than offsetting rent appropriation of the "champion" on foreign markets.

It should be emphasized again that "national champions" are always inferior to international mergers in our model, because they do not imply trade cost reductions between countries H and F (see prop. 3). The case for "national champions" argument is therefore questionable to begin with if firms could as well merge across borders.[10] However, we might assume that international mergers between firms from H and F are ruled out for some exogenous reason, e.g. because coordination costs for international merger formation are prohibitively high.

[10] This issue is also raised in Horn/Persson (2001, p.327), who point out: "Once the endogenous nature of mergers is taken into account, […] the relevant question is whether a ´national champion´ is desirable, *when equal synergies could be obtained through an international merger?*" (italics in the original)

Given that this is the case, we briefly compare (simultaneous) national mergers with the pre-merger configuration. The respective welfare difference can be computed by using (11) and (12). We neglect direct merger synergies, because they do not change results qualitatively. For the domestic welfare difference, setting $c = 1$ yields

$$\Delta\Omega_{nat} \equiv \Omega_{nat} - \Omega = \frac{\left[g\left(16a(1+g-ag) - 229g + 442\right) - 229\right] + 14 \cdot B \cdot G^2 \left(ag_W - 1\right)^2}{450b(g)^2} \quad (18)$$

The first term in the numerator depicts the welfare effects on the joint market H+F. This familiar term from the benchmark model (see prop. 1) is unambiguously negative, which represents the detrimental *domestic* effects of the national merger. Yet, when the world market size B is large enough, namely if

$$B > \tilde{B}_{nat} = \frac{\left(229 - g\left(16a(1+g-ag) - 229g + 442\right)\right)}{14 \cdot G^2 \left(ag_W - 1\right)^2} \qquad \text{with} \quad \frac{\partial \tilde{B}_{nat}}{\partial g_W} < 0,$$

the enhanced profit extraction on the world market comes to dominate (the second term in the numerator of (18)), and the "national champions" policy would increase national and regional welfare. However, even if *national/regional* welfare increases, *global* welfare will always decrease if countries H and F pursue a "national champions" policy. The respective global welfare difference is always negative, regardless of the size of the world market or the level of trade freeness g_W,

$$\Delta\Omega_{nat}^G \equiv \Omega_{nat}^G - \Omega_{nat} = \frac{\left[\left(g\left(16a(1+g-ag) - 229g + 442\right) - 229\right) - 8 \cdot B \cdot G^2 \left(ag_W - 1\right)^2 \right]}{225b(g)^2} < 0$$

In other words, a hypothetical global competition authority would always prevent a "national champions" policy in this model, because there are no trade cost reductions involved and the merger only implies higher market concentration. This result would of course have to be modified if the national merger leads to lower unit costs c. However, the "dominance" of trade cost saving international mergers continues to hold also in this case.

4) Conclusion

In this paper we have compared national and cross-border mergers from a private, and from a social point of view. A robust result of our analysis is that international M&A are more attractive for the participating firms than purely domestic mergers, and also more appealing for national and (hypothetical) global competition authorities. This is due to the fact that only international mergers yield trade cost savings, whereas the other effects (strategic effects and "synergies") are similar for both merger types in open economies. These trade cost savings can also render cross-border M&A efficient from a national or regional perspective compared to an un-concentrated market structure, but only if trade freeness is rather low. Once trade barriers have fallen sufficiently, trade cost savings are no longer a convincing efficiency defence for mergers.

These results of our model are consistent with the empirical observations that international mergers have become more and more important compared to national ones over the recent years, and that regional competition authorities (e.g. in the EU) have tended to put these cross-border M&A under increased scrutiny.

Another motive for mergers that is stressed in this paper is the possibility to appropriate rents on world markets ("strategic merger policy"). From the point of view of the world market it does not make a difference if, say, two French and two German firms ally, or if two Franco-German enterprises are formed. In both cases competition decreases and consumer surplus on the world market declines. However, from a global welfare perspective cross-border mergers may still be beneficial if they yield sufficiently strong profit gains. This in turn requires that trade costs *between* France and Germany are on an intermediate level. If these intra-regional trade costs are too low, their abolition is too unimportant to render the mergers globally efficient. If trade costs are too high, profits do also not rise strong enough, because the French and German firms lose too much shelter of their respective domestic markets. In general, however, there need not be a conflict between national/regional and global welfare when it comes to evaluate cross-border mergers, even though regional authorities tend to be too permissive as they neglect the negative effects on the world market.

On the other hand, there is a conflict between national/regional and global welfare when it comes to "national champions". The promotion of national mergers may in the interest of the regional bloc if cross-border mergers are not feasible and if the opportunity to appropriate rents on world markets is sufficiently strong. However, this policy always lowers global welfare (provided it does not induce very strong "synergy effects"). The promotion of "national champions" is therefore a case of *beggar-thy-neighbour* policy, related for example to strategic export subsidies, or other forms of state aid. Regional competition authorities can not be relied upon to prevent this type of policy, because the promotion of champions will occur simultaneously in several countries inside the bloc and raise bloc welfare. An effective prevention of socially detrimental "strategic merger policies" would require a multilateral approach.

Appendix 1: Proof of Proposition 6

The welfare difference $\Delta\Omega_{\text{int}}$ from eq. (15) is equal to zero if trade freeness g is equal to the following critical level,

$$\tilde{g}(\cdot) = \frac{42}{33 + 9a - 5\sqrt{\psi_1 + B \cdot \psi_2}} \tag{19}$$

with

$\psi_1 = \left(a(54 + a) - 56ac + 28c^2 - 27\right) > 0$

$\psi_2 = \frac{7}{25(g_W)^2}\left(ag_W\left(7ag_W + 36\right) + 25c^2 - 50ag_W c - 18\right) > 0$.

$\Delta\Omega_{\text{int}} = 0$ also holds for $g = 42\Big/\left(33 + 9a + 5\sqrt{\psi_1 + B \cdot \psi_2}\right)$. This solution is irrelevant, however, because it is always smaller than g_{trade}. Two necessary and sufficient conditions must hold for $g_{trade} < \tilde{g}(\cdot) < 1$, as given in (19), namely

$$B < \tilde{B} = \frac{4g_W\left(27 + 2a(a - 27) + 50ac - 25c^2\right)}{ag_W\left(36 + 7ag_W\right) - 50ag_W c + 25c^2 - 18} \tag{20}$$

and

$$c > \tilde{c} = a - \tfrac{3}{5}\sqrt{3}(a - 1) \tag{21}$$

If either the world market is too large ($B > \tilde{B}$) or the cost reduction is too significant ($c < \tilde{c}$), we have $\tilde{g}(\cdot) > 1$ and thus $\Delta\Omega > 0 \; \forall g \in [g_{trade}, 1]$. Provided $B < \tilde{B}$ and $c > \tilde{c}$, $\Delta\Omega_{\text{int}}$ is negative if $g > \tilde{g}(.)$, and positive if $g_{trade} < \tilde{g}(.) < 1$.

Note that

$$\frac{\partial\tilde{g}(\cdot)}{\partial B} = \frac{105\psi_2}{\left(33 + 9a - 5\sqrt{\psi_1 + B \cdot \psi_2}\right)^2 \sqrt{\psi_1 + B \cdot \psi_2}} > 0.$$

Furthermore, note that $\partial\tilde{g}(\cdot)\big/\partial\psi_1 > 0$ and that $\partial\tilde{g}(\cdot)\big/\partial\psi_2 > 0$. Since $\partial\psi_1/\partial c < 0$ and $\partial\psi_2/\partial c < 0$, it follows that $\partial\tilde{g}(\cdot)\big/\partial c < 0$. Finally, note that

$$\tilde{g}(c = 1, B = 0) = \overline{g} = \frac{21}{19 + 2a}.$$

□

Appendix 2: Global welfare difference

The global welfare difference $\Delta\Omega_{\text{int}}^{G}$ from eq. (17) is equal to zero if trade freeness g is equal to one of the following two critical levels,

$$\tilde{g}_{1,2}^{G}(\cdot)=\frac{42}{33+9a\pm 5\sqrt{\xi_1+B\cdot\xi_2}} \tag{22}$$

with

$$\xi_1=\psi_1=\left(a(54+a)-56ac+28c^2-27\right)>0$$
$$\xi_2=\frac{14}{25(g_W)^2}\left(2ag_W\left(ag_W-27\right)+25c^2-50ag_Zc-27\right).$$

The structure of these critical trade freeness levels is similar to the respective critical level $\tilde{g}(\cdot)$ for the domestic welfare evaluation of international mergers, see appendix 1. It turns out that $\xi_1=\psi_1$ in (22) and (19). Imposing the parameter restrictions $B<\tilde{B}$ and $c>\tilde{c}$ that were introduced in (20) and (21) warrants that $\xi_2<0$ and that $\left(\xi_1+B\,\xi_2\right)>0$. It then follows immediately that $\tilde{g}_1^G(\cdot)<\tilde{g}_2^G(\cdot)<\tilde{g}(\cdot)$. Hence in the range $\tilde{g}_2^G(\cdot)<g<\tilde{g}(\cdot)$ the international mergers increase domestic welfare but reduce global welfare. Provided $\tilde{g}_1^G(\cdot)>g_{trade}$ there is an additional parameter range $g_{trade}<g<\tilde{g}_2^G(\cdot)$ where $\Delta\Omega_{\text{int}}>0$ but $\Delta\Omega_{\text{int}}^{G}<0$. Otherwise, if $\tilde{g}_1^G(\cdot)<g_{trade}$, the discrepancy between domestic and global welfare arises only for $\tilde{g}_2^G(\cdot)<g<\tilde{g}(\cdot)$. □

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