

Cross-border Mergers and National Champions in an Integrating Economy

Jens Südekum *)

University of Duisburg-Essen

Mercator School of Management

Lotharstraße 65

47057 Duisburg, Germany

Phone: +49/203/3792357

Email: Jens.Suedekum@uni-due.de

Abstract

In this paper we present a simple oligopolistic trade model with three countries. The two producing countries form a bloc and host two firms each. The third country only consumes and may set an optimal import tariff. We illustrate the strategic aspects of merger policy in this setting. Mergers can be used to appropriate rents on the third market, even when the trade policy of the third country endogenously reacts. Due to these rent capturing possibilities, competition policy inside the bloc is too permissive towards M&A. A hypothetical global competition agency would pursue a stricter merger control. However, cross-border mergers that avoid intra-bloc trade costs need not imply a conflict between regional and global welfare, but they may be efficient from a global point of view. In contrast, the promotion of “national champions” may be in the interest of individual countries if rent capturing possibilities are strong enough, but global welfare is adversely affected by this policy. I.e., we offer a rationale why a policy of “European champions” may be warranted from a global efficiency perspective, but not a policy of “national champions”.

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

JEL-class.: F12, F23, L13, L52

FINAL VERSION

Forthcoming in: *Journal of Institutional and Theoretical Economics* (JITE)

*) The author thanks Dominique Demougin (the editor), two anonymous referees, Tomaso Duso, Carsten Eckel, Oliver Fabel, Renate Ohr, Christian Kirchner and seminar participants at Humboldt University Berlin and University of Goettingen for helpful comments. All remaining errors are solely my responsibility. This work was supported by a grant from the Ministry of Science, Research and the Arts of Baden-Württemberg (Az: 21-655.042-5-2/1) to Jens Südekum.

1) Introduction

In several countries the argument has become prominent that governments should encourage large scale mergers between domestic firms (often called “*national champions*”). Even though such mergers may reduce competition and harm domestic consumers, the hope is that the newly created champion will play a significant role on world markets. One particularly clear example of such a policy has been the acquisition of the German energy and gas provider RUHRGAS by its competitor EON in 2002. That merger was originally blocked by German competition authorities, on the grounds that it would lead to a dominant position on the domestic energy market. However, this decision was overruled by the federal government (with the so-called *Ministererlaubnis*), which argued that the creation of a Germany-based global player is still in the interest of society, despite the detrimental domestic effects. Even more recently, a lively discussion started whether industrial policy within the European Union should rather aim for *European champions*. The EU Commission usually condemns policy actions by the Member States to create national champions and to deter foreign takeovers as bad examples of economic patriotism, which are inconsistent with the Single Market Act. On a pan-European level, however, the commission seems to welcome the creation of champions that have sufficient power to face competition on global markets. An instructive quote in this respect comes from EU competition commissioner NEELIE KROES [2006]: “*The vast majority of cross-border mergers have gone ahead without any interference from national governments. But in a small number of well publicized instances, direct or indirect steps have been taken by Member States to prevent or to frustrate cross-border mergers. I’m all for champions – European champions who can go out and win on global markets [...]*”.

With open economies and oligopolistic market structures there may be an incentive for a single country to use the instruments of merger control and competition policy *strategically* in order to gain a competitive advantage relative to other countries. Economists have discussed the effects of several related policy instruments such as export subsidies or state aid, which may be used to appropriate rents on international markets (BRANDER AND SPENCER [1985] or COLLIE [2000]). These literatures have emphasized that the strategic use of such policy instruments is often detrimental to global welfare. Yet, given its real world relevance, there is a surprisingly small literature on strategic merger policy in open economies so far.¹

In this paper we introduce a simple three-country model with oligopolistic competition and imperfect trade openness. Two symmetrical countries form a country bloc (like the EU) and host two firms each. The third country represents the world market in which there is only consumption. Firms compete on all markets subject to transport costs. Our main concern is to compare two different merger types from the point of view of the participating firms as well as from a national and global welfare perspective: National mergers within the European countries (“national champions”) and cross-border mergers among the bloc countries (“European champions”). The motive for the mergers in our model is, first of all, the wish to increase profits by reducing competition. Secondly, we emphasize efficiency-seeking aspects by allowing for general synergy effects and, in particular, by assuming that cross-border mergers can avoid intra-bloc transport costs. Other relevant aspects of FDI, such as market-

¹ Some papers address related aspects of mergers in the context of open economies. BARROS AND CABRAL [1994] extend the concept of ‘external merger effects on outsiders’ to open economies. HEAD AND RIES [1997] analyze nationally vs. globally optimal policy towards cross-border mergers. Several papers (e.g., SAGGI AND YILDIZ [2006], HUCK AND KONRAD [2004], HORN AND LEVINSOHN [2001]) discuss the interrelation between competition policy and other instruments at the disposal of governments, e.g. strategic trade policy. LOMMERUD ET AL. [2006] address the relationships between mergers and unionized labour markets.

seeking or resource-seeking motives, are neglected in our model in order to present a simple framework that is rooted in the traditional merger analysis in industrial organization.

A model similar to ours has recently been presented by HAUFLER AND NIELSEN [2008], henceforth labelled as “HN”, who also compare national and international mergers from a private and social perspective in a three-country model where production is concentrated in two of them. Our model differs from the approach by HN in several crucial aspects, and we obtain substantially different results regarding the pros and cons of different mergers forms.

First and foremost, we assume that firms compete on all markets subject to transport costs. In HN, firms from the two producing countries serve their respective home market and compete only in the third country. Such a situation is relevant for some industries like energy, where national champions from different EU countries only interact on emerging markets, but not in the respective home terrain of the other champion. Our setup includes the analysis by HN as a special case when intra-bloc transport costs are prohibitively high. Second, HN assume that mergers give rise to synergy effects, i.e., reductions in post-merger production costs which are taken as exogenously given. In this paper we also allow for general (exogenous) merger synergies, but we explicitly highlight transport cost savings as an endogenous source for cost reductions of cross-border mergers. Third, in contrast to HN we allow the consumptive country to react to the merger formation inside the bloc, which effectively hurts consumers on the world market through reduced competition, by using trade policy instruments. Finally, in terms of the main results, HN find that national mergers dominate cross-border mergers for certain parameter values, because the formation of a national champion leads to a domestic monopoly in their framework. We show that the introduction of even modest trade between the two producing countries overturns this result.

Briefly previewing our main findings, we show that cross-border mergers are generally profitable compared to the pre-merger situation with independently acting firms, and compared to the option of creating national champions, due to the transport cost saving aspects. Yet, cross-border mergers are welfare increasing for the country bloc only if intra-bloc transport costs are sufficiently high, i.e., those cost savings become less important as an efficiency defence argument beyond a certain stage of integration. These results of our model are consistent with two main empirical observations. First, cross-border M&A have been on the rise recently, both relative to other forms of FDI and also relative to purely national mergers.² Secondly, competition authorities like the EU Commission had to deal with a vastly increasing number of merger regulation cases in recent years. This may reflect the fact that cross-border M&A are in fact put under increased scrutiny as economic integration proceeds.

Turning to the strategic motives for merger policy, we highlight that domestic competition authorities tend to be too permissive towards M&A. Allowing mergers increases the amount of profits that can be captured on the world market, even when the third country reacts to the merger formations and sets a higher (optimal) import tariff. The negative impact of mergers on welfare in the world market is not taken into account by competition agencies inside the

² UNCTAD [2005] reports, that the share of cross-border mergers relative to 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. Furthermore, drawing on UNCTAD data, CHAPMAN [2003] reports that “the ratio of both the number and the value of domestic to cross-border deals during the 1990s was approximately 3:1. This was a significant drop from earlier years and the much higher level of cross-border activity is a distinguishing feature of current relative to previous merger booms”. Secondly, according to the EU Commission’s competition directorate, the number of cross-border merger cases settled by the competition directorate of the EU commission also more than tripled over the period from 1995-2006 (from 110 to 356 cases).

country bloc. A hypothetical global competition authority, which does not (yet) exist in practice, would recognize this effect and pursue a stricter merger control.

Yet, one central result of this paper is to show that, even in the complete absence of direct synergy effects, the hypothetical global competition authority would not categorically reject European champions that avoid intra-bloc trade costs. This is true even though consumers on the world market are harmed, but there is a more than offsetting profit gain inside the country bloc that could – at least potentially – be redistributed to compensate consumers in the world market. European champions, thus, need not imply a conflict between regional and global welfare. This is different for a policy of national champions. Such a policy can be in the interest of individual countries if rent capturing possibilities on the world market are strong enough, but from a global perspective it is a socially harmful policy, similar to other forms of strategic trade policy or state aid. In sum, we offer a rationale in this paper why a policy of European champions may be warranted from an efficiency perspective – even from a global point of view – but a not policy of national champions.

The rest of this paper is structured as follows. In section 2 we present a benchmark version of our model without the consumptive third country. This part is useful to gain some preliminary intuition for the pros and cons of different merger types (national vs. cross-border) for different levels of transport costs. In section 3 we turn to the main issue of this paper, the analysis of strategic merger policy in the complete three-country model, but we still abstract from endogenous trade policy reactions of the world market. Section 4 extends the model and considers an optimal import tariff of the third country, which endogenously adjusts after the firms' mergers. Section 5 concludes. The proofs of all propositions are deferred to the appendix, whereas the main text focuses on the economic intuition of the results.

2) Benchmark two-country model

In this benchmark model we only consider two countries, H and F. We postulate identical, quasi-linear quadratic preferences of consumers in the two countries, given by

$$U_H = \left[aQ_H - bQ_H^2 \right] + q_{0,H} \quad U_F = \left[aQ_F - bQ_F^2 \right] + q_{0,F} \quad (1)$$

The good q_0 is a freely tradable outside commodity, whose price is normalized to one in both countries and where all income effects of demand accrue. The other good Q is a homogeneous commodity, where Q_H and Q_F denote total consumption in country H and F, respectively. $a > 2$ and $b > 0$ are demand-sided market size parameters which are the same in both countries. Denoting with p_H and p_F the consumer price of good Q in the respective country, it is straightforward to derive the following inverse demand functions:

$$p_H = a - b \cdot Q_H \quad p_F = a - b \cdot Q_F \quad (2)$$

Since no income effects of demand arise for good Q , we can apply partial equilibrium analysis throughout this paper, and due to the constant marginal utility of income we can use the standard concept of consumer surplus as a precise measure for consumer welfare.

There are four firms ($i=1,2,3,4$) producing good Q . Firms 1 and 2 are located in country H, and firms 3 and 4 are located in country F. As HAUFLER AND NIELSEN [2008] we assume that all firms are symmetrical and have constant unit costs equal to one. Firms compete in quantities à la Cournot. In contrast to HN, we allow firms from country H to be active on the market F (and vice versa), subject to iceberg costs for international transport. From each unit shipped in country H only a fraction arrives in country F (and vice versa).

The total quantity of good Q in country H is given by $Q_H = x_1 + x_2 + g(y_3 + y_4)$, and in country F it is $Q_F = x_3 + x_4 + g(y_1 + y_2)$. In this formulation x_i denotes the quantity that firm $i=1,2,3,4$ produces for its respective domestic market, y_i is the quantity that firm i produces for its respective export market, and $0 < g < 1$ represents the level of iceberg transport costs. For example, firm 1 produces the quantity y_1 for the market in country F, yet only the fraction $g \cdot y_1$ arrives for consumption, whereas the rest “melts away” during the shipping. The effective marginal costs for one unit to arrive on the export market is, thus, $1/g$. Governments do not raise revenue from the trade barrier, i.e., the barrier is not a tariff.

2.1. Pre-merger equilibrium

We first solve this simple model for the Cournot-Nash equilibrium in the pre-merger constellation. Firm 1 solves the following profit maximization problem,

$$\text{Max } \pi_1 = (a - b(x_1 + x_2 + g(y_3 + y_4))) \cdot x_1 + (a - b(x_3 + x_4 + g(y_1 + y_2))) \cdot g y_1 - x_1 - y_1, \quad (3)$$

and chooses quantities x_1 and y_1 . Firms 2, 3 and 4 solve analogous problems. In the initial situation with four independently acting firms, standard optimization yields the following Cournot-Nash equilibrium quantities (x for the domestic, y for the export market), price p , profits π and total surplus Ω . We can omit firm and country subscripts due to symmetry.

$$\begin{aligned} x &= \frac{a - 3 + 2/g}{5b} & y &= \frac{a + 2 - 3/g}{5bg} & p &= \frac{a + 2 + 2/g}{5} & (4) \\ \pi &= \frac{1}{25b} \left[(a - 3 + 2/g)^2 + (a + 2 - 3/g)^2 \right] & \Omega &= 2\pi + \frac{2}{25b} (2a - 1 - 1/g)^2 \end{aligned}$$

The profit level per firm π consists of the profits made on the respective domestic market (first term in squared parentheses) and the profits made on the export market (second term), both of which are increasing in total market size (increasing in a and decreasing in b). The domestic quantity x and domestic profits are decreasing in trade openness g , whereas the export quantity y and export profits are increasing in g . This is due to the fact that the transport costs effectively shelter firms from foreign competition.³ The equilibrium price p is decreasing in g , which represents the fact that trade integration (rising levels of g) intensifies competition and, thus, leads to lower prices for consumers.

³ For example, the market share of a foreign firm on the market of country H is given by $s_y \equiv (g y / Q_H) = (a + 2 - 3/g) / (4a - 2 - 2/g)$. This market share is increasing in g and approaches $s_y = 1/4$ as $g \rightarrow 1$.

To ensure that firms export to the other country at all in the initial situation, the effective cost disadvantage due to transport costs must not be too large. More precisely, trade openness g must be above a lower limit g_{trade} , given by

$$y > 0 \Leftrightarrow g_{trade} < g, \quad g_{trade} \equiv 3/(2+a) \quad (5)$$

When trade openness is below that threshold level ($g < g_{trade}$), firms from country F do not export to country H (and vice versa) in the initial setting, because effective marginal costs are too high relative to the marginal costs of the competing domestic firms. In that case we would have a similar case as in the paper by HN, where firms do not service the market of the other country inside the bloc. Notice that a larger market size a reduces the threshold g_{trade} , i.e., firm export at earlier stages of trade integration the larger the involved countries are.

Finally, notice that total welfare Ω in either country is defined by a utilitarian criterion as the sum of profits of the national firms (2π) and domestic consumer surplus, which reads as $CS = \frac{2}{25b}(2a-1-1/g)^2$ in the initial situation. The overall welfare implications of trade integration are ambiguous. Even though rising levels of g reduce the price p and, thus, increase consumer surplus, there is also an opposite effect that trade integration implies more wasteful transportation of identical commodities across borders. Using (4) we find that integration raises total welfare only if the level of trade openness is sufficiently high:

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

This confirms the insights on the welfare effects of trade integration in oligopolistic markets that have been studied in the seminal “reciprocal dumping” model by BRANDER [1981].

2.2. Merger analysis in the benchmark model: Preliminaries

Starting from this initial situation with four independently acting firms we now examine different types of mergers. By assumption we neglect the grand coalition among all four firms as a relevant alternative, because this would lead to an international monopoly that is never tolerated by competition authorities. Apart from the grand coalition, there exist the following principal possibilities for a merger formation in the present model:

- A simultaneous national merger of the two firms from the same country, i.e., an ownership structure $\{1+2\}, \{3+4\}$
- The simultaneous formation of two cross-border mergers (e.g. $\{1+3\}, \{2+4\}$)
- A single national merger in only one country, with the two firms from the other country remaining independent (e.g. $\{1+2\}, \{3\}, \{4\}$)
- A single international merger between two firms from different countries, with the two other firms remaining independent (e.g. $\{1+3\}, \{2\}, \{4\}$)
- An asymmetric merger between three firms, where the fourth firm remains independent (e.g. $\{1+2+3\}, \{4\}$). The independent firm may be located in country H or in country F.

In this benchmark model we neglect direct merger synergies, i.e., reductions of marginal production costs due to mergers. Merger synergies will be analyzed in section 3. However, we

do assume that cross-border mergers imply that the resulting multinational enterprise can henceforth service both markets without having to bare transport costs, e.g. because it can draw on the existing distribution channel of its affiliate in the respective country.⁴

In the remainder of this section we show that only the two first scenarios – the simultaneous bilateral (national or international) mergers – are relevant alternatives to the pre-merger constellation. Some of the other possibilities (e.g., the single international merger) may be profitable compared to the initial status quo under certain circumstances (as shown below), but these cases are then inferior to some other merger formation.⁵ Given this fact and similarly to HN, we will then only focus on the simultaneous mergers in section 3. The way we proceed is as follows: We first analyze the two types of simultaneous mergers in greater detail and compare these ownership structure with the pre-merger constellation and amongst each other. Afterwards we show why the other merger scenarios are not relevant alternatives.

2.3. Simultaneous national mergers

Consider the simultaneous formation of mergers between the two firms from the same country. The resulting ownership structure is a duopoly with one firm in country H and one in country F. The two firms are symmetrical and still have to bare transport costs for servicing their respective export market. From standard profit maximization it is straightforward to compute the endogenous variables for this configuration, which are subscripted with “nat”:

$$\begin{aligned} x_{nat} &= \frac{a-2+1/g}{3b} & y_{nat} &= \frac{a+1-2/g}{3bg} & p_{nat} &= \frac{a+1+1/g}{3} & (7) \\ \pi_{nat} &= \frac{1}{9b} \left[(a-2+1/g)^2 + (a+1-2/g)^2 \right] & \Omega_{nat} &= \pi_{nat} + \frac{1}{18b} \left[(2a-1-1/g)^2 \right] \end{aligned}$$

The first term of π_{nat} is again the domestic, and the second one the export profit level. National welfare in this scenario consists of the champion’s profits and the consumer surplus. We can now compare this scenario with the initial situation, both in terms of the profitability of the merger for the participating firms (π_{nat} vs. $2 \cdot \pi$), and with respect to national welfare (Ω_{nat} vs. Ω). Using (7) and (4) we establish the following results (proven in appendix A1)

Proposition 1

- (a) *The simultaneous formation of national mergers is profitable if g is above some threshold level \underline{g} (defined in appendix A1). It is unprofitable if $g_{trade} < g < \underline{g}$.*
- (b) *The simultaneous formation of national mergers always reduces welfare.*

⁴ It is not critical to our results that trade costs vanish completely, but only that there are *some* transport cost reductions in case of cross-border mergers.

⁵ This analysis is close in spirit to the literature on endogenous merger formation in international markets that started with the seminal paper by HORN AND PERSSON [2001] who consider a cooperative bargaining setup where all possible coalitions are mutually compared. Like HN we do not consider an explicit cooperative bargaining setup in this paper, but we suffice with a more traditional approach. Yet, we receive several results that are consistent with the more complete HORN AND PERSSON [2001] framework. It should be noted clearly, however, that it is not the purpose of our benchmark model to add to the endogenous merger literature, but to prepare the discussion of strategic merger policy with world market competition in sections 3+4.

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 openness 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 fully informed and welfare maximizing national competition authorities would prevent this merger.

2.4. Simultaneous cross-border mergers

Consider now the case of two simultaneous mergers between firms from different countries, i.e., the emergence of two multi-national firms ($\{1+3\},\{2+4\}$ or analogously $\{1+4\},\{2+3\}$). The profits of the (symmetric) multinational corporations are split equally across countries (owners), so that welfare in country H and country F is still symmetrical. The case with two international mergers comes down to a standard Cournot duopoly where firms compete on an integrated market. The endogenous variables, subscripted with “*int*”, are given by

$$\begin{aligned} x_{\text{int}} &= \frac{a-1}{3b} & y_{\text{int}} &= \frac{a-1}{3b} & p_{\text{int}} &= \frac{a+2}{3} & (8) \\ \pi_{\text{int}} &= \frac{2(a-1)^2}{9b} & \Omega_{\text{int}} &= \frac{2(a-1)^2}{9b} + \frac{2(a-1)^2}{9b} \end{aligned}$$

Using (8), (7) and (4) we can establish the following results (see appendix A2)

Proposition 2

- (a) *The simultaneous formation of international mergers is always profitable compared to the pre-merger configuration.*
- (b) *The simultaneous formation of international mergers increases welfare compared to the pre-merger configuration if $g_{\text{trade}} < g < \bar{g} \equiv \frac{21}{2a+19}$, whereas it lowers welfare if $g > \bar{g}$.*
- (c) *The simultaneous formation of international mergers is more profitable than the simultaneous formation of national mergers in the parameter range $g_{\text{trade}} < g < 1$.*
- (d) *The simultaneous formation of international mergers is less profitable than the simultaneous formation of national mergers in a parameter range $0 < g < \frac{5}{2a+3} < g_{\text{trade}}$.*

The first surprising result for the case of simultaneous international mergers is that they are generally profitable compared to the pre-merger configuration, unlike the simultaneous national mergers. This is so, because the cross-border mergers increase market concentration *and* avoid trade costs. That second aspect is missing for national mergers. Yet, international mergers are socially desirable compared to the pre-merger constellation only if trade openness is low. The reason is that the increase in market concentration is not in the interest of consumers, whereas the reduction of trade costs per se implies higher consumer surplus (as shown above). This trade cost effect is stronger the lower g is. Put differently, the trade cost saving aspect of cross-border mergers becomes less important as g rises, and cannot act as a convincing efficiency defence argument beyond a certain point where g is larger than \bar{g} .

Comparing the simultaneous national mergers and the simultaneous national mergers directly, we find that the former are generally more attractive for the participating firms under the imposed parameter restriction $g > g_{trade}$. The reason is that both merger types yield an identical change in market concentration, but the cross-border mergers additionally imply trade costs savings, which also benefit firms by lowering effective marginal costs of production for the respective export market. This intuitive result may also be labelled the “tariff jumping” motive for cross-border mergers. Interestingly, though, we find that the national mergers would be more profitable in the parameter range $0 < g < \frac{5}{2a+3} < g_{trade}$ where trade openness is so low that there would be no international trade in the initial configuration. For these extremely low levels of trade openness it would be more profitable for firms to merge nationally, hence to build a national monopoly, rather than to avoid transport costs via cross-border mergers but to be exposed to duopoly competition on two markets.⁶ It should be noted, however, that this “anti-competitive effect” of national mergers only prevails in a rather extreme constellation in our model, and that the assumption $g > g_{trade}$ is sufficient to ensure that the “tariff jumping” effect generally renders cross-border mergers more profitable than national mergers.

2.5. Other merger formations

So far we have only analyzed and compared the scenarios with simultaneous mergers. In proposition 3 and the proof in appendix A3 we show why the other possible merger types that have been mentioned in section 2.2. are not relevant alternatives.

Proposition 3

- (a) *A single national merger of two firms from the same country (with the other two firms remaining independent) is never profitable for the participants.*
- (b) *A single cross-border merger of two firms (with the other two firms remaining independent) is profitable compared to the pre-merger scenario if g is sufficiently low. However, in that case the other pair of firms has an incentive to merge as well.*
- (c) *An asymmetric merger between three firms can be profitable for the participants compared to the pre-merger scenario in a range of trade openness defined in appendix A3. However, it is always more profitable for firms to form two cross-border mergers.*

Part (a) is closely related to the famous “merger paradox” due to SALANT ET AL. [1983]. Suppose for the moment that $g = 1$, in which case our model would be a standard linear Cournot oligopoly with four firms. It is well known that in this market structure a merger between two firms (a move from four to three firms) would not be profitable in the absence of synergy effects, since the combined market share of the participating firms falls short of the 80%-benchmark that has been established by SALANT ET AL. [1983]. The introduction of trade costs does not change this basic intuition. Note, however, that we have shown in proposition 1 that a simultaneous national merger may be profitable. Hence, there exists a range of trade openness where any single pair of national firms does not have an incentive to merge in isolation, but where a coordinated formation of two national mergers is profitable.

A single cross-border merger may – in contrast – be profitable for the participants if a large enough chunk of trade costs can be avoided. The trade cost reduction acts like a synergy

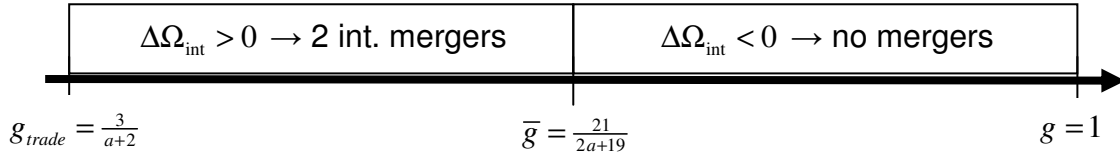
⁶ Parts (c) and (d) of prop. 2 confirm one main result by HORN AND PERSSON [2001] in our simpler model. They were the first to establish this surprising result that national mergers are in fact more profitable than cross-border mergers if trade costs are *high*, despite the fact that trade costs can only be avoided with international mergers.

effect in that case. However, owing to the symmetry of the model, it is clear that the other pair of firms would then merge as well, so that we would effectively move to the scenario with two cross-border mergers. A similar intuition applies why the asymmetric merger will never prevail. Even if that merger type can be profitable compared to the pre-merger constellation, firms can do better by forming two MNEs.⁷

2.6. Benchmark model: Summary

The benchmark model yields clear-cut results regarding the profitability and the social desirability of different mergers in different stages of trade integration. The only relevant possibilities are either a market structure with two international firms, or the un-concentrated market structure for $g > \bar{g}$.⁸ The results are illustrated in figure 1.

Figure 1: Market structure in the benchmark model



The simultaneous national mergers are, strictly speaking, also not a relevant possibility in our model. They always lower welfare compared to the pre-merger scenario and would, thus, not be permitted by national competition authorities. Furthermore, they are less profitable than the simultaneous cross-border mergers, at least in the parameter range $g_{trade} < g < 1$. Still we have put some emphasis on the case of simultaneous national mergers, because they represent the policy option of “national champions” that we will inspect in greater detail in the next section. The other merger formations are no relevant alternatives as shown in proposition 3, and hence we will neglect these cases in the remainder of this paper.

3) Three-country model

In this section we move on to main focus of the present paper. We extend the above benchmark model to include a world market, and the possibility that mergers involve direct synergy effects apart from the trade cost saving aspect of international mergers. This section will explicitly discuss the rationale for strategic merger policy that tries to exploit world markets, and it analyzes positive and normative aspects of “national champions”.

⁷ For completeness, it should also be noted that there can never be a scenario where a single MNE is profitable and welfare improving compared to the pre-merger constellation, and where at the same time the simultaneous cross-border merger would not raise welfare. A similar argument can be made for the asymmetric case.

⁸ 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 $g < \bar{g}$ we now find that higher trade freeness will never be socially harmful. For $g_{trade} < g < \bar{g}$, welfare is given by $\Omega_{int} = 4(a-1)^2/9b$. Hence $\partial\Omega/\partial g = 0$. For $g > \bar{g}$, welfare is given by (4). Since $\bar{g} = 21/(19+2a) > 14/(11+3a)$, we have $\partial\Omega/\partial g > 0$ also in this range of g .

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. As in the model by HN, it is assumed that 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 to which they export subject to transport costs. For the moment it is assumed that country W does not engage in any sort of trade policy, but this assumption is relaxed below in section 4.

Consumers in the world market are assumed to have the same preferences as consumers in the country bloc H+F,⁹ hence the demand curve in the world market is given by

$$p_W = a - b_W \cdot Q_W \quad b_W > 0 \quad Q_W = \sum_{i=1}^4 g_W w_i \quad (9)$$

The variable Q_W denotes the total consumption of good Q in the world market W, which consists of the production levels w_i of firms $i=1,2,3,4$ net of transport losses. Iceberg trade costs for servicing market W are given by $0 < g_W < 1$, which may be different from the trade costs that arise between countries H and F ($g_W \neq g$). We also allow for size differences between market W and countries H, 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 $b_W > b$ if it is smaller).

Equilibrium prices and quantities on the markets H and F (variables x and y) remain unchanged compared to (4), but firms now also sell the quantity w to the world market. To warrant positive trade flows between H and F, the condition $g > g_{trade}$ from (5) must still hold. In addition, we require $(1/a) < g_W < 1$ to hold, in order to have positive production of any firm for the world market ($w > 0$). The equilibrium profit level per firm π increases compared to (4) due to the additional profit opportunities on market W, see the third term in squared parentheses in (10). These world market profits are larger the higher the trade openness with the world market g_W is, and they are increasing in the (relative) size of the world market which is captured by the parameter $B \equiv b/b_W > 0$. Total welfare in country H, F is defined as before, but it is now higher than in the benchmark model due to the higher profits of the national firms. Regional welfare of the country bloc H+F is simply given by 2Ω due to symmetry, and global welfare Ω^G includes welfare in H and F plus the consumer surplus on market W. That consumer surplus (the welfare of country W) has stronger weight for global welfare the larger this country is compared to the bloc H+F (the larger B is). Endogenous variables in the pre-merger configuration are now given by

$$x = \frac{a - 3 + 2/g}{5b} \quad y = \frac{a + 2 - 3/g}{5bg} \quad w = \frac{a - 1/g_W}{5b_W g_W}$$

⁹ From now on we will use the term “country bloc” for countries H+F. With this term emphasize that the two countries form an economic union like the EU, intra-bloc transport costs g notwithstanding, and face identical transport costs for servicing the external market W. “Regional welfare” is now the sum of welfare in H+F.

$$\pi = \frac{1}{25b} \left[(a-3+2/g)^2 + (a+2-3/g)^2 + B \cdot (a-1/g_w)^2 \right] \quad (10)$$

$$\Omega = 2\pi + \frac{2}{25b} (2a-1-1/g)^2 \quad \Omega^G = 2\Omega + \frac{8}{25b} \cdot B \cdot (a-1/g_w)^2$$

3.2. National vs. international mergers

As in the previous section we could use this pre-merger equilibrium as the reference scenario and analyze national and international mergers separately. However, it turns out to be more convenient to proceed slightly differently. In this subsection we will start with the comparison of (simultaneous) national and international mergers.¹⁰ Only afterwards do we analyze if a merged configuration is more profitable and socially more desirable than the pre-merger situation.

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 and g_w , respectively. In contrast to the previous section we now allow for direct “merger synergies” by assuming that post-merger unit costs are equal to $c \leq 1$. Straightforward calculations yield the following results for the endogenous variables (again with subscript “nat”)

$$x_{nat} = \frac{a-2c+c/g}{3b}, \quad y_{nat} = \frac{a+c-2c/g}{3bg}, \quad w_{nat} = \frac{a-c/g_w}{3b_w g_w} \quad (11)$$

$$\pi_{nat} = \frac{1}{9b} \left[(a-2c+c/g)^2 + (a+c-2c/g)^2 + B \cdot (a-c/g_w)^2 \right]$$

$$\Omega_{nat} = \pi_{nat} + \frac{1}{18b} (2a-c-c/g)^2 \quad \Omega_{nat}^G = 2 \cdot \Omega_{nat} + \frac{2}{9b} \cdot B \cdot (a-c/g_w)^2$$

International mergers: When two cross-border mergers are formed, both MNEs 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 as for national mergers. The endogenous variables are given by

$$x_{int} = \frac{a-c}{3b}, \quad y_{int} = \frac{a-c}{3b}, \quad w_{int} = \frac{a-c/g_w}{3b_w g_w} \quad (12)$$

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

$$\Omega_{int} = \pi_{int} + \frac{2(a-c)^2}{9b} \quad \Omega_{int}^G = 2\Omega_{int} + \frac{2}{9b} \cdot B \cdot (a-c/g_w)^2$$

A comparison of (12) and (11) yields the following results (proven in appendix A4)

Proposition 4

(a) *The simultaneous formation of international mergers is more profitable than the simultaneous formation of national mergers in the admissible parameter range of g .*

¹⁰ As explained in section 2, there are never isolated national or international mergers or an asymmetric merger among three firms, hence we neglect these constellations in this section.

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

This proposition generalizes an earlier result, namely that international mergers are superior to 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. Importantly, 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 . Put differently, simultaneous national mergers and simultaneous cross-border mergers inside the bloc H+F affect the world market W identically. In the model by HN, 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 then lead to a 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 cross-border over national mergers.

3.3. International mergers vs. no mergers

Comparing now the setting with two multinational firms (equations (12)) and the pre-merger configuration (equations (10)) we establish the following first result (see appendix A5)

Proposition 5

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

The international merger raises profits on the joint market H+F, because it increases market concentration *and* it avoids trade costs g . With respect to country W the merger is profitable for all admissible values of g_w , because there is an instantaneous switch from four to two firms. Similar to the intuition stated above, this discrete switch in market concentration from four to two firms is profitable for the participants even in the absence of any direct cost reduction, and even more so with direct synergy effects. In sum, the merger formation allows firms from countries H and F to extract more profits from the world market W.

Turning to a welfare comparison between the pre-merger and the international merger scenario, assume at first that $c=1$ (no synergy effects) and consider the role of the world market only. Using (12) and (10) the national welfare difference is

$$\Delta\Omega_{int}(c=1) \equiv \Omega_{int} - \Omega = -\frac{4}{225b} \left[(a+2-3/g) \cdot (2a+19-21/g) \right] + \frac{7}{225b} \cdot B \cdot (a-1/g_w)^2 \quad (13)$$

The first term in (13) is identical to the respective welfare difference in the benchmark model without a world market (see eq. (24) in appendix A2). Its sign is ambiguous and depends on whether g is larger or smaller than $\bar{g} = 21/(2a+19)$, which represents the trade-off between the increase in market concentration and the saving of intra-bloc trade costs. Introducing the market W yields the second term, which is clearly positive and increasing in the world market size B . This term represents the profit extraction effect. If B is large enough, expression (13) will be positive for all admissible values $g_{trade} < g < 1$. More precisely, a sufficient condition for (13) to be positive irrespective of g is that the size of the world market is above a critical

level $B > \tilde{B} \equiv 8(a-1)^2 / 7(a-1/g_w)^2$. When the market W is not so large, the domestic effects of the mergers are relatively more important for national welfare, and thus for regional welfare (which is simply twice the $\Delta\Omega_{int}$). More precisely, if $B < \tilde{B}$ trade openness g must be low enough to yield socially desirable cross-border mergers, similarly as in the benchmark model, yet with a larger parameter range of g for which the mergers are welfare improving:

$$\left\{ \Delta\Omega(c=1) > 0 \quad \wedge \quad B < \tilde{B} \equiv 8(a-1)^2 / 7(a-1/g_w)^2 \right\} \Leftrightarrow g_{trade} < g < \tilde{g}(c=1) < 1 \quad (14)$$

$$\text{where } \tilde{g}(c=1) = \frac{42}{9a+33-5\sqrt{(a-1)^2 + \frac{49}{25} \cdot B \cdot (a-1/g_w)^2}} > \bar{g} = \frac{21}{2a+19}$$

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 consumers inside the bloc, and the simultaneous international merger would be socially detrimental.

If we additionally allow for direct unit cost reduction of a merger, the social desirability of mergers increases, ceteris paribus. The welfare difference $\Delta\Omega_{int}$ for general $c \leq 1$ is given by

$$\Delta\Omega_{int} = \frac{1}{225b} \left[\begin{aligned} &4(27a - 50ac - 2a^2 + 25c^2 - 63 + 27a/g + 99/g - 63/g^2) \\ &+ 7B(7a^2 + 36a/g_w + (5c/g)^2 - 50ac/g_w - 18/(g_w)^2) \end{aligned} \right] \quad (15)$$

One can show that $\partial(\Delta\Omega)/\partial c = -\frac{8}{9b}(a-c) - \frac{2B}{9b}(a-c/g_w) < 0$ and $\partial^2(\Delta\Omega)/\partial c \partial g = 0$: The stronger is the unit cost reductions (the lower c is), the more socially desirable is the merger irrespective of the current level of trade freeness g . Using (15) we can state the following proposition (see appendix A6)

Proposition 6

- (a) *The simultaneous formation of two international mergers increases national/regional welfare if g is below some threshold level $\tilde{g}(c, B, \cdot)$ defined in appendix A6. 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, $\tilde{g}(c, B, \cdot) > \bar{g} = 21/(2a+19)$.*

Proposition 6 states that stronger unit cost reductions (lower c) and a larger size of the world market (larger B) both increase the parameter domain of g for which the simultaneous international mergers are socially desirable for the country bloc H+F. This possible welfare gain is due to the fact that firms from H+F can extract higher profits from market W if they merge (see prop. 5). This profit gain raises regional producer surplus, whereas consumer surplus in H+F is unaffected by this profit extraction.

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. However, a global welfare analysis would also recognize the impact on consumer surplus in W. We can use (12) and (10) 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 reductions at first, i.e. we set $c = 1$. The global welfare difference can then be written as follows:

$$\Delta\Omega_{int}^G (c = 1) = -\frac{8}{225b} \left[(a + 2 - 3/g) \cdot (2a + 19 - 21/g) \right] + \frac{14 \cdot B}{225b} \cdot \left(a - \frac{1}{g_w} \right)^2 - \frac{22 \cdot B}{225b} \cdot \left(a - \frac{1}{g_w} \right)^2 \quad (16)$$

The first term in (16) represents the social desirability of the international mergers with respect to producer and consumer surplus pertaining to the joint market H+F only. Its sign is ambiguous and depends on how much intra-bloc trade costs can be avoided. The second term in (16) captures the profit gain that firms from H+F can capture from market W through the mergers. The third term in (16), finally, is the welfare difference from the point of view of country W. This term is negative, which represents the loss of consumer surplus that the mergers imply for the world market. Notice that the sum of the second and third term in (16) is also negative, namely $-(22 \cdot B / 225b) \cdot (a - 1/g_w)^2$, which states that the increase in profit extraction is always smaller than the loss of consumer surplus on market W. This welfare loss of country W has stronger global welfare implications the larger this country is.

Hence, if the world market size B is sufficiently large, global welfare would always decrease with simultaneous international mergers, because the adverse effects on consumers would be the dominating effect. However, global welfare may also increase due to the formation of the two cross-border mergers, *even if* direct synergy effects are completely absent. This result is covered in the following proposition which is proven in appendix A7:

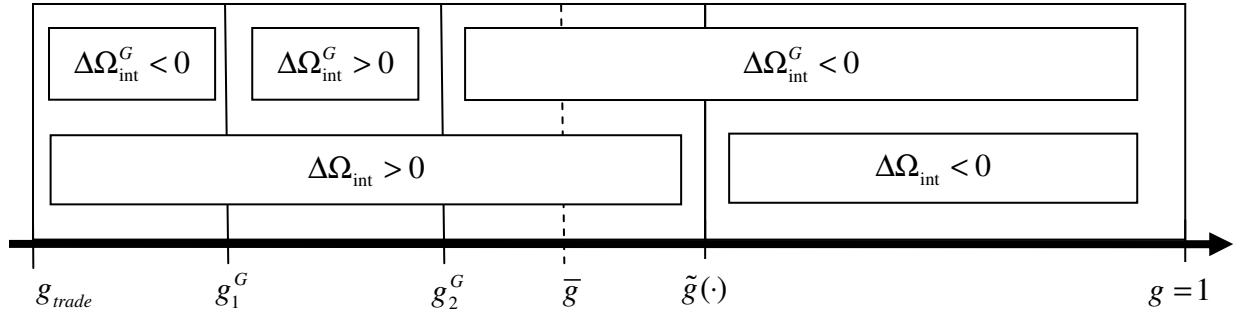
Proposition 7

Assume there are no direct cost reductions of mergers ($c = 1$).

- (a) *The simultaneous international merger raises global welfare if two conditions are met:*
 - (i) $B < \tilde{B}'$, and
 - (ii) $0 < g_1^G < g < g_2^G < 1$, where the thresholds are defined in appendix A7. *If either of these two conditions does not hold, the merger reduces global welfare.*
- (b) *Provided $B < \tilde{B}'$ there always exists a parameter range of trade freeness g where the international merger raises domestic welfare but lowers global welfare.*

Figure 2 summarizes this result. 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. They would allow the mergers since regional welfare increases, even though global welfare decreases. A hypothetical global competition authority would pursue a stricter merger control, because it would internalize this negative impact. A surprising result, however, is that such a global agency would also not categorically reject any merger formation in countries H+F, even if there are no direct synergies involved! The global competition authority would allow the “European champions” in the parameter range $g_1^G < g < g_2^G$, where regional and global welfare rise, despite the fact that welfare in W declines.

Figure 2: Welfare evaluation of international mergers (no synergy effects)



Intuitively, this possibility of a positive net effect on global welfare is due to the fact that the mergers induce a sufficiently strong profit gain on the joint market H+F. Recall that this profit difference $(\pi_{\text{int}}^{H+F} - 2\pi^{H+F})$ is hump-shaped in g (see eq. (28) in appendix A5), i.e., it is largest in an intermediate range of trade openness. As it turns out, this profit gain outweighs the negative net welfare impact on market W precisely in a range $g_1^G < g < g_2^G$. (Re-)introducing direct cost reductions, we can use (10) and (12) 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

$$\Delta\Omega_{\text{int}}^G = \frac{4}{225b} \left[\begin{aligned} &2(27a - 50ac - 2a^2 + 25c^2 - 63 + 27a/g + 99/g - 63/g^2) \\ &- B(2a^2 - 54a/g_w + 50ac/g_w - (5c/g_w)^2 + 27/g_w^2) \end{aligned} \right] \quad (17)$$

A first observation is that cost reductions raise the social desirability of mergers also from the standpoint of global welfare. This can be seen directly from (17) by noting that

$$\frac{\partial(\Delta\Omega_{\text{int}}^G)}{\partial c} = -\frac{16(a-c)}{9b} - \frac{8B(a-c/g_w)}{9b} < 0$$

The merger formation is tolerable over a larger parameter domain the stronger are the cost reduction effects (the lower is c). In appendix B 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 a range where international mergers enhance welfare in countries H+F but reduce global welfare. However, global welfare increases in another (intermediate) range of intra-bloc trade openness g . This range is larger the stronger the synergy effects are.

3.5. “National champions”

There is a lively 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 that the “national champion” appropriates sufficiently large profits 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. The case for “national champions” is therefore questionable to begin with, if firms could as well merge across borders inside the country bloc, in order to save on intra-bloc trade costs. 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 alliances are prohibitively high. 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 (10) and (11). Again neglecting synergy effects ($c = 1$), this yields

$$\Delta\Omega_{nat}(c=1) \equiv \Omega_{nat} - \Omega = -\frac{16a(a-1-1/g)+229-442/g+229/g^2}{450b} + \frac{14 \cdot B \cdot (a-1/g_w)^2}{450b} \quad (18)$$

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

$$B > \tilde{B}_{nat} = \frac{16a(a-1-1/g)+229-442/g+229/g^2}{14(a-1/g_w)^2} \quad \text{with} \quad \frac{\partial \tilde{B}_{nat}}{\partial g_w} < 0,$$

the enhanced profit extraction on the world market comes to dominate (the second term in (18)), and the “national champions” policy would increase national/regional welfare. This explains why individual countries can have an incentive to promote “national champions”. Profit opportunities on the world market must be strong enough to dominate the negative domestic effects. However, even if *national/regional* welfare may increase, *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 ,

$$\Delta\Omega_{nat}^G(c=1) \equiv \Omega_{nat}^G - \Omega^G = -\frac{16a(a-1-1/g)+229-442/g+229/g^2}{225b} - \frac{8 \cdot B \cdot (a-1/g_w)^2}{225b} < 0$$

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 . If national mergers imply strong cost reductions, then “national champions” will also become welfare enhancing beyond a certain level, because parts of these cost reductions are passed on to the consumers in the world market. However, also in this case we would find a clear “dominance” of international mergers, because the transport cost savings still come as an additional positive effect for producers and consumers.

4) Trade policy reactions on the world market

The role of the country W has been quite passive so far. In particular, there has been no policy reaction to the merger formations, which effectively leads to an exploitation of consumers in that market. Such inactivity may result if W is a diffuse world market, or a collection of several weak developing countries whose policy actions cannot be coordinated at reasonable costs. However, if policy coordination is not so costly, it seems plausible to expect that country W will take some action against the consumer exploitation due to the mergers. Even if it is beyond the control of W to prevent the mergers directly by means of competition policy, there are at least trade policy instruments available that the consumptive country W is likely to use. In this section we extend the model and assume that the government of W sets an optimal tariff, in order to maximize the sum of consumer surplus and tariff revenue. When firms from the bloc H+F merge, the government's optimal tariff endogenously adjusts upwards, i.e., country W tightens its trade policy as a response to the strategic merger policy. In this section we analyze the implications of this policy repercussion for the profitability and the (regional and global) welfare effects of mergers.

Pre-merger constellation: It is useful to start again with the description of the pre-merger scenario. Firm i ($i=1,2,3,4$) now solves the following profit maximization problem:

$$\text{Max } \pi_i = \pi_i^{H+F} + g_w \cdot w_i \cdot (a - b_w g_w (w_1 + w_2 + w_3 + w_4)) - w_i - t \cdot w_i \quad (19)$$

The term π_i^{H+F} denotes the profit level of firm i on the joint market H+F, which does not change compared to the previous sections (i.e., all endogenous variables pertaining to the market H+F are as described in section 3). With respect to W there is now a specific tariff t ($0 < t < 1$) per unit w_i exported to that market.¹¹ Formally, we have a two-stage game where the government of W first decides on the tariff t , and firms decide on their optimal export quantity w_i afterwards. To simplify the notation we normalize the (non-tariff) trade costs with market W to unity from now on ($g_w = 1$).¹²

In the second stage, firm i chooses the following optimal quantity: $w_i = (a-1-t)/5b_w$, which leads to a consumer price equal to $(a+4+4t)/5$ on market W. In the first stage, the government in W maximizes total welfare (consumer surplus+tariff revenue) with respect to t :

$$\text{Max}_{\{t\}} \Omega^W = CS^W + 4 \cdot t \cdot w_i = \frac{8(a-1-t)^2}{25b_w} + \frac{4t(a-1-t)}{5b_w} \quad (20)$$

This leads to a welfare maximizing tariff $t^* = (a-1)/6 > 0$ in the initial constellation, i.e., country W actually imposes a positive tariff and redistributes the revenue lump-sum among its residents. With the tariff set optimally ($t = t^*$), endogenous variables are as follows:

¹¹ This is the standard specification of tariffs in the strategic trade policy literature (see e.g. BRANDER AND SPENCER [1985], HUCK AND KONRAD [2004]). We do not consider additional policy instruments on the part of countries H+F (such as export subsidies or state aid), since this would not add any essential new insights to the analysis.

¹² This normalization of effective marginal costs of symmetrical firms is purely for analytical convenience. It does not affect the qualitative results, since these trade costs cannot be avoided through any type of merger.

$$t = t^* = \frac{a-1}{6}; \quad x = \frac{a-3+2/g}{5b}, \quad y = \frac{a+2-3/g}{5bg}, \quad w = \frac{a-1}{6b_w} = \frac{B(a-1)}{6b}$$

$$\pi = \pi^{H+F} + \pi^W = \frac{1}{25b} \left[(a-3+2/g)^2 + (a+2-3/g)^2 \right] + \frac{1}{36b} \cdot B \cdot (a-1)^2 \quad (21)$$

$$\Omega = 2\pi + \frac{2}{25b} (2a-1-1/g)^2, \quad \Omega^W = \frac{2B(a-1)^2}{9b} + \frac{B(a-1)^2}{9b} = \frac{B(a-1)^2}{3b}, \quad \Omega^G = 2\Omega + \Omega^W$$

The quantities and profits pertaining to the country bloc H+F (x, y, π^{H+F}) are as described in eq. (10). Total welfare of country H, F is denoted by Ω . Total welfare of country W is given by Ω^W and consists of the consumer surplus (first term) and the tariff revenue (second term). Finally, global welfare Ω^G is simply the sum of welfare of all countries.

Simultaneous international mergers: The alternative scenario is where the four firms from the country bloc H+F have formed two cross-border mergers.¹³ Knowing that direct synergy effects would increase the social desirability of mergers ceteris paribus, we assume that post-merger production costs remain unchanged at $c=1$ and focus on the intra-bloc trade cost savings (the vanishing g). In the second stage of the game each of the two MNEs chooses the export quantity $w_{int} = (a-1-t)/3b_w$ which implies a consumer price equal to $(a+2+2t)/3$ in country W. The welfare maximization problem of the government in W now becomes:

$$\underset{\{t\}}{\text{Max}} \Omega_{int}^W = CS_{int}^W + 2 \cdot t \cdot w_{int} = \frac{2(a-1-t)^2}{9b_w} + \frac{2t(a-1-t)}{3b_w}, \quad (22)$$

which implies an optimal tariff equal to $t_{int}^* = (a-1)/4$. That is, country W responds to the merger formation by setting a higher optimal tariff ($t_{int}^* > t^*$). This is plausible, since we have shown above that – in the absence of trade policy – one principal effect of the merger is a reduction of consumer surplus on the market W. Country W now answers this quest for consumer exploitation by using the instrument at its disposal. Using $t = t_{int}^*$ it is straightforward to compute all endogenous variables for this scenario. They are now given by

$$t = t_{int}^* = \frac{a-1}{4}; \quad x_{int} = y_{int} = \frac{a-1}{3b}, \quad w_{int} = \frac{a-1}{4b_w} = \frac{B(a-1)}{4b},$$

$$\pi_{int} = \pi_{int}^{H+F} + \pi_{int}^W = \frac{2(a-1)^2}{9b} + \frac{B \cdot (a-1)^2}{16b}, \quad \Omega_{int} = \pi_{int} + \frac{2}{9b} (a-1)^2, \quad (23)$$

$$\Omega_{int}^W = \frac{B(a-1)^2}{8b} + \frac{B(a-1)^2}{8b} = \frac{B(a-1)^2}{4b}, \quad \Omega_{int}^G = 2\Omega_{int} + \Omega_{int}^W$$

¹³ No other merger formation needs to be analyzed at this point. In particular, we have shown above that the double national merger is always less profitable and less socially desirable than the double international merger, and that this is due to effects pertaining to the joint market H+F only. The two merger types have completely identical effects from the point of view of country W, hence, the repercussions of both merger types on the tariff set by country W are identical. This holds with and without our normalization of trade costs $g_w=1$.

The optimal quantities x_{int} and y_{int} as well as the profit level that arises on market H+F (π_{int}^{H+F}) are as described in eq. (12) with $c=1$. A comparison of (23) and (21) directly yields the following results (proven formally in appendix A8):

Proposition 8

Assume that country W sets an optimal import tariff, and responds to the formation of the simultaneous cross-border mergers in H+F with an increase of the tariff from t^ to t_{int}^* .*

- (a) *The simultaneous international merger are always profitable for the participating firms, both with respect to the joint market H+F and with respect to market W.*
- (b) *Consumer surplus on the world market (CS^W) decreases, total tariff revenue in country W increases and total welfare Ω^W decreases due to the mergers.*
- (c) *Total welfare inside the country bloc H+F always rises if the size of the world market is sufficiently large (if $B > \tilde{B}''$). If $B < \tilde{B}''$ welfare in H+F rises if intra-bloc trade openness g is sufficiently low (if $g < \tilde{g}''$), and it declines otherwise.*
- (d) *If the world market is not too large (if $B < \hat{B}'''$), there exists a parameter range $\hat{g}_1''' < g < \hat{g}_2'''$ where the mergers imply an increase of global welfare. In another range of g , the simultaneous mergers increase regional welfare but decrease global welfare.*

This proposition shows that all essential results from the previous section can be generalized to a model where the consumptive country W is able to respond to the merger formation with its trade policy tool, the optimal tariff. In particular, it is still profitable for firms from H+F to form the simultaneous cross-border mergers, even with respect to market W only. The profit gain that the firms are able to capture is smaller with the trade policy than without it, but it is still positive.¹⁴ The intuition for this result is that the mergers will induce firms to sell a lower overall quantity to W, which implies a tendency of increasing consumer prices on that market. As a response, the government of country W optimally increases the specific tariff in order to grasp more tariff revenue. This increase of the tariff rate t per se also tends to increase the consumer price and, thus, the profit margin of firms. As a result, total profits on market W still rise due to the mergers, and thus, consumer surplus decreases. This negative effect on consumer surplus outweighs the increase of total tariff revenue. Hence, the mergers still imply a lower overall welfare in country W, even though the welfare loss in W is smaller with the possibility to adjust trade policy than without it (cif. footnote 14).

The intuition for parts (c) and (d) of proposition 8 then follows a similar logic as for the proposition 6 and 7 above. The welfare implications of the cross-border mergers inside the country bloc are ambiguous and depend on whether enough intra-bloc trade costs can be avoided to justify the increase in market concentration. Yet, since the mergers imply unambiguously more profit extraction from the world market, regional welfare in H+F will clearly go up if the world market is large enough (if $B > \tilde{B}''$). If country W is not so large, regional welfare in H+F only goes up if enough intra-bloc trade costs can be avoided (if $g < \tilde{g}''$). Provided that welfare increases inside the bloc but decreases in country W, the global welfare implications are unclear a priori. If the world market is large and, thus, has a strong weight, there would be an unambiguous decline of global welfare. If the world market

¹⁴ In the model without the tariff (section 3) and with $c=1$ and $g_w=1$ the profit gain of the cross-border mergers on market W is given by $(7/225b)B(a-1)^2$, see appendix A5. With the endogenously increasing optimal tariff the profit gain is only $(1/144b)B(a-1)^2$, see appendix A8. A similar argument can be made for country W's total welfare. The total effect $\Delta\Omega_{int}^W$ is $-(22/225b)B(a-1)^2$ without the tariff (see eq. (16)) and $-(1/12b)B(a-1)^2$ with the trade policy, see appendix A8. That welfare loss is smaller but still existing.

is not so large (if $B < \hat{B}'''$), and if intra-bloc trade costs are in an intermediate range such that the profit gain is most substantial (if $\hat{g}_1''' < g < \hat{g}_2'''$), there is still the possibility that the merger formation raises global welfare even in the absence of direct synergy effects. Otherwise, the mergers reduce global welfare but increase regional welfare, i.e., we would observe an overly permissive, strategic competition policy of the bloc countries.¹⁵

5) 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, and more appealing for national and (hypothetical) global competition authorities than purely domestic mergers. 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 perspective, but only if trade openness is sufficiently low. Once trade barriers have fallen far enough, trade cost savings are no longer a convincing efficiency defence for mergers. These results are consistent with the empirical observations that international mergers have become more and more important compared to national ones in recent years, and that regional competition authorities (e.g. in the EU) have tended to put these cross-border M&A under increased scrutiny (cif. footnote 4).

The main concern of this paper has been to consider the motives for a strategic merger policy in open economies that is driven by the possibility to appropriate rents on world markets. 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, welfare on the world market decreases due to the higher profit extraction, and this is true with and without an endogenous response of the world market’s trade policy. However, cross-border mergers may still be beneficial from a global welfare perspective, even in the absence of direct “synergy effects”. This requires that trade costs between France and Germany are on an intermediate level, since the intra-bloc trade cost savings then yield the highest profit gain. If these trade costs are too low, their abolition is too unimportant to render the mergers globally efficient. If they are too high, profits also do not rise strong enough, because the French and German firms lose too much shelter of their respective domestic markets.

In general, there need not be a conflict between national/regional and global welfare when it comes to the evaluation of cross-border mergers, even though regional authorities tend to be too permissive as they neglect the negative effects of intra-bloc mergers on the world market. On the other hand, there is a clear conflict between national/regional and global welfare when it comes to “national champions”. The promotion of national mergers may be in the interest of the regional bloc if cross-border mergers are not feasible, and if the opportunity to appropriate rents on the world market is sufficiently strong to compensate the detrimental domestic effects. However, this policy clearly lowers global welfare in the absence of strong synergy effects. The promotion of “national champions” is therefore a case of *beggar-thy-neighbour*

¹⁵ Of course, the intuition for the policy of “national champions” also remains robust: They can be rational from the perspective of a single country as this merger type allows for an identical profit extraction from country W, but national champions can never be globally efficient in the absence of direct synergy effects. Allowing for direct merger synergies $c < 1$, or explicitly considering non-tariff trade costs g_W would complicate the various thresholds and the analytical details, as additional parameter restrictions would become necessary. However, there would be no change in the basic intuition of the results.

policy, related to strategic export subsidies or other forms of state aid. Regional competition authorities cannot be relied upon to prevent this type of strategic merger policy, because the promotion of champions will occur simultaneously in several countries inside the bloc and raise bloc welfare. An effective prevention would require a multilateral approach in merger control. A policy of “European champions” on the other hand may be warranted on efficiency ground, even from a global point of view. This is true even in the complete absence of direct merger synergies, whose strength is uncertain difficult to assess for regulators in practise.

References

- BARROS, P., AND L. CABRAL [1994], “Merger policy in open economies,” *European Economic Review*, 38, 1041-1055.
- BJORVATN, K. [2004], “Economic integration and the profitability of cross-border mergers and acquisitions,” *European Economic Review*, 48, 1211-1226.
- BRANDER, J. [1981], “Intra-industry trade in identical commodities,” *Journal of International Economics*, 11, 1-14.
- BRANDER, J., AND B. SPENCER [1985], "Export Subsidies and International Market Share Rivalry," *Journal of International Economics*, 18, 83-100.
- CHAPMAN, K. [2003], “Cross-border mergers/acquisitions: a review and research agenda,” *Journal of Economic Geography*, 3, 309-334.
- COLLIE D.R. [2000], “State aid in the European Union: The prohibition of subsidies in an integrated market,” *International Journal of Industrial Organization*, 18, 867-884.
- HAUFLER, A., AND S. NIELSEN [2008], “Merger policy to promote ‘global players’? A simple model,” forthcoming: *Oxford Economics Papers*
- HEAD, K., AND J. RIES [1997], “International mergers and welfare under decentralized competition policy,” *Canadian Journal of Economics*, 30, 1104-1123.
- HORN, H., AND J. LEVINSOHN [2001], “Merger policies and trade liberalization,” *Economic Journal*, 111, 244-276.
- HORN, H., AND L. PERSSON [2001a], “The equilibrium ownership of an international oligopoly,” *Journal of International Economics*, 53, 307-333.
- HUCK, S., AND K. KONRAD [2004], “Merger profitability and trade policy,” *Scandinavian Journal of Economics*, 106, 107-122.
- KROES, N. [2006], “Cross-border mergers and energy markets,” Speech at the Villa d’Este Forum, Cernobbia (available under: http://ec.europa.eu/commission_barroso/kroes/speeches_en.html)
- LOMMERUD, K., O. STRAUME, AND L. SORGARD [2006], “National versus international merger in unionised oligopoly,” *RAND Journal of Economics*, 37, 212-233.

SAGGI, K., AND H. YILDIZ [2006], "On the international linkages between trade and merger policies," *Review of International Economics*, 14, 212-225.

SALANT, S., S. SWITZER, AND R. REYNOLDS [1983], "Losses from horizontal mergers: The effects of an exogenous change in industry structure on Cournot-Nash equilibrium," *Quarterly Journal of Economics*, 98, 185-199.

UNCTAD (2005), *World Investment Report*, United Nations: New York.

Appendix A: Proofs

A1) Proof of proposition 1

Suppose $a > 2, b > 0$ and $0 < g_{trade} = 3/(a+2) < g < 1$. The following results hold:

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

It is readily verified that $\Delta\pi_{nat} > 0$ if $g > \underline{g} = \frac{109}{15(a-1)\sqrt{7} - 7a + 119} \in [g_{trade}, 1]$ and

$\Delta\pi_{nat} < 0$ if $g_{trade} < g < \underline{g}$.

$$(b) \quad \Delta\Omega_{nat} \equiv \Omega_{nat} - \Omega = -\frac{16a(a-1-1/g) + 229 - 442/g + 229/g^2}{450b} < 0 \quad \square$$

A2) Proof of proposition 2

Suppose $a > 2, b > 0$ and $0 < g_{trade} = 3/(a+2) < g < 1$. The following results hold:

$$(a) \quad \Delta\pi_{int} \equiv \pi_{int} - 2 \cdot \pi = \frac{2(a+2-3/g) \cdot (7a-46+39/g)}{225b} > 0$$

$$(b) \quad \Delta\Omega_{int} \equiv \Omega_{int} - \Omega = -\frac{4}{225b} \left[(a+2-3/g) \cdot (2a+19-21/g) \right] \quad (24)$$

The sign of (24) depends on the sign of the second term in squared parentheses:

$$\Delta\Omega_{int} > 0 \Leftrightarrow \frac{3}{2+a} = g_{trade} < g < \bar{g} = \frac{21}{2a+19}, \quad \Delta\Omega_{int} < 0 \Leftrightarrow g > \bar{g}.$$

$$(c) \quad \Delta\pi'_{int} \equiv \pi_{int} - \pi_{nat} = \frac{(1/g-1) \cdot (2a+3-5/g)}{9b} > 0$$

(d) Suppose $a > 1, b > 0$ and $0 < g < 1$, i.e., relax the restriction $g_{trade} < g$.

The term $\Delta\pi'_{int}$ can then become negative if $0 < g < \frac{5}{2a+3}$. Notice that $\frac{5}{2a+3} < g_{trade}$. \square

A3) Proof of proposition 3

(a) When only firms 1 and 2 merge, whereas firms 3 and 4 remain independent, standard optimization yields the following Cournot-Nash profit levels:

$$\pi_{uni}^{\{1+2\}} = \frac{1}{16b} \left[(a-3+2/g)^2 + (a+2-3/g)^2 \right] \quad (25)$$

$$\pi_{uni}^{\{3\}} = \pi_{uni}^{\{4\}} = \frac{1}{16b} \left[(a-2+1/g)^2 + (a+1-2/g)^2 \right]$$

The subscript “uni” distinguishes this scenario. Analogous profit levels would apply if firms 3 and 4 merge and firms 1 and 2 remain independent. Comparing (25) with (4) we immediately find that $(\pi_{uni}^{\{1+2\}} - 2\pi) = -\frac{7}{400b} \left[(a+2-3/g)^2 + (a-3+2/g)^2 \right] < 0$ for $a > 2, b > 0$ and $g_{trade} < g < 1$

- (b) When only firms 1 and 3 merge, whereas firms 2 and 4 remain independent the following Cournot-Nash profit levels can be derived:

$$\pi_{mne}^{\{1+3\}} = \frac{1}{8b}(a-2+1/g)^2 \quad \pi_{mne}^{\{2\}} = \pi_{mne}^{\{4\}} = \frac{1}{16b} \left[(a-2+1/g)^2 + (a+2-3/g)^2 \right] \quad (26)$$

The subscript “*mne*” distinguishes this scenario. Analogous profit levels would apply for other cases with only one cross-border merger. Comparing (26) with (4) we find that

$$\Delta\pi_{mne} \equiv (\pi_{mne}^{\{1+3\}} - 2\pi) = -\frac{1}{200b} \left[(a+2-3/g)^2 \cdot (7a+54-61/g)^2 \right]$$

Given our parameter restrictions $a > 2, b > 0$ and $g_{trade} < g < 1$, we immediately see that $\Delta\pi_{mne} > 0$ if $g_{trade} < g < \frac{61}{7a+54}$ and $\Delta\pi_{mne} < 0$ if $\frac{61}{7a+54} < g < 1$. Suppose now that trade openness is in the lower range so that $\Delta\pi_{mne} > 0$. We now check if the other two firms, which are still independent, have an incentive to form a second cross-border merger. Using (8) and (26) we can compute the following profit difference

$$\Delta\pi'_{mne} \equiv (\pi_{int} - \pi_{mne}^{\{2\}} - \pi_{mne}^{\{4\}}) = -\frac{1}{36b} \left[(a+2-3/g)^2 \cdot (a+14-15/g)^2 \right]$$

Given that $a > 2, b > 0$ and $g_{trade} < g < \frac{61}{7a+54}$, we find that $\Delta\pi'_{mne} > 0$ always holds. That is, the other pair of firms would always have an incentive to merge if the other two firms have already merged across borders.

- (c) Consider now the asymmetric merger between firms 1,2 and 3 where firm 4 remains independent. The merged firm can service both markets without trade costs, whereas the outsider firm 4 has to bare trade costs for servicing the market in country H. The following Cournot-Nash profit levels can be derived:

$$\pi_{asy}^{\{1+2+3\}} = \frac{1}{9b} \left[(a-2+1/g)^2 + (a-1)^2 \right] \quad \pi_{asy}^{\{4\}} = \frac{1}{9b} \left[(a+1-2/g)^2 + (a-1)^2 \right] \quad (27)$$

Analogous equations apply for other types of asymmetric mergers. We use the subscript “*asy*” to distinguish this scenario. Comparing (27) with (4) we find that

$$\Delta\pi_{asy} \equiv (\pi_{asy}^{\{1+2+3\}} - 3 \cdot \pi) = -\frac{2}{225b} \left[2a^2 + 48a + 113 - 52a/g - 274/g + 163/g^2 \right]$$

It is possible to show that under our parameter restrictions $a > 2, b > 0$ and $g_{trade} < g < 1$ the profit difference $\Delta\pi_{asy}$ is positive if trade openness g falls into the following range:

$$\Delta\pi_{asy} > 0 \Rightarrow g_{trade} < \frac{a(26-5\sqrt{14})+137+5\sqrt{14}}{2a(24+a)+113} < g < \frac{a(26+5\sqrt{14})+137-5\sqrt{14}}{2a(24+a)+113} < 1$$

If g falls out of this range the asymmetric merger is not profitable to the participants. However, even if it is profitable, it can be shown that all firms can receive higher profits by forming two MNEs. To prove this it suffices to show that the scenario “*int*” yields a higher sum of profits than the scenario “*asy*”. Using (27) and (8) we can show that

$$2 \cdot \pi_{int} - \left(\pi_{asy}^{\{1+2+3\}} + \pi_{asy}^{\{4\}} \right) = \frac{1}{9bg} \left[(1-g) \cdot (2a+3-5/g) \right] > 0$$

for $a > 2, b > 0$, $g_{trade} < g < 1$. For illustration, one can check that a single MNE (with profits π_{mne} as in (26)) does not have an incentive to take a third firm “on board”. The two outsider firms in the *mne*-scenario have rather an incentive to merge themselves. \square

A4) Proof of proposition 4

Suppose $a > 2, b > 0$ and $0 < g_{trade} = 3/(a+2) < g < 1$. Using (11) and (12) we can show that

$$(a) \quad \Delta \pi'_{int} \equiv \pi_{int} - \pi_{nat} = \frac{(1/g - 1)c (2a + 3c - 5c/g)}{9b} > 0$$

$$(b) \quad \Delta \Omega'_{int} \equiv \Omega_{int} - \Omega_{nat} = \Omega_{int}^G - \Omega_{nat}^G = \frac{(1/g - 1)c (8a + 3c - 11c/g)}{18b} > 0 \quad \square$$

A5) Proof of proposition 5

$$\begin{aligned} \Delta \pi_{int} &\equiv \pi_{int} - 2\pi = (\pi_{int}^{H+F} - 2 \cdot \pi^{H+F}) + (\pi_{int}^W - 2 \cdot \pi^W) \\ &= \frac{2}{225b} \left[25(a-c)^2 - 9 \left((a+2-3/g)^2 + (a-3+2/g)^2 \right) \right] \quad \oplus \\ &\quad + \frac{B}{225b} \cdot \left[25(a-c/g_w)^2 - 18(a-1/g_w)^2 \right] \quad \oplus \end{aligned}$$

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 unambiguously positive under the imposed parameter restrictions $g_{trade} < g < 1$, $1/a < g_w < 1$, $a > 2$, $b > 0$ and $b_w > 0$. Hence, $\Delta \pi_{int} > 0$. Notice that

$$\frac{d(\pi_{int}^{H+F} - 2 \cdot \pi^{H+F})}{dg} = \frac{52 - 4g(a+12)}{25b g^3} \quad (28)$$

It can be shown that the term in (28) is positive in the range $g_{trade} < g < 13/(a+12)$ and negative in the range $13/(a+12) < g < 1$. Hence, the profit difference $(\pi_{int}^{H+F} - 2 \cdot \pi^{H+F})$ on the market H+F is always positive but hump-shaped in g . We use this property below. \square

A6) Proof of proposition 6

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

$$\tilde{g}(\cdot) = \frac{42}{33 + 9a - 5\sqrt{\psi_1 + B \cdot \psi_2}} \quad (29)$$

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

$$\psi_2 = \frac{7}{25g_w^2} (ag_w(7ag_w + 36) + 25c^2 - 50ag_w c - 18) > 0$$

Given the parameter restrictions $a > 1, b > 0, g_{trade} < g < 1, 1/a < g_w < 1, 0 < c < 1$ and $B > 0$, we find that $\psi_1 > 0$ and $\psi_2 > 0$ holds. Notice that $\Delta \Omega_{int} = 0$ also holds for $g = 42 / (33 + 9a + 5\sqrt{\psi_1 + B \cdot \psi_2})$. This solution is irrelevant, however, because it is always smaller than g_{trade} under the parameter restrictions spelled out above.

Two necessary and sufficient conditions must hold for $g_{trade} < \tilde{g}(\cdot) < 1$, as given in (29), namely

$$B < \tilde{B} = \frac{4g_w(27 + 2a(a-27) + 50ac - 25c^2)}{ag_w(36 + 7ag_w) - 50ag_w c + 25c^2 - 18} \quad (30)$$

and
$$c > \tilde{c} = a - \frac{3}{5}\sqrt{3}(a-1) \quad (31)$$

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 $\Delta\Omega_{int} > 0 \forall g \in [g_{trade}, 1]$. Provided $B < \tilde{B}$ and $c > \tilde{c}$ and given the other usual parameter restrictions, $\Delta\Omega_{int}$ is negative if $g > \tilde{g}(\cdot)$ and positive if $g_{trade} < \tilde{g}(\cdot) < 1$. Notice 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 $\partial \tilde{g}(\cdot)/\partial \psi_1 > 0$ and that $\partial \tilde{g}(\cdot)/\partial \psi_2 > 0$. Since $\partial \psi_1/\partial c < 0$ and $\partial \psi_2/\partial c < 0$, it follows that $\partial \tilde{g}(\cdot)/\partial c < 0$. I.e., the parameter range of g for which the double international merger raises welfare in countries H,F expands the larger the world market is and the stronger the merger synergy effect is. Finally, note that $\tilde{g}(c=1, B=0) = \bar{g} = \frac{21}{2a+19}$. I.e., the threshold level of the complete model correctly reduces to the threshold level of the benchmark model once $c=1$ and $B=0$. \square

A7) Proof of proposition 7

Suppose that $a > 2, b > 0, g_{trade} < g < 1, 1/a < g_w < 1, B > 0$ and $c=1$. Using (16), it is straightforward to show that global welfare will always decrease with the mergers if the world market size is large enough, more precisely:

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

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

$$g_{1,2}^G(c=1) = \frac{42}{33 + 9a \pm 5\sqrt{(a-1)^2 - \frac{28}{25} \cdot B \cdot (a-1/g_w)^2}}, \quad (32)$$

Given $B < \tilde{B}'$ and the parameter restrictions spelled out above, the following ranking of thresholds applies: $g_{trade} < g_1^G < g_2^G < \bar{g} < \tilde{g}(c=1) < 1$. If $g_1^G < g < g_2^G$, we know from (13) and (16) that $\Delta\Omega_{int}^G > 0$ and $\Delta\Omega_{int} > 0$, hence the international merger would increase national and global welfare. With $g > \tilde{g}(c=1)$ we have $\Delta\Omega_{int}^G < 0$ and $\Delta\Omega_{int} < 0$. 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 $B \rightarrow 0$ the critical level g_1^G reduces to g_{trade} , whereas g_2^G and $\tilde{g}(c=1)$ reduce to \bar{g} . \square

A8) Proof of proposition 8

Suppose $a > 2, b > 0, g_{trade} < g < 1$ and $B > 0$. Using (23) and (21) the following results hold:

$$(a) \quad \Delta\pi_{int}^{H+F} \equiv \pi_{int}^{H+F} - 2 \cdot \pi^{H+F} = \frac{2}{225b} \cdot (a+2-3/g) \cdot (7a-46+39/g) > 0$$

$$\Delta\pi_{int}^W \equiv \pi_{int}^W - 2 \cdot \pi^W = \frac{1}{144b} \cdot B \cdot (a-1)^2 > 0$$

$$(b) \quad CS_{int}^W - CS^W = -7B(a-1)^2/72b < 0, \quad 2 \cdot t_{int} \cdot w_{int} - 4 \cdot t \cdot w = B(a-1)^2/72b > 0$$

$$\text{Therefore, } \Delta\Omega_{int}^W \equiv \Omega_{int}^W - \Omega^W = -B(a-1)^2/12b < 0, \quad (33)$$

(c) The welfare difference $\Delta\Omega_{int}^{H+F} \equiv \Omega_{int}^{H+F} - \Omega^{H+F}$ can be written as follows:

$$\Delta\Omega_{int}^{H+F} = \frac{4(a-1)^2}{9b} + \frac{B(a-1)^2}{144b} - \frac{2}{25b} \left[(a+2-3/g)^2 + (a-3+2/g)^2 + (2a-1-1/g)^2 \right] \quad (34)$$

If the world market size B is larger than $\tilde{B}'' = 128/25$ this term positive for all admissible values of g given that $a > 2$ and $b > 0$.

Provided $B < \tilde{B}''$, $\Delta\Omega_{int}^{H+F} > 0$ requires that trade openness g is below \tilde{g}'' , where

$$\tilde{g}'' = \frac{168}{36a+132-5(a-1)\sqrt{7B+16}} \in [g_{trade}, 1] \text{ for } a > 2 \text{ and } B < \tilde{B}'' . \quad (35)$$

Welfare in H+F decreases ($\Delta\Omega_{int}^{H+F} < 0$) if $B < \tilde{B}''$ and $g_{trade} < \tilde{g}'' < g < 1$.

(d) The global welfare difference $\Delta\Omega_{int}^G$ can be written as $\Delta\Omega_{int}^G = 2 \cdot \Delta\Omega_{int}^{H+F} + \Delta\Omega_{int}^W$, where the two terms on the right hand side are given in (33) and (34). A sufficient condition for $\Delta\Omega_{int}^G < 0$ is that $B > \hat{B}''' = 16/35$. In this case global welfare would always decrease (for all levels of g) since the weight of country W is too large.

Provided that $B < \hat{B}'''$ and $a > 2$ there exists an admissible range of g such that $\Delta\Omega_{int}^G > 0$. This range is given by $g_{trade} < \hat{g}_1''' < g < \hat{g}_2''' < 1$, where

$$\hat{g}_1''' = \frac{168}{36a+132+5(a-1)\sqrt{16-35B}}, \quad \hat{g}_2''' = \frac{168}{36a+132-5(a-1)\sqrt{16-35B}} \quad (36)$$

Furthermore, $B < \hat{B}'''$ and $a > 2$ ensure that the following ranking of thresholds levels of g applies (see (35) and (36)):

$$g_{trade} < \hat{g}_1''' < \hat{g}_2''' < \tilde{g}'' < 1 \quad (37)$$

Hence, the simultaneous mergers raise global and regional welfare in the range $\hat{g}_1''' < g < \hat{g}_2'''$, they increase regional welfare but reduce global welfare in the ranges $g_{trade} < g < \hat{g}_1'''$ and $\hat{g}_2''' < g < \tilde{g}''$, and they decrease regional and global welfare if $\tilde{g}'' < g < 1$. This completes the proof of proposition 8. \square

Appendix B: Global welfare difference

Suppose that $a > 2, b > 0, g_{trade} < g < 1, 1/a < g_w < 1, B > 0$ and $0 < c < 1$. The global welfare difference $\Delta\Omega_{int}^G$ from eq. (17) is equal to zero if trade openness g is equal to one of the following two critical levels,

$$\tilde{g}_{1,2}^G(\cdot) = \frac{42}{33 + 9a \pm 5\sqrt{\xi_1 + B \cdot \xi_2}} \quad (38)$$

with

$$\xi_1 = \psi_1 = (a(54 + a) - 56ac + 28c^2 - 27) > 0$$

$$\xi_2 = \frac{14}{25g_w^2} (2ag_w(ag_w - 27) + 25c^2 - 50ag_w c - 27).$$

It turns out that $\xi_1 = \psi_1$ in (38) and (29). We now impose the additional parameter restrictions $B < \tilde{B}$ and $c > \tilde{c}$ that were introduced in (30) and (31) to warrant that the threshold $\tilde{g}(\cdot)$ falls into the admissible range of g such that $\Delta\Omega_{int} > 0$ if $g_{trade} < \tilde{g}(\cdot) < 1$ and $\Delta\Omega_{int} < 0$ if $\tilde{g}(\cdot) < g < 1$, see appendix A6. Under the parameter restrictions $0 < B < \tilde{B}, \tilde{c} < c \leq 1, a > 2, b > 0, g_{trade} < g < 1$, and $1/a < g_w < 1$ it is ensured that $\xi_2 < 0$ and that $(\xi_1 + B \xi_2) > 0$ in (38). 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 $g_{trade} < g < \tilde{g}_1^G(\cdot)$ where $\Delta\Omega_{int} > 0$ but $\Delta\Omega_{int}^G < 0$. Otherwise, if $\tilde{g}_1^G(\cdot) < g_{trade}$, the discrepancy between domestic and global welfare arises only for $\tilde{g}_2^G(\cdot) < g < \tilde{g}(\cdot)$. \square