

# STRATEGIC TRADE POLICY AND MERGER PROFITABILITY

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# STRATEGIC TRADE POLICY AND MERGER PROFITABILITY

## Abstract

We study the profitability incentives of merger and the endogenous industry structure in a strategic trade policy environment. Merger changes the strategic trade policy equilibrium. We show that merger can be profitable and welfare enhancing here, even though it would not be profitable in a laissez-faire economy. A key element is the change in the governments' incentives to give subsidies to their local firms. National merger induces more strategic trade policy, whereas international merger does not.

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# 1 Introduction

Despite the prevalence of horizontal mergers no unified model has yet emerged that satisfactorily explains such mergers. Ravenscraft and Scherer (1987) mention several merger motivations that are not mutually exclusive and can be more or less relevant in individual cases. For example, a temporary overvaluation of own stock or an undervaluation of the target firm might make acquisitions attractive. A second set of motivations can be summarized as “synergies”. Such synergies may include complementarities in production or marketing, economies of scale, improvements in risk characteristics or financial constraints, or tax advantages. A third set of motives include asymmetric competence or a perception of superior own competence on the side of the management of the acquiring firm, and empire building motives. Finally, the effects of merger and acquisition on market concentration and market power considerations play a major role.<sup>1</sup>

A large theoretical literature on the profitability of merger has emerged that focusses on the market concentration aspect, and this aspect is also central for the concerns of the anti-trust authorities. This theory suggests that market power considerations do not constitute a strong motivation for merger. In a linear Cournot market, for example, two firms never have an incentive to merge (see Salant, Switzer, and Reynolds 1983) unless the merger leads to a monopoly. While this strong result is weakened for other types of competition, or for synergies (see, e.g., Perry and Porter 1985 who consider convex cost), there is a general tendency for firms not involved in a merger to benefit more from the merger than the two merging firms (see, e.g., Deneckere and Davidson 1985 for the Bertrand case).

We study this profitability effect of changes in market power and market shares when firms compete in international markets. More specifically, we analyse the profitability effect in export oriented industries with high market

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<sup>1</sup>Market power considerations were important in early merger waves, e.g., around 1900 (see, e.g., Caves, Fortunato and Ghemawat 1984), and may also play a role in the more recent merger wave where a large share of the mergers were horizontal.

concentration where there is strategic trade policy. In this international setup it will be important to distinguish between national merger and acquisition and cross-border merger and acquisition. National and cross-border mergers have very different profitability effects both for the firms involved in the merger and for their competitors in the different countries. We show that the strategic trade policy aspect can make profitable a national merger that would be unprofitable in a laissez-faire economy. International acquisition is shown to be less profitable. We also determine the equilibrium industry structure that emerges from endogenous acquisition decisions.

The mechanism that drives our results can be easily illustrated for a Cournot industry with three firms, A, B and M. A is located in country 1, B and M are located in a different country 2. In the absence of strategic trade policy, the merger between B and M changes the market from a triopoly to a duopoly. Under free trade, the merger of B and M is unlikely to increase their joint profits and is likely to benefit firm A that is not involved in the merger. If country 1 uses strategic trade policy, e.g., via export subsidies to firm A that are observed by the competitors, the competitors, B and M, will reduce competitive efforts (Brander and Spencer 1985). The situation is different in country 2, where two firms are located. If country 2 subsidizes firm B, it will induce a reaction not only by A, but also by M. Similarly, if country 1 subsidizes firm M, it will induce a reaction not only by A, but also by B. If it subsidizes both firms, these negative side effects (or “cannibalization” effects) do not cancel out, they add up. Accordingly, in the pre-merger situation, the fact that B and M are both located in country 2 puts country 2 in a disadvantageous position. The merger removes this disadvantage. After the merger we would expect an increase in country 2’s strategic trade policy activities, and, as an equilibrium effect, a reduction in country 1’s strategic trade activities.

The question addressed here has many links with the existing literature on trade and merger. Optimal trade policy can be understood as a country’s attempt to generate coordination of its exporting firms in order to maximize national welfare. Therefore, trade policy and merger policy are closely

linked. This link has been highlighted in a number of papers. A paper that is closely related to our analysis is Dixit (1984). He considers the strategic trade policy of two countries that host several firms in the same industry and compete in both countries' markets. His comparative static analysis of changes in the number of firms addresses issues of welfare and overall profitability of merger. However, he does not disentangle the profitability effects for the merging firms and non-merging firms in the same country and in other countries, or the difference between national and international merger. He also does not address the issue of endogenous merger. Head and Ries (1997) consider national incentives to block national mergers in an international context. Cowan (1989) considers competition policy and strategic trade policy with one importing country and one exporting country. Richardson (1999) shows that "slack competition policy" is a substitute for trade restrictions: tariffs act as a coordination device that can change the behavior of a country's competitive industry towards behaving like a colluding group of suppliers who use their market power. Horn and Levinsohn (2001) consider the government's choice between strategic trade policy and competition policy more closely. They consider governments which choose market concentration and trade subsidies in their own country. They show that the timing of the choice of market concentration and trade subsidies is important. A similar welfare analysis is pursued in Rysman (2001) in which governments that maximize national welfare first choose competition policy (the number of firms) and then choose strategic trade subsidies.

In these analyses both competition policy (or the choice of market concentration) and trade policy, are typically decision variables in the hands of governments and the focal question is how they are related to each other. Moreover, governments only control the number of firms in their own country. International merger and acquisition is not considered. In our framework firms — not governments — make merger decisions, and thereby affect governments' future decisions about strategic trade policy. Profit and not welfare is the objective function of the decision makers in the first stage. With this setup we study how the involvement of governments via strategic trade policy

affects the standard results on merger profitability. National and international merger often have opposite profitability effects. Strategic trade policy generates results for national merger that turn the standard results on the concentration effects of merger upside down,<sup>2</sup> whereas international mergers remain unprofitable.

Our interest in the analysis of merger in export oriented markets with strategic trade policy has been stimulated by a few recent merger cases in oligopolistic export industries in which strategic trade policy is empirically an important element. Three examples are: the competition among aircraft producers where recently a merger between two main producers in the US (Boeing and McDonnell-Douglas) reduced the market from triopoly to a duopoly (Boeing and Airbus). A second example is the highly concentrated market for aircraft engines in which a merger between two major producers in the US (Honeywell and General Electric) was discussed. A third example is the competition in the production of tanks between the US and Germany in the eighties. In all three cases there is a clear perception that strategic trade policy plays a major role.<sup>3</sup> We do not provide case studies of these industries here. Instead, we highlight a more general effect that makes national merger beneficial (both for merging firms and for countries in which

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<sup>2</sup>A literature that is closely related to our analysis considers the fact that there are strategic interactions not only in the output market. Lommerud, Straume and Sørsgard (2001), for instance, consider the role of input markets with imperfect competition, particularly unionized labor markets, and show that these can make merger more profitable. Ziss (2001) and Gonzales-Maestre and Lopez-Cunat (2001) consider the profitability of merger when shareholders strategically delegate their output decisions to managers, making their objective function a weighted average of profits and sales. This differs from a sales subsidy that turns out to have stronger effects. The strategic trade effect and the delegation effect could also be present simultaneously, in which case we expect that the two effects would add up.

<sup>3</sup>For instance, hidden subsidies are a perpetual matter of much debate between the major aircraft manufacturers, and the two countries in which they are located, both sides claiming that the competitor firm is highly subsidized, for instance, through defense contracts or preferential governmental loans. See, e.g., *Wirtschaftswoche* no. 21, May 17, 2001, p. 70.

this merger occurs) that is relevant in all export oriented oligopoly markets in which strategic trade policy is used.

In the analysis here we focus on Cournot competition<sup>4</sup> but similar results also hold under different forms of competition.<sup>5</sup> In Section 2 we introduce the Cournot model for the simple two-country case that is generalized in Section 3. In Section 4 we consider endogenous merger decisions and Section 5 concludes.

## 2 Cournot competition with two countries and three firms

Consider the merger problem as in Salant, Switzer and Reynolds (1983) in the context of strategic trade policy as in Brander and Spencer (1985). Let us start the analysis by looking at the special case that was used in the introduction: a Cournot industry with three firms,  $A$ ,  $B$  and  $M$ .  $A$  is located in country 1, while  $B$  and  $M$  are located in a different country 2.

The firms are owned by inhabitants of the country in which they are located.<sup>6</sup> They produce a homogenous good and compete in a standard Cournot game. Each firm chooses its quantity  $x_i$  ( $i = A, B, M$ ) simultane-

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<sup>4</sup>The Cournot framework can also be seen a shortcut to competition by capacity choice with subsequent price competition as in Kreps and Scheinkman (1983).

<sup>5</sup>In an earlier version of this paper we present a full analysis of strategic trade policy and national and international merger if the market interaction is described by promotional competition (see Huck and Konrad 2001).

<sup>6</sup>This assumes away the possibility of internationally dispersed share ownership, where the profits of a firm located in country  $i$  are part of country  $j$ 's welfare. The assumption is in line with empirically well documented strong home country biases in portfolio composition (see, e.g., Adler and Dumas, 1983, and French and Poterba 1991). The assumption also fits with the Boeing-Airbus example, and in Huck and Konrad (2003) we show why there is a tendency for a home bias in ownership structure, particularly in a strategic trade policy context. International dispersion of shareholdings changes the strategic environment. A paper that has highlighted this fact in a different context is Barros and Cabral (1994).

ously with all other firms. They sell their products exclusively in a market in a *third* country. This assumption has been carefully discussed in the strategic trade literature and is purely for simplicity.<sup>7</sup>

Before the firms choose their quantities, both countries, 1 and 2, decide about subsidizing the sales of the home firms by a per-unit subsidy. We limit consideration to cases where firms in the same country have to receive the same per-unit subsidy, denoted  $s^j$  for country  $j$ .<sup>8</sup> All three firms observe the subsidy choices in the two countries before they choose their quantities. Demand for the homogenous good is downward sloping and linear and can, thus, be normalized to

$$p(X) = 1 - X, \quad (1)$$

where  $X \equiv x_A + x_B + x_M$ . We also follow Salant, Switzer and Reynolds (1983) and assume that all firms have the same constant cost  $c$  per unit of output, and that this cost is not changed if a merger occurs.

In a completely unregulated world economy the Cournot equilibrium entails  $x_i = \frac{1-c}{4}$ . Given the subsidies  $(s^1, s^2)$ , the 3-player Cournot subgame for given subsidies has a different solution. Using (9), firm  $i$ 's profit that is located in country  $j$  can be written as

$$\Pi_i = x_i(1 - X - c + s^j). \quad (2)$$

Welfare in country 1 is firm  $A$ 's revenue net of production cost,

$$W_1 = x_A(p(X) - c) \quad (3)$$

while welfare in country 2 is the combined revenue from firms  $B$  and  $M$  net of their combined production cost,

$$W_2 = (x_B + x_M)(p(X) - c). \quad (4)$$

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<sup>7</sup>Brander and Spencer (1985) make this assumption to remove considerations of consumer rent from the picture so as to single out and highlight the strategic interaction of firms. Consumer rents in the exporting countries are considered in a broader analysis in which the results derived here remain relevant.

<sup>8</sup>While this non-discrimination provision is a plausible assumption (especially from a legal point of view), it is not clear *a priori* whether it restricts the generality of the results. Countries may want to pursue asymmetric strategies.



In both cases, subsidy payments net out in the equation determining a country's welfare: they reduce government revenue and increase firm profits.

For given subsidies,  $s^1$  and  $s^2$ , the equilibrium quantity for firm  $A$  in country 1 as the solution of the two-stage game for firms  $A$  and for firms  $B$  and  $M$  is given by  $x_A^* = \frac{1}{4}(1 - c + 3s^1 - 2s^2)$  and  $x_B^* = x_M^* = \frac{1}{4}(1 - c - s^1 + 2s^2)$ , respectively, yielding an equilibrium price of  $p = \frac{1}{4}(1 + 3c - s^1 - 2s^2)$ . Substituting into (3) and (4) we can write country 1's first-order condition as  $s^1 = \frac{1}{3} - \frac{1}{3}c - \frac{2}{3}s^2$  and  $s^2 = 0$ . Hence, in equilibrium  $s^{1*} = \frac{1-c}{3}$  and  $s^{2*} = 0$ .

Thus, the ‘‘cannibalizing’’ effect of subsidies in countries with more than one firm reduces this country's incentives to subsidize its firms. In this example, the effect is so strong that equilibrium subsidies are zero. This induces equilibrium profits of

$$\pi_A = \frac{(1-c)^2}{4} \text{ and } \pi_B = \pi_M = \frac{(1-c)^2}{36} \quad (5)$$

while equilibrium welfare is

$$W_1 = \frac{(1-c)^2}{12} \text{ and } W_2 = \frac{(1-c)^2}{18}. \quad (6)$$

Consider now a national merger in country 2. A merger in the framework of Salant, Switzer and Reynolds who assume constant unit cost is basically equivalent to one of the merging firms disappearing or being closed down. Intuitively, if one of the two firms,  $B$  and  $M$ , disappears due to the merger, country 2's incentives to use strategic trade policy should be resurrected. If  $B$  and  $M$  merge and, hence, there is only one firm left in country 2, this becomes the duopoly case considered by Brander and Spencer (1985). Equilibrium subsidies are  $s^1 = s^2 = \frac{1-c}{5}$ . This yields profits<sup>9</sup>

$$\pi_A = \pi_{BC} = \frac{4}{25}(1-c)^2 \quad (7)$$

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<sup>9</sup>The profit of the merged firms is simply the market profit earned by the firm that is the result of the merger. We do not discuss pricing of ownership shares and monetary transfers if one firm acquires the other, as this transfer between the owners of the pre-merger firms nets out when considering the total profits of the firm generated by the merger.

and welfare in both countries is given by

$$W_1 = W_2 = \frac{2}{25}(1 - c)^2. \quad (8)$$

A comparison of (5) and (6) with (7) and (8) shows that the merger of  $B$  and  $M$  in country 2 is profitable, welfare in country 2 increases, the profit of firm  $A$  in country 1 falls, and welfare in country 1 is reduced. These results are in sharp contrast to the effects of a merger in a laissez-faire economy where a national merger harms the firms involved and, thus, the country they are located in, while foreign firms and countries gain. This illustrates the importance of the strategic trade effect on mergers.

Consider also an international merger in this example. Let firm  $A$  in country 1 merge with firm  $M$  in country 2. Applying the same logic as before, this is equivalent to one of the firms disappearing. For international mergers we have to distinguish which of the two merging firms “disappears”. We will say “ $A$  acquires  $M$ ”, if firm  $M$  is closed down after the merger, and vice versa. We also need to discuss share ownership in the case of international merger. For the national merger of firms owned by individuals from the same country, the firm that exists after the merger is still nationally owned. For international acquisitions, many cases and issues could be addressed but are left out of the picture here.<sup>10</sup> Instead, we isolate the repercussions of international mergers on strategic trade policy. For this purpose the acquiring company buys the shares of the acquired firm, which automatically leads to indigenised ownership, also of the firm that made the acquisition.<sup>11</sup> Alternatively, this new ownership structure could be the result of an acquisition that is paid for

<sup>10</sup>For instance, the international ownership structure of the merged entity could depend on whether the owners of the acquired firm are paid with stock or with cash; tax treatment of the new entity; tax arbitrage through profit shifting and transfer pricing; the use of foreign direct investment as an instrument for tariff jumping; effects on bargaining power vis-a-vis local unions, or vis-a-vis national governments.

<sup>11</sup>The joint profit earned by the firm after acquisition in the market must then also pay for the price paid for the acquired firm. As in Salant, Switzer and Reynolds, we do not discuss the problem of determining this price, but rather consider whether the market profit of the joint entity increases or decreases compared to their independent profits. If profits earned in the product market reduce (as it happens in this example), such merger

by an equity swap and further transactions in the stock market by which the after-merger firm is fully indigenised in the end. Full indigenisation of the firm after merger or acquisition is clearly a special case, but a particularly important one, as there is a tendency for firms to indigenise in a world with strategic trade policy.<sup>12</sup>

For illustration, consider now  $A$  acquiring  $M$ . The new industry structure is again described by a symmetric duopoly of indigenised firms. We therefore can use the results in (5) and (7). Compared to the triopoly situation, the joint profits of firms  $A$  and  $M$  drop from  $\pi_A + \pi_M = \frac{(1-c)^2}{4} + \frac{(1-c)^2}{36}$  in the situation without acquisition to  $\frac{4}{25}(1-c)^2$  and the profit of firm  $B$  increases from  $\frac{(1-c)^2}{36}$  to  $\frac{4}{25}(1-c)^2$ . Accordingly, the company that emerges from  $A$  acquiring  $M$  makes lower profits in the market than  $A$  alone makes without the acquisition. Hence, even if the takeover price were zero,  $A$  would not want to make this acquisition.

How these effects generalize in a “larger” world with arbitrarily many countries and firms is shown in the next section, in which we can also consider the impact on firms in countries in which neither an acquiring firm nor an acquired firm is located.

### 3 The general model

We make the same general assumptions about production, timing and welfare as above but now consider  $n$  firms, located in  $k$  countries. The set of firms is denoted by  $N$  and the set of countries by  $K$ . The set of firms in country  $j$  is denoted by  $N_j$  and  $n_j$  is the number of firms in country  $j$ . Accordingly, is typically not taking place. The willingness to pay on the side of the acquirer would be negative, the asking price on the side of the owners of the acquired firm would be strictly positive.

<sup>12</sup>There are more general results suggesting that international ownership is a disadvantage in a strategic trade context. Huck and Konrad (2003) survey some of the literature and in a strategic trade context show that firm value is increased by indigenisation if other firms are indigenised.

$\bigcup_{j \in K} N_j = N$  and  $\sum_{j \in K} n_j = n$ . Demand is again normalized to

$$p(X) = 1 - X, \quad (9)$$

where  $X \equiv \sum_{i \in N} x_i$  and all firms are assumed to have the same constant cost  $c$  per unit of output. In an unregulated world economy the Cournot equilibrium implies  $x_i = \frac{1-c}{n+1}$ .

Firm  $i$ 's profit that is located in country  $j$  can be written as

$$\Pi_i = x_i(1 - X - c + s_j) \quad (10)$$

while welfare in country  $j$  is described by the sum of the revenues of the country's firms net of production cost,

$$W_j = \sum_{i \in N_j} (p(X) - c)x_i. \quad (11)$$

We look only for subgame perfect equilibria of the two-stage game of Cournot oligopoly in a strategic trade environment. Sometimes we will use a superscript  $i$  with the subsidy variable;  $s^i$  signifies the subsidy which firm  $i$  receives. As all firms in a country receive the same subsidy,  $s^i = s^r = s_j$  holds for all firms  $i$  and  $r$  in country  $j$ . It will be convenient to use  $S \equiv \sum_{i \in N} s^i = \sum_{j \in K} n_j s_j$ .

For given trade subsidies, firm  $i$ 's best-response function can be written implicitly as

$$x_i - s^i = 1 - X - c. \quad (12)$$

Taking the sum of all left-hand and all right-hand sides of (12) we obtain the total quantity  $X$  as a function of the "total subsidies"  $S$ . Substituting into (12) yields the equilibrium quantities as

$$x_i^* = \frac{1 - c - S}{n + 1} + s^i. \quad (13)$$

Firm  $i$ 's profits are given by

$$\Pi_i = (x_i^*)^2 \quad (14)$$

and country  $j$ 's welfare by

$$W_j = \sum_{i \in N_j} x_i^* (p(X^*) - c) = \sum_{i \in N_j} x_i^* (x_i^* - s_j). \quad (15)$$

This describes the Cournot outcome for given subsidies.

We now turn to the strategic trade policy game in which each country maximizes (15) by a choice of  $s_j$ . Country  $j$ 's best response function is obtained by differentiating (15) with respect to  $s_j$ .

$$\begin{aligned} \frac{dW_j}{ds_j} &= \sum_{i \in N_j} \left( \frac{\partial x_i^*}{\partial s_j} (2x_i^* - s_j) - x_i^* \right) \\ &= \sum_{i \in N_j} \left( x_i^* \frac{n+1-2n_j}{n+1} - s_j \frac{n+1-n_j}{n+1} \right). \end{aligned}$$

Using symmetry of firms within the same country, the resulting first-order condition can be written as

$$s_j = x_i^* \frac{n+1-2n_j}{n+1-n_j} \text{ with } i \in N_j.$$

Substituting  $x_i^*$  by (13) the first-order condition can be rewritten as

$$s_j n_j = (1-c-S) \frac{n+1-2n_j}{n+1}. \quad (16)$$

Summing both sides of (16) over countries gives

$$S = (1-c-S) \left( k - \frac{2n}{n+1} \right).$$

Hence, in equilibrium

$$S = (1-c) \frac{k(n+1) - 2n}{k(n+1) - n + 1}. \quad (17)$$

Inserting (17) into (16) and re-arranging gives the equilibrium subsidies as

$$s_j^* = (1-c) \frac{(n+1-2n_j)}{(kn+k-n+1)n_j}. \quad (18)$$

Hence, by (13) and (14) firm  $i$  in country  $j$  supplies

$$x_i^* = (1-c) \frac{n-n_j+1}{(kn+k-n+1)n_j} \quad (19)$$

and earns

$$\Pi_i^* = \left[ (1 - c) \frac{n - n_j + 1}{(kn + k - n + 1) n_j} \right]^2. \quad (20)$$

Accordingly, we can compute country  $j$ 's welfare as

$$W_j^* = (1 - c)^2 \frac{n - n_j + 1}{(kn + k - n + 1)^2}. \quad (21)$$

These results can be used to determine the consequences of a merger for firm profits and the welfare of the countries. We consider the merger of  $m$  firms. When stating our results we distinguish between firms that are involved in the merger, their competitors in the same country, and their competitors in other countries. First we consider mergers between  $m$  firms in the *same* country.

**Proposition 1** (i) *A merger of  $m$  firms within country  $j$  is never profitable for firms in country  $r \neq j$ . (ii) A merger in country  $j$  is always profitable for competitors in the same country. (iii) A merger is profitable for the group of merging firms in country  $j$  if*

$$n_j < (m + \sqrt{m}) \frac{(k - 1)(n - m) + 2k}{(k - 1)(n - m - \sqrt{m} + 1) + 2} \quad (22)$$

(iv) *A merger of  $m$  firms in country  $j$  is always more profitable for competitors in country  $j$  than for the merging firms in this country.*

For a proof of Proposition 1 we compare the respective profits (20). This is straightforward for (i)-(iii). Property (iv) follows from symmetry of firms within a country *ex ante* and *ex post* and from the fact that the merging firms' share in profits accruing to the firms in country  $j$  drops from  $m/n_j$  to  $1/(n_j - m + 1)$ , whereas the share in profits accruing to a firm not involved in this merger increases from  $1/n_j$  to  $1/(n_j - m + 1)$ .

The inequality in (iii) in Proposition 1 which determines whether the merger is profitable or not, merits some attention. In general, it says that the number of firms in the country in which the merger takes place must not be too big. The critical size increases in the total number of firms  $n$  and

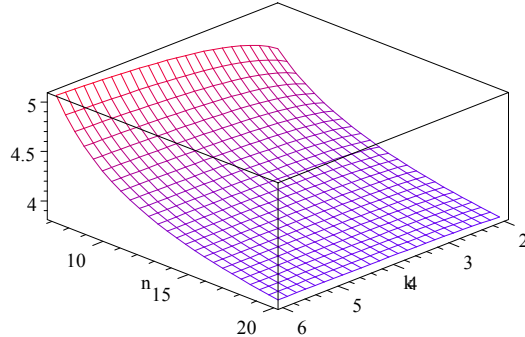


Figure 1: Critical  $n_j$  for profitability of  $m = 2$  as a function of  $k$  and  $n$ .

decreases in the number of countries. Thus, a merger of two firms is rather profitable in an industry where there are many firms in a few countries than the other way round. Figure 1 plots the critical  $n_j$  (number of firms in the country where the merger takes place) for the case of a bilateral merger ( $m = 2$ ). It can be seen that bilateral mergers are rarely profitable if there are initially more than 5 firms in the country in which the merger is planned because the reduction of the cannibalization effect is too small.

Next we consider international merger. As discussed in section 2, in a market environment as above, the impact of an international merger depends on post-merger ownership structure, but there is a tendency for indigenisation of the company that emerges after an acquisition. We consider this case here. Hence, an acquisition of a firm in another country  $r$  by a firm in country  $j$  can be seen as the closing down of the acquired firm in country  $r$ . Taking this into account we can again use (20) and calculate the benefit of an international acquisition and compare it to national mergers. We find

**Proposition 2** *Suppose a firm  $i$  in country  $j$  acquires a set  $M_r$  of  $m_r < n_r$  firms in country  $r$  ( $r \neq j$ ) and ownership of the merged entity is with residents in country  $j$ . (i) This merger is profitable for the firms in the set  $N_r \setminus M_r$  (i.e., the firms in country  $r$  that are not acquired). (ii) This merger is not profitable*

for non-merging firms in country  $j$  ( $N_j \setminus \{i\}$ ) and even less profitable for the group of merging firms ( $M_r \cup \{i\}$ ).

For a proof of property (i) we confirm

$$[(1-c)\frac{n-n_i+1}{(kn+k-n+1)n_i}]^2 < [(1-c)\frac{(n-m_i)-(n_i-m_i)+1}{(kn+k-(n-m_i)+1)(n_i-m_i)}]^2.$$

For property (ii) we confirm

$$[(1-c)\frac{n-n_j+1}{(kn+k-n+1)n_j}]^2 > [(1-c)\frac{(n-m_i)-n_j+1}{(k(n-m_i)+k-(n-m_i)+1)n_j}]^2.$$

Finally, consider the acquisition of the set of firms  $M_r$  by a firm  $i$  in country  $j$ . The merged entity receives the same profit as any firm in country  $j$  post acquisition. Prior to the acquisition, however, the joint profits of  $i$  and the firms in  $M_r$  were equal to the profit of firm  $i$  (that is identical to the profit of any of the other firms in country  $j$ ) plus the profit of the firms in  $M_r$ . Hence, in addition to the loss incurred by any firm in the acquiring firm's country as in (ii), the merging firms lose the pre-merger profit of the firms in  $M_r$ .

We can summarize the results in Propositions 1 and 2. We considered the profitability of national and cross-border firm acquisitions in linear Cournot markets in which an acquisition of a firm is equivalent to buying a competitor and closing it down. In the free-trade situation, it is never profitable to acquire a firm (and essentially close it down) if more than one firm remains. But with strategic trade policy, buying another national firm (and closing it down) can be a profit-enhancing strategy for the acquiring firm. In contrast, buying up firms that operate in other countries is never a profitable strategy as long as more than one firm remains world wide. Hence, our results reverse the profitability results by Salant, Switzer and Reynolds (1983) for national mergers, whereas, for international mergers, their results are remain qualitatively intact in the presence of strategic trade. Although profitability drives merger decisions, it is interesting to consider briefly welfare as well.

**Proposition 3** *A national merger of  $m$  firms in country  $j$  is always beneficial for country  $j$ . It can be harmful for other countries.*



The proof of the first part of Proposition 3 follows from comparing the respective equilibrium welfare levels as described by (21). The second part is shown by the example in the previous section. It was shown there for two countries with one firm  $A$  in country 1 and two firms  $B$  and  $M$  in country 2 that the merger between  $B$  and  $M$  reduced national welfare in country 1 from  $W_1 = \frac{(1-c)^2}{12}$  to  $W_1 = \frac{2}{25}(1-c)^2$ .  $\square$

The intuition for Proposition 3 can be developed as follows. If firms merge in country 2, this country can use strategic trade policy more efficiently and will make more use of it. Hence, for unchanged trade subsidies in other countries, this direct effect will increase the output of this country's firms and will harm the firms in other countries. The welfare benefit of this effect is typically smaller than the resulting profit increase, but typically goes in the same direction. Further, anticipating country 2's behavior, the other country 1 will typically use strategic trade policy less aggressively. This further benefits the firm(s) in country 2 and country 2's welfare.

A further result can be stated for aggregate welfare. World welfare is simply a function of prices. The equilibrium price is obtained from (9). Substituting  $X^* = \sum_{j=1}^k n_j x_j^*$  with  $x_j^*$  determined in (19) and using that  $\sum_{j=1}^k n_j = n$  yields

$$p^* = 1 - (1-c) \frac{kn - n + k}{kn + k - n + 1}. \quad (23)$$

The equilibrium price is, hence, monotonically decreasing in  $n$ , reaching  $p = c$  for  $n \rightarrow \infty$ . Any merger therefore increases aggregate welfare among the group of exporting countries and reduces world welfare.

## 4 Endogenising merger

Horn and Persson (2001a) point out that the profitability of a particular merger between two firms is not sufficient to explain whether or not the merger takes place. If two firms do not merge, others may, and, as we have seen in the previous sections, the benefit of a merger between two firms in

a country may be higher for non-merging firms in this country than for the firms that are actually involved in the merger, and this could induce a waiting game.

Several suggestions have been made to endogenise the merger decision, surveyed in Horn and Persson (2001a).<sup>13</sup> They also suggest a framework for studying endogenous merger and apply it in an international framework in which firms use foreign direct investment as a means of tariff jumping in Horn and Persson (2001b). In their approach firm owners determine the market structure fully cooperatively, allowing for binding agreements and side payments. Once the firm structure has been chosen, firms interact fully non-cooperatively in the product market. If the merger outcome is the result of efficient bargaining with side payments, the problem that merger generates a positive externality to other firms can be solved.

We apply this approach to determine the endogenous industry structures in a strategic trade policy environment. Two cases must be distinguished. In one case all firms in all countries can negotiate. In a second case, efficient negotiations take place only among firms within one country, simultaneously in all countries. The first case has a trivial solution with or without strategic trade policy: a cooperative outcome has precisely one firm ( $n = 1$ ) serving the whole world market as a monopolist (receiving zero subsidies from the government). This follows immediately from the fact that the monopoly maximizes the total industry rent and that negotiations cannot stop prior to reaching this outcome.

Consider the more interesting case in which firms can negotiate only nationally. Here, in principle, the concentration process could come to a stop prior to reaching national monopolies. We find, however,

**Proposition 4** *If firms can merge and bargain efficiently only within coun-*

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<sup>13</sup>A further recent contribution is by Wey (2001). He assumes that a takeover target is determined exogenously whereupon all other firms in the industry make takeover bids as in a standard auction. The interesting aspect that mirrors the merger problem in the Cournot game in Section 2 of this paper is that all firms prefer that the take-over takes place, but prefer if one of the other firms is acquiring the target.

tries then an industry structure with one firm in each country is the unique equilibrium outcome.

For a proof we show that national monopolization is a dominant strategy for firms in country  $j$ . The sum of firm profits in country  $j$  in the Cournot equilibrium if the number of firms in all other countries is  $n_{-j}$  can be written as

$$\left[ (1 - c) \frac{n_{-j} + 1}{((k - 1)n_{-j} + (k - 1)n_j + k + 1) \sqrt{n_j}} \right]^2.$$

This term is strictly decreasing in  $n_j$  and reaches a maximum for  $n_j \geq 1$  at  $n_j = 1$ .  $\square$

## 5 Conclusions

In this paper we consider the profitability of merger in an international context in which governments use strategic trade policy and the equilibrium outcome if merger is endogenous. The analysis is stimulated by the takeover of McDonnell-Douglas by Boeing and other recent takeover attempts among firms which compete for high-tech products in international markets, and in which strategic trade policy is a particularly relevant aspect.

We show that strategic trade policy can be a key explanation for why mergers between firms in the same country occur: the anticipated change in strategic trade policy increases the profitability of merger within a country. The same does not hold for international mergers which are not rendered more profitable by strategic trade policy. With strategic trade policy, the merger of two firms in one country increases this country's incentives to use strategic trade policy. The country in which the merger occurred chooses higher trade subsidies and the country in which no merger occurred chooses lower trade subsidies. This leads to the following results: (i) firms involved in the merger can benefit from the merger. (ii) merger among firms within a country can harm competitors in other countries. (iii) merger of firms within

a country can increase national welfare in this country and reduce welfare in other countries.

In contrast, international acquisitions are not profitable for the acquiring firm and the target, they harm competitors in the acquiring firm's home country and benefit the firms in the home country of the acquired firm, much like in the absence of strategic trade policy. Furthermore, we find by applying the approach introduced by Horn and Persson (2001a) to endogenous mergers that if the merger decisions are made by firms within each country in a fully cooperative stage before they enter a fully non-cooperative international Cournot market game, the equilibrium industry structure has one firm in each country.

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