STRATEGIC POLICY AND INTERNATIONAL ECONOMIC INTEGRATION*

Rafael Moner-Colonques, José J. Sempere-Monerris and Amparo Urbano**

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A B S T R A C T

In a context of economic integration, we analyse the strategic effect of two policies: merger policy and state aid policy. When governments play a Stackelberg policy game before firms compete in the market we find that: a) only under certain conditions, the leader country chooses a merger policy and, b) there is a policy equivalence in welfare terms for the follower. A centralised policy decision is welfare improving relative to the strategic policy game and equals total welfare of the area under autarky. Besides, there always exists a social incentive to propose mergers and both, the state aid level and the state aid expenditure, are lower.

Keywords: Merger Policy; State Aid; Market Enlargement.

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1 INTRODUCTION

The idea of relating trade and industrial policies, either in developing or in advanced countries, is not new. More recently, and as a result of the growth in international economic integration, attention has also been paid to competition policy. The links between these policies become particularly relevant not only in the context of a single-market but also concerning the harmonisation of policies in enlargement processes. It is not surprising that antitrust authorities question, from a pro-competitive point of view, the current European merger wave in some industrial sectors and the injection of financial aid into some public companies.[1] The limit between trade, industrial and competition policies is per se rather blurred.[2] In fact, it turns even more unclear when countries employ them strategically in view of prospective growth in competition.

In particular, when countries become engaged in a process of enlargement, two effects appear that work in opposite direction: a market expansion effect and an increased competition effect. Before that, new protectionist temptations and the formation of alliances to acquire or reinforce leadership may hinder the participating countries from reaping the full benefits of integration processes (see e.g. Jacquemin and Wright, 1993). It is not evident which is the best strategy to adopt and respond to the new generated situation.

This paper is a contribution to the study of strategic policy either in a context of economic integration or in an enlargement process. It is also useful in the context of the aforementioned harmonisation of policies by accession countries. We consider the strategic effects of the use of two microeconomic

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[1]Commercial banks are consolidating their positions in Europe with big cross-border mergers: Netherlands' ING-Belgium's Banque Bruxelles Lambert, Sweden's Nordbanken-Merita of Finland, Swiss Bank Corporation and Union Bank of Switzerland. Similar processes are going on in the insurance, pharmaceuticals or automobile sectors, only to mention a few. Recently, the financial aid received by Air France is now a case in the European Court of Justice. The plaintiffs (led by BA and SAS) base their appeal on the anticompetitive effects of the state aid. Similar arguments are behind the fight between Boeing and Airbus.

[2]For a precise analysis of the conflicts and complementarities among these microeconomic policies, see Gual (1995).

policies: a merger recommendation policy[3] and the implementation of a state aids policy. Before enlargement is effectively attained, the governments of the participating countries are aware that these policies will be undertaken by a common (supranational) agency. Hence, in the course of such a process, the governments may have, possibly different, strategic incentives to adopt any of these two policies. Our work is a theory-oriented approach and we set up a strategic game to model the governments' interaction. The governments' actions are their policy decisions. The equilibria obtained will allow us to study the social desirability of using either of the two alluded policies.

We will concentrate on them since they are closely scrutinised by antitrust authorities although their treatment is rather different. Concerning merger policy, there have been periods of merger waves due to several factors including the authorities' more tolerance. Also, mergers have been judged on the potential efficiency gains which might compensate for the reduction in competition implied by them. State aids, however, are basically prohibited when they affect the countries' terms of trade. Interesting enough, we will show that there is some kind of welfare equivalence between those policies.[4]

We set up a multi-stage game where a country joins another economic area. The analysis is in two parts. Firstly, governments choose policies non-cooperatively and sequentially, prior to the play of a Cournot game by firms.

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[3]Governments cannot choose the oligopoly sizes. However, they may favour the approval of mergers by showing more permissiveness towards them. We want to capture such an influence by analysing the incentives a public agency may have when deciding on the number of firms. Also, and for the sake of the exposition, whenever we refer to a merger recommendation or a merger policy, we are meaning that the number of existing firms in the industry is altered in any direction.

[4]For a measure to be regarded as aid that is subject to the principle of incompatibility with the common market set out in Article 92(1) of the EC Treaty, it must satisfy four criteria: it must provide the firm with an advantage; it must be granted by the State or through state resources; it must have particular characteristics, i. e. it must favour only "certain undertakings or the production of certain goods"; lastly, it must affect trade among Member States. The four conditions are cumulative, namely, if one of them is not satisfied, Art. 92 is not applicable. Essentially, there are two prime kinds of state aids according to their effects on costs. A fixed lumpsum aid and a specific production subsidy. The former are permitted when they are aimed at other regional and/or industrial goals. The latter are generally banned. There are, however, exceptions concerning the issue of environmental protection.

We call this the strategic policy game. In such a game, the government of the economic area will play the leader role whereas the other government will be the follower of a Stackelberg game. Secondly, we analyse the case when the policy choice is taken by a supranational authority - the case of a centralised decision. Our findings can be summarised as follows. Whenever the initial oligopoly sizes are given, then at the Stackelberg equilibrium of the noncooperative policy game: a) the follower government is indifferent between a merger/divestiture recommendation and a state aid policy once the leader government has selected its policy and, b) the leader country will prefer a merger/divestiture policy only if its oligopoly is not too concentrated. Then, by comparing the equilibrium oligopoly sizes under autarky and under the strategic policy game, we may identify whether there are any private and social incentives to recommend mergers. We show that the follower government has no strategic incentive to recommend mergers whereas the leader government will do so provided two conditions are satisfied, i.e. that consumers are not given too much weight and a certain proportionality between market sizes exists. Finally, if the decision on which policy to choose is taken by a supranational authority, then we find that there is always a social strategic incentive to propose mergers -to reduce the number of firms operating in the enlarged area compared with the autarky situation-; besides, the state aid level and the amount spent are both reduced. Also, the aggregate welfare of the integrated area is bigger compared to the non-cooperative Stackelberg solution and equal to that under autarky. A centralised decision, concerning mergers as well as state aids, is more pro-competitive compared to the strategic policy game.

The paper is organised as follows. The next Section gives a brief overview of the literature related to our work and of the antitrust treatment of mergers and state aids. The theoretical models are presented in Section 3 whereas the centralised decision is studied in Section 4. Some concluding remarks and possible extensions are given at the end.

2 RELATED LITERATURE AND ANTITRUST POLICY

The game theoretical modelling that we will present below takes after the IO models applied to international economics which have resulted in the so called "new trade theory". The pioneering models, starting with Brander and Krugman (1983), that focused on why trade happens and its effects in this new context, were also providing a means to study strategic trade policy. Markusen and Venables' (1988) paper is a good synthesis and they offer conclusions about the optimal strategic trade policy under different competing assumptions.

International economic integration constitutes one of the subfields of international economics.[5] It deals with the attempt by governments to link together the economies of two or more countries through the removal of economic frontiers under different stages or levels of integration schemes. The conventional method for quantifying the effects of integration-induced trade-flow changes is the partial equilibrium approach. It allows the use of information obtained from microeconomic studies to analyse the impact on individual product markets one at a time and it is based on the theory of the customs unions. Some authors have employed partial equilibrium models of IO applied to an international setting different from that traditional approach. Ethier and Horn (1984) and Smith and Venables (1988) are two notable examples.

Unfortunately, the literature of economic integration has not formally analysed, to the best of our knowledge, the role of mergers or state aids as strategic choices in view of (potentially) increased international competition. It is far back to Stigler (1950) who, concerning merger profitability, pointed out that the non-merging firms may gain from a merger. Various oligopoly models have explored the interactions between agents participating and those not participating in a merger. These include Salant, Switzer and Reynolds (1983), Deneckere and Davidson (1985), and Perry and Porter (1985). All of them are studies in a closed economy context and they consider mergers as exogenous. Compared to them, our model disregards firm size and possible

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[5]The interested reader is referred to Hine (1994).

synergies when two or more firms merge. However, our approach is a way of tackling with endogenous mergers different from coalition formation models.

Concerning the welfare effects of mergers, Williamson (1968) pointed out the essential tradeoff between efficiency gains and reduced competition following a merger. That is, for a merger to benefit from the so called 'efficiency defense', the area corresponding to the deadweight loss (the loss of consumer surplus due to the merger) must be smaller than the one corresponding to the savings in resources which become available for alternative use. Later, Farrell and Shapiro (1990) provided a model to analyse the output and price effects of a merger among Cournot oligopolists, emphasising the effects on nonparticipating firms. Their main contribution is an identification of the role of the response of these nonparticipant firms, to any output reduction by the merging parties. Then, a sufficient condition for a welfare increasing merger is a positive effect over all other participants. If nonparticipating firms reduce their output, the merger may well lower welfare even though it is privately profitable. That condition is conveniently redefined by Barros and Cabral (1994) in an open economy context.[6] In contrast with these papers, our analysis is not a normative one. Rather, it is a welfare comparison to discern whether a merger policy or a state aid policy is socially preferable. Assuming a centralised decision allows us to establish the convenience of intervention versus free trade.

There are also a number of articles analysing state aids, some of them from a strictly legal perspective and others from an empirical point of view (see e.g. Huttin, 1989, and Neven, 1994). Campbell et al. (1994) examine possible reforms to domestic policy to make international harmonisation easier. These authors look at merger policy in four countries, at industrial policy and at state aid policy. They conclude, by analysing the aids to Air France and Groupe Bull that the same welfare standards, across policies and across countries, should be employed to facilitate international harmonisation. Yet, and to the best of our knowledge, a formal model in an enlargement process

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[6]They extend the Farrel and Shapiro's (1990) model based on the external effect of mergers on non-participant firms to the case of an open economy. The approval rule for a merger is redefined since the regulator must account for consumer surplus and domestic firms' profits. Furthermore, they also examine the implications of such externality in a model of a single market.

has not been developed.

Concerning antitrust policy in the European Union, it must be said that there is no article in the Treaty of Rome which specifically deals with mergers and acquisitions.[7] However, the Commission and the European Court of Justice have interpreted Articles 85 and 86, the two pillars of EC competition policy, in such a way as to make them partly applicable to mergers. With Article 86, the control only concerns firms already dominant and in principle is made after it has occurred. More detailed regulation became effective in 1990 (Regulation No 4064/89). It is founded upon two main points: a) the regime to be set up is applicable to major mergers which have a truly European dimension linked to transnational externalities; the aim is to prevent both the creation and the enlargement of dominant market positions, and b) the regulation does not provide for authorization in derogation from the prohibition, on the basis of the efficiency effects of the merger, but efficiency becomes one element in the overall appraisal. The regulation has been recently amended and it entered into forceon 1st March 1998.[8] State aids appear in articles 92 to 94 of the Treaty of Rome. In particular, article 92 forbids state aids that distort trade between Member States. The concept of state aid in the Treaty is very broad and covers not only direct grants but also low-interest loans, tax relief and any gratuitous advantage in general. Recently, the Commission has issued guidelines that reveal that state aid policy is profoundly influenced by other policy objectives such as industrial and research policy, among others.[9]

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[7]The discussion that follows is built on Buigues, Jacquemin and Sapir (1995), Fisher (1987), Jacquemin (1990), Schmalensee (1987) and White (1987).

[8]Basically, the EU Merger guidelines define a series of thresholds above which the Commission will have a case. The total world-wide turnover of the total number of firms concerned must represent a sum in excess of 3 billion ecu, and the total turnover realised within the Community by at least two of the firms involved must represent a figure in excess of 200 million ecu. Other criteria are employed in order to assist the process of deciding whether or not there exists the creation or the reinforcement of a dominant position, e.g. the market position and the financial power of the firms concerned, and the structure of the markets affected taking into account international competition.

[9]On July 15th 1997, and in pursuance of Article 94, the Commission adopted a regulation allowing for the exemption of some categories of horizontal aid and aid below a certain threshold.

In the United States, mergers are judged on the basis of Section 7 of the Clayton Act (1914), amended in 1950. The Federal Trade Commission (FTC) issues guidelines to the Department of Justice (DOJ); the guidelines are suggestive rather than definitive. Unlike Europe, the 1992 US Merger Guidelines make reference to concentration indices and their evolution in addition to other elements such as stable market shares or territorial restrictions, in order to challenge a merger. US law and Community law both follow a regulatory model with its requirements for notification under certain circumstances. There is, however, a big difference since, under Community law, a merger that does not require notification will not be challenged. US law allows the government to challenge mergers that do not meet the reporting thresholds. This has obvious and immediate implications for the analysis of joint ventures and strategic alliances. On the latter, the Commission has recently shown a favourable attitude towards these types of collaboration. Finally, what both legislations do leave open is the possibility for an efficiency defense. However, cost efficiencies are difficult to measure and, consequently, the evaluation of potentially anticompetitive mergers is done on a case-by-case basis.[10]

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[10] William J. Baer, Director of the Bureau of Competition at the FTC, wrote in the 1997 report: "It is not enough to identify the mergers that are likely to cause competitive harm and injure consumers. We also need an effective remedy...(that)...includes divestiture of certain assets so that a third party can restore competition that is lost as a result of the merger". In fact, this kind of negotiations are also common practice in Europe. For example, last 18th November 1997 the Commission granted an approval under conditions in the acquisition of Swiss firm Elektrowatt by German Siemens AG. Those conditions included: the divestiture of the publicphone division of Electrowatt to a third independent party, either effective or prospective competitor. Siemens must also ensure access to its technology to any third party under the same conditions as those for Electrowatt.

3   THE MODEL

There are two countries, 1 and 2, in a process of economic integration.[11] In each country we focus on a market for a homogeneous good consisting of n_k^0, $k = 1, 2$, oligopolistic firms. All firms are symmetric in costs and produce at constant marginal cost c. A simple way to capture differences in the density of consumers across countries is by a linear demand of the form:

$$Q_k = \gamma_k(a - p), \; k = 1, 2, \; \gamma_k > 0 \tag{1}$$

with the parameter γ_k representing the market size of country k and Q_k the demand in k at price p.[12]

The situation we model is the typically known as *enlargement* of a market area although it might as well be applied to the idea of the single-market.[13] In so doing we propose a Stackelberg-type mode of competition between the governments which may choose between a merger/divestiture recommendation, M, or a state aid policy, S. Specifically, we set up a three-stage game where in the first stage the country 1's government (the leader) decides either

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[11] From an analytical point of view, the model does not consider the distinction between several levels of integration, i.e. a free trade area, a customs union, a common market and an economic and monetary union. However, we will describe our model as one of integration since the main point we focus on is the coordination of policies following the pre-accession period.

[12] This demand specification assumes that consumers' tastes and incomes are identically distributed but the density of consumers is different. Also, notice that this demand schedule has the property that equilibrium prices do not depend on the dimension of markets.

[13] Such processes normally involve a pre-accession period where the countries negotiate the conditions they must satisfy in order to be eligible for integration. This is currently happening with the future enlargement of the European Union to the East, where competition rules are considered by Commissioner K. Van Miert as part of the "acquis communitaire" to be applied from the beginning of the enlargement. This is extracted from Van Miert: "The Role of Competition Policy in Modern Economies" speech given at the Danish Competition Council in Copenhagen on November 10th, 1997. The same ideas are expressed by the Commissioner in an interview in the LSE magazine, summer 1998. Therefore, the result of that negotiation must include a commitment from those countries wishing to join the EU to approximate their laws to those of the EU, and to set up an authority to monitor the granting of state aid. Assistance by the EU to those East countries is being provided partly through financial support under the PHARE programme and, through a significant programme of training and exchanges of staff in order to facilitate the fulfilment of that commitment. Then, we may naturally assume that there is one agent (the follower) that responds to the initial givens by the other (the leader).

on the number of firms, n_1, it wants to contribute to the integrated economy or on the amount of the per unit output subsidy, s_1, its national firms will enjoy. Similarly, country 2's government (the follower), knowing the government 1's choice, chooses its policy level: either n_2 or s_2. Finally, the number of firms with the effective marginal costs resulting from the first two stages compete à la Cournot in a market of size $\gamma_1 + \gamma_2$. The timing of the game is displayed in Figure 1. Consequently, four different subgames can arise. Denote them by MM, MS, SM, and SS, where the first character refers to the leader's choice and the second to the follower's. Let TSS_k, $k = 1, 2$ be the weighted national surplus for country k (see Figure 2).

In addition, taking the equilibrium under integration as a reference point and focusing only on merger policies, we may identify, in this context, whether there are any private and social incentives to propose merger departing from a situation where two countries were operating under autarky. All these equilibria appear in the subsections below.

3.1 The equilibrium under economic integration

As usual, we will solve the model in the standard backward way. The third stage of the game is a Cournot game in the enlarged economy. Before reaching this stage, the governments play a sequential game in policies. The four subgames appear in the subsection under the heading the Stackelberg games. Then, we study which is the equilibrium of the full strategic policy game.

3.1.1 The Cournot game

If the two economies join together we will have an oligopoly of size $n_1 + n_2$ operating in a market of size $\gamma_1 + \gamma_2$. For the sake of the exposition, we will start by characterising the equilibrium explicitly depending on the choice variables of the model. Let λ_k be an indicator that can take on values, one or zero, to distinguish the case when government k uses a state aid policy from when it does not. If government $k's$ decision involves the use of state aids, then the effective marginal cost of any country k firm is $c - s_k$. Next, denote by x_i, $i = 1, ..., n_1$, the output of a firm from country 1 and by $y_j, j = 1, ..., n_2$, the output of a firm from country 2. The Cournot-Nash equilibrium of the third stage of the game is obtained from the following optimisation programme, where firms maximise profits,

$$\max_{x_i} \pi_i = \left(a - \frac{1}{\gamma_1 + \gamma_2} \left(\sum_{i=1}^{n_1} x_i + \sum_{j=1}^{n_2} y_j \right) - c + \lambda_1 s_1 \right) x_i \quad i = 1, ..., n_1 \quad (2)$$

$$\max_{y_j} \pi_j = \left(a - \frac{1}{\gamma_1 + \gamma_2} \left(\sum_{i=1}^{n_1} x_i + \sum_{j=1}^{n_2} y_j \right) - c + \lambda_2 s_2 \right) y_j \quad j = 1, ..., n_2 \quad (3)$$

The solution to the above system of equations is given by[14]:

$$x^I = x_i^I = \frac{(\gamma_1 + \gamma_2)(a - c + (n_2 + 1)\lambda_1 s_1 - n_2 \lambda_2 s_2)}{(n_1 + n_2 + 1)} \quad \forall i \quad (4)$$

$$y^I = y_j^I = \frac{(\gamma_1 + \gamma_2)(a - c + (n_1 + 1)\lambda_2 s_2 - n_1 \lambda_1 s_1)}{(n_1 + n_2 + 1)} \quad \forall j \quad (5)$$

and hence, profits of a single firm, π_k^I, consumer surplus, CS_k^I, and state aid expenses, SA_k^I are:

$$\pi_1^I = \frac{(\gamma_1 + \gamma_2)(a - c + (n_2 + 1)\lambda_1 s_1 - n_2 \lambda_2 s_2)^2}{(n_1 + n_2 + 1)^2}$$
$$CS_1^I = \frac{\gamma_1((n_1 + n_2)(a - c) + n_1 \lambda_1 s_1 + n_2 \lambda_2 s_2)^2}{2(n_1 + n_2 + 1)^2}$$
$$SA_1^I = \frac{\lambda_1 s_1 n_1 (\gamma_1 + \gamma_2)(a - c + (n_2 + 1)\lambda_1 s_1 - n_2 \lambda_2 s_2)}{(n_1 + n_2 + 1)}$$

$$\pi_2^I = \frac{(\gamma_1 + \gamma_2)(a - c + (n_1 + 1)\lambda_2 s_2 - n_1 \lambda_1 s_1)^2}{(n_1 + n_2 + 1)^2}$$
$$CS_2^I = \frac{\gamma_2((n_1 + n_2)(a - c) + n_1 \lambda_1 s_1 + n_2 \lambda_2 s_2)^2}{2(n_1 + n_2 + 1)^2}$$
$$SA_2^I = \frac{\lambda_2 s_2 n_2 (\gamma_1 + \gamma_2)(a - c + (n_1 + 1)\lambda_2 s_2 - n_1 \lambda_1 s_1)}{(n_1 + n_2 + 1)}$$

$$(6)$$

3.1.2 The Stackelberg games

During the pre-accession period, both governments play a sequential policy game. In the second stage of the game, government 2 maximises its weighted national surplus which consists of consumer and producers' surplus net of the state aid policy expenses (when appropriate). The parameter ρ denotes the weight given to consumer surplus, $0 < \rho < 1$, that is, governments consider consumers less important than firms.[15] Government 2 may observe two

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[14]Upperscripts I and A will denote the equilibrium under integration and autarky, respectively.

[15]Although this is not new, there is an ongoing debate among antitrust practitioners about the convenience of which should be given more importance in taking decisions,

different actions by the leader, either a merger/divestiture policy (a choice of n_1 with $\lambda_1 = 0$) or a state aid policy (a choice of s_1 with $\lambda_1 = 1$, and where $n_1 = n_1^0$). The four possible subgames are analysed next.

The MM-subgame.

The leader government has decided to use a merger/divestiture policy. Then the optimisation problem for the follower, which also uses a merger/divestiture policy, is given by:[16]

$$\max_{n_2} TSS_2^{MM} \;=\; n_2 \pi_2^{MM} + \rho CS_2^{MM} = \tag{7}$$
$$=\; \frac{n_2(\gamma_1 + \gamma_2)(a-c)^2}{(n_1 + n_2 + 1)^2} + \frac{\rho\gamma_2(n_1 + n_2)^2(a-c)^2}{2(n_1 + n_2 + 1)^2}$$

The first order condition is:

$$\frac{(\gamma_1 + \gamma_2)(n_1 - n_2 + 1)}{(n_1 + n_2 + 1)^3} + \frac{\rho\gamma_2(n_1 + n_2)}{(n_1 + n_2 + 1)^3} = 0 \tag{8}$$

from which we obtain the following reaction function:

$$n_2(n_1; \rho) = \frac{\gamma_1 + \gamma_2 + [\gamma_1 + (1 + \rho)\gamma_2]n_1}{\gamma_1 + (1 - \rho)\gamma_2} \tag{9}$$

Note that the follower's merger/divestiture policy behaves as a strategic complement. Now, the leader maximises the following function obtained by substitution of (9) into the corresponding TSS_1^{MM}, that is:

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whether consumers or both consumers and firms. In any case, it is possible to find situations where it seems closer to the actual policy to give more weight to the industry, e.g. the automobile industry in the EU. Moreover, the Commission has adopted a new framework for European State Aid to this industry. One way or the other, in our model consumer surplus is increasing in the number of firms which unfortunately leads to a solution with an infinite number of firms. To avoid this trivial outcome and make the problem interesting, we restrict our attention to finite solutions by assuming the maximisation of a weighted national surplus.

[16]The term TSS_2^{MM} stands for the weighted national surplus for country 2 once we have evaluated the terms π_2^I and CS_2^I in (6) at $\lambda_1 = \lambda_2 = 0$. The same obvious notation is followed in order to define all of the possible combinations, e.g. TSS_1^{SM}, when $\lambda_1 = 1$ and $\lambda_2 = 0$.

$$
\max_{n_1} TSS_1^{MM} = \frac{(\gamma_1 + \gamma_2)(a - c)^2}{2} \times \tag{10}
$$

$$
\left[\frac{2[\gamma_1 + (1 - \rho)\gamma_2]^2 n_1 + \rho\gamma_1(\gamma_1 + \gamma_2)(1 + 2n_1)^2}{[2(\gamma_1 + \gamma_2)(1 + n_1) - \rho\gamma_2]^2} \right]
$$

The Stackelberg leader equilibrium number of firms is:

$$
n_1^*(MM) = \frac{2(\gamma_1 + \gamma_2)^2 + (\gamma_1 + \gamma_2)(2\gamma_1 - 3\gamma_2)\rho + \gamma_2^2\rho^2}{2(\gamma_1 + \gamma_2)[\gamma_1 + \gamma_2 - (2\gamma_1 + \gamma_2)\rho]} \tag{11}
$$

which is a positive number as long as $\rho < \frac{\gamma_1 + \gamma_2}{2\gamma_1 + \gamma_2} \equiv \rho^{\max}$. Note that for a finite equilibrium to exist governments should value more the firms' side than the consumers' one. If ρ exceeds $\rho^{\max}$, we conclude that the TSS_k function is always increasing with n_k, and therefore the optimal number of firms will tend to infinity. It can also be verified that the equilibrium number of firms in country 2 is greater than the one of the leader country. Using (9), the Stackelberg follower number of firms corresponds to:

$$
n_2^*(MM) = \frac{4(\gamma_1 + \gamma_2)^2 - (\gamma_1 + \gamma_2)(2\gamma_1 - \gamma_2)\rho - \gamma_2^2\rho^2}{2(\gamma_1 + \gamma_2)[\gamma_1 + \gamma_2 - (2\gamma_1 + \gamma_2)\rho]} \tag{12}
$$

Notice that $\lim_{\gamma_1 \to \infty} \rho^{\max} = \frac{1}{2}$, while $\lim_{\gamma_2 \to \infty} \rho^{\max} = 1$; that is, $\rho^{\max}$ is also bounded below. Therefore, we always have a nonnegligible interval. These results are summarised in the following lemma.

Lemma 1 *i) For any* $0 < \rho < \rho^{\max}$, *the equilibrium number of firms in both countries is finite, positive and* $n_2^*(MM) > n_1^*(MM)$. *Besides, these equilibrium values are:*
a) increasing with the leader's market size,
b) decreasing with the follower's market size and,
c) increasing with the weight assigned to the consumers in the social surplus function.
ii) If $\rho^{\max} < \rho < 1$, *then the equilibrium number of firms is infinite.*

Proof. See the Appendix.

Note that we have an initial oligopoly size in each country, n_1^0 and n_2^0. There will exist an incentive to merger as long as those initial oligopoly sizes are greater than the equilibrium ones, $n_1^*(MM)$ and $n_2^*(MM)$. We may identify the agents' private incentives to merge by properly choosing the weight in the TSS_k^{MM}. Thus, for $\rho = 0$, we obtain the industry size that maximises aggregate profits. Under integration, firms prefer to form an oligopoly with one more firm than the rival's oligopoly size. However, consumers prefer perfect competition (consumer surplus is always increasing with n_k). There is an obvious conflict of interests.

Finally, the weighted national surplus attained at equilibrium in each country is:

$$TSS_1^{MM*} = \frac{(a-c)^2((\gamma_1 + \gamma_2)^2 + 2(\gamma_1 + \gamma_2)(2\gamma_1 - \gamma_2)\rho + \gamma_2^2\rho^2)}{8(\gamma_1 + \gamma_2)(2 - \rho)}$$

$$TSS_2^{MM*} = \frac{(a-c)^2((\gamma_1 + \gamma_2)^2 - 2(\gamma_1 + \gamma_2)(\gamma_1 - \gamma_2)\rho - \gamma_2^2\rho^2)}{4(\gamma_1 + \gamma_2)(2 - \rho)}$$

The MS-subgame.

In this case we take $\lambda_1 = 0$ and $\lambda_2 = 1$. The optimisation problem for the follower government is given by:

$$\max_{s_2} TSS_2^{MS} = n_2^0 \pi_2^{MS} + \rho CS_2^{MS} - SA_2^{MS} = \qquad (13)$$

$$= \frac{(\gamma_1 + \gamma_2)n_2^0(a - c + (n_1 + 1)s_2)^2}{(n_1 + n_2^0 + 1)^2}$$

$$- \frac{s_2 n_2^0(\gamma_1 + \gamma_2)(a - c + (n_1 + 1)s_2)}{n_1 + n_2^0 + 1}$$

$$+ \frac{\rho\gamma_2[(n_1 + n_2^0)(a - c) + n_2^0 s_2]^2}{2(n_1 + n_2^0 + 1)^2}$$

From the first order condition for (13) we obtain the following reaction function:

$$s_2(n_1; \rho) = \frac{(a - c)[(\gamma_1 + \gamma_2)(1 + n_1 - n_2^0) + \gamma_2(n_1 + n_2^0)\rho]}{[2(\gamma_1 + \gamma_2)(1 + n_1) - \gamma_2\rho]n_2^0} \qquad (14)$$

As before, the follower's state aid policy behaves as a strategic complement of a merger policy by the leader.[17] The Stackelberg leader number

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[17]Specifically, $\frac{ds_2}{dn_1} = \frac{(a-c)[(\gamma_1+\gamma_2)-\gamma_2\rho][2(\gamma_1+\gamma_2)n_2+\gamma_2\rho]}{n_2[2(\gamma_1+\gamma_2)(1+n_1)-\gamma_2\rho]^2}$, which is positive.

of firms, $n_1^*(MS)$, coincides with $n_1^*(MM)$. This means that: *the equilibrium number of firms chosen by the leader is independent of the follower's policy choice.* Finally, the Stackelberg follower specific state aid amount corresponds to:

$$s_2^*(MS) = \frac{(a-c)[2(\gamma_1+\gamma_2)^2(2-n_2^0) + \rho(\gamma_1+\gamma_2)(-2\gamma_1+\gamma_2+(2\gamma_1+\gamma_2)n_2^0) - \gamma_2^2\rho^2]}{4n_2^0(\gamma_1+\gamma_2)^2(2-\rho)}$$

(15)

Regarding the sign of the above expression, it is positive for a sufficiently concentrated oligopoly in the follower market.[18] Put differently, if country two's oligopoly size is fairly big, then the follower government would rather tax instead of subsidise production. In particular, for identical market sizes, it is sufficient that $n_2^0 \leq 4$. Finally, the weighted national surplus attained at equilibrium in each country is:

$$TSS_1^{MS*} = TSS_1^{MM*}$$
(16)

$$TSS_2^{MS*} = TSS_2^{MM*}$$
(17)

The discussion that follows is aimed at giving an intuition for the welfare equivalences in (16) and (17). Suppose that the leader government has chosen M and to reduce the number of operating firms, i.e. $n_1 < n_1^0$. This choice by government 1 becomes known to government 2. In the event that the follower opts for merger policy too, since the strategic policy variables are strategic complements, it will also reduce the number of firms; then, the total size of the oligopoly diminishes and output per firm increases. Aggregate profits of country 2 firms increase whereas the total output of those firms goes down. Consequently, *there is a redistribution of gains from consumers to firms (in country 2).* Besides, there is an induced effect on the output of the firms of the leader country which results in: output per firm, total output and aggregate profits increase. However, overall output is lower than before the variation in n_2. Hence, consumers in the enlarged area are worse off.

Suppose, on the contrary, that government 2 chooses S and that the subsidy is positive. This policy is favourable to firms in country 2 (output per firm, total output and aggregate profits increase). The indirect effect of that measure on country 1's firms is precisely the opposite; we have an asymmetric oligopoly in production costs. Therefore, *the redistribution goes from firms*

---

[18]The precise condition for $s_2^*(MS) \geq 0$ is that $n_2^0 \leq \frac{4(\gamma_1+\gamma_2)^2+(\gamma_1+\gamma_2)(-2\gamma_1+\gamma_2)\rho-\gamma_2^2\rho^2}{2(\gamma_1+\gamma_2)^2-(2\gamma_1+\gamma_2)\rho}$.

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in the leader country to firms in the follower country and to consumers in both countries. There is, in addition, an expenditure on state aids. This means that there will be an inter-sectorial redistribution within the follower country.

Therefore, we conclude that if it is the case that welfare levels are equal under any policy choice, the redistributions in the case of state aids compensate one another. Notice that we are implicitly assuming that redistribution is costless.

The SS-subgame.

In this case, government 1 has opted for a state aid policy. Then the optimisation problem for government 2, which also employs a state aid policy, $(\lambda_1 = \lambda_2 = 1)$ is given by:

$$
\begin{aligned}
\max_{s_2} TSS_2^{SS} &= n_2^0 \pi_2^{SS} + \rho CS_2^{SS} - SA_2^{SS} \qquad (18) \\
&= \frac{(\gamma_1 + \gamma_2)n_2^0(a - c + (n_1^0 + 1)s_2 - n_1^0 s_1)^2}{(n_1^0 + n_2^0 + 1)^2} \\
&\quad - \frac{s_2 n_2^0(\gamma_1 + \gamma_2)(a - c + (n_1^0 + 1)s_2 - n_1^0 s_1)}{n_1^0 + n_2^0 + 1} \\
&\quad + \frac{\rho\gamma_2[(n_1^0 + n_2^0)(a - c) + n_1^0 s_1 + n_2^0 s_2]^2}{2(n_1^0 + n_2^0 + 1)^2}
\end{aligned}
$$

The corresponding reaction function, from the first order condition for (18), is given by:

$$
s_2(s_1; \rho) = \frac{(a - c)[(\gamma_1 + \gamma_2)(1 + n_1^0 - n_2^0) + \gamma_2(n_1^0 + n_2^0)\rho] - [(\gamma_1 + \gamma_2)(1 + n_1^0 - n_2^0) - \gamma_2\rho]n_1^0}{[2(\gamma_1 + \gamma_2)(1 + n_1^0) - \gamma_2\rho]n_2^0}
$$

$$(19)$$

Note that country 2's state aid strategy is a strategic complement of country 1's state aid policy for $n_2^0 \geq n_1^0 + (1 - \frac{\gamma_2\rho}{\gamma_1 + \gamma_2})$, that is, when the country 2 industry is less concentrated than the one in country 1; however, for symmetric oligopoly sizes ($n_1^0 = n_2^0$) they are strategic substitutes. Government 1 maximises the function obtained by substitution of (19) in the corresponding TSS_1^{SS}, obtaining the Stackelberg leader specific state aid amount:

$$
s_1^*(SS) = \frac{(a - c)[2(\gamma_1 + \gamma_2)^2 + \rho(\gamma_1 + \gamma_2)(\gamma_1 - 3\gamma_2 + 2\gamma_1 n_1^0) + \gamma_2^2\rho^2]}{n_1^0(\gamma_1 + \gamma_2)[2(\gamma_1 + \gamma_2)(2 + n_1^0) - (\gamma_1 + 2\gamma_2)\rho]} \qquad (20)
$$

Using (20), the corresponding Stackelberg follower specific state aid amount is:

$$s_2^*(SS) = \frac{(a-c)[(\gamma_1+\gamma_2)^2(1+n_1-n_2)-\rho(\gamma_1+\gamma_2)(\gamma_1-2\gamma_2+(\gamma_1-\gamma_2)n_1-(\gamma_1+\gamma_2)n_2)}{n_2(\gamma_1+\gamma_2)[2(\gamma_1+\gamma_2)(2+n_1)-(\gamma_1+2\gamma_2)\rho]}$$

(21)

The subsidy $s_1^*(SS)$ is always positive. However, $s_2^*(SS)$ will not be positive unless the oligopoly size in the follower country be sufficiently concentrated. Also, in the symmetric case, $\gamma_1 = \gamma_2$, it is easy to see that the leader's subsidy level is greater than that of the follower whenever the leader's oligopoly size is smaller than that of the follower. Finally, the weighted national surplus attained at equilibrium in each country is:

$$TSS_1^{SS*} = \frac{(a-c)^2((\gamma_1+\gamma_2)^2+2(\gamma_1+\gamma_2)(\gamma_1-\gamma_2+\gamma_1 n_1)\rho+\gamma_2^2\rho^2}{2[2(\gamma_1+\gamma_2)(2+n_1)-(\gamma_1+2\gamma_2)\rho]}$$

$$\begin{aligned}TSS_2^{SS*} = {} & \frac{(a-c)^2}{2[2(\gamma_1+\gamma_2)(2+n_1)-(\gamma_1+2\gamma_2)\rho]^2} \times [2(\gamma_1+\gamma_2)^3(1+n_1) \\ & +(\gamma_1+\gamma_2)(-4\gamma_1+11\gamma_2+4(-\gamma_1+3\gamma_2)n_1+4\gamma_2 n_1^2)\rho \\ & -2(\gamma_1+\gamma_2)(-\gamma_1+3\gamma_2)(\gamma_1+2\gamma_2+(\gamma_1+3\gamma_2)n_1)\rho^2 \\ & +\gamma_2^2(2\gamma_1+3\gamma_2)\rho^3]\end{aligned}$$

The SM-subgame.

In this subgame, government 1 has taken up a state aid policy, $\lambda_1 = 1$. The optimisation problem for government 2, which uses a merger policy, $\lambda_2 = 0$, is the following:

$$\begin{aligned}\max_{n_2} TSS_2^{SM} = {} & n_2\pi_2^{SM} + \rho CS_2^{SM} \\ = {} & \frac{(\gamma_1+\gamma_2)n_2(a-c-n_1^0 s_1)^2}{(n_1^0+n_2+1)^2} \\ & + \frac{\rho\gamma_2[(n_1^0+n_2)(a-c)+n_1^0 s_1]^2}{2(n_1^0+n_2+1)^2}\end{aligned}$$

(22)

From the first order condition for (22) we obtain the following reaction function:

$$n_2(s_1;\rho) = \frac{(a-c)[(\gamma_1+\gamma_2)(1+n_1^0)+\gamma_2 n_1^0\rho]-[(\gamma_1+\gamma_2)(1+n_1^0)-\gamma_2\rho]n_1^0 s_1}{(a-c)(\gamma_1+\gamma_2-\gamma_2\rho)-(\gamma_1+\gamma_2)n_1^0 s_1}$$

(23)

Government 1 maximises the function obtained by substitution of (23) into the corresponding TSS_1^{SM}. The equilibrium $s_1^*(SM)$ and $n_2^*(SM)$ obtained are,

$$s_1^*(SM) = s_1^*(SS) \qquad (24)$$

and

$$n_2^*(SM) = \frac{(\gamma_1 + \gamma_2)^2(1 + n_1^0) - \rho(\gamma_1 + \gamma_2)(\gamma_1 - 2\gamma_2 + (\gamma_1 - \gamma_2)n_1^0) - \gamma_2^2\rho^2]}{(\gamma_1 + \gamma_2)^2(1 - \rho)}$$

$$(25)$$

It turns out that $n_2^*(SM)$ is always positive for the interval of reference in ρ.

Finally, the weighted national surplus attained at equilibrium in each country is:

$$TSS_1^{SM*} = TSS_1^{SS*} \qquad (26)$$
$$TSS_2^{SM*} = TSS_2^{SS*} \qquad (27)$$

A similar argument as above can be applied to explain the welfare equalities in (26) and (27). The literature on strategic trade policy has not contemplated the number of firms as a strategic variable in the way we have done it here. However, production (or export) subsidies have received considerable attention. In particular, suppose that consumers are not given any weight. Then, subsidies simply play a profit-shifting role. Cooper and Riezman (1989), in an environment of demand uncertainty, find that the country with a larger number of firms will choose to tax the output of its firms. Their results extend those of Dixit (1984), where consumers receive a weight of $\rho = 1$, for the bilateral subsidy case. Our SS-subgame has two main differences with these articles. Firstly, we do not restrict attention to the extreme cases of $\rho = 0$ and $\rho = 1$. Secondly, we assume that governments choose policies (and levels) *sequentially* and not *simultaneously* as in Dixit and in Cooper and Riezman. These differences deliver interesting conclusions since our model predicts that the leader government always sets a positive subsidy and that the follower government might do that as well. It will only set a tax if its oligopoly is not too concentrated.

The equalities in (16)-(17) and (26)-(27) lead us to conclude that the relevant policy choice is that of the leader country. This is so because the

follower is indifferent between a merger/divestiture policy or a state aid policy once the leader has decided which policy to follow (and viceversa). As shown next, the leader makes its policy choice according to the comparison between the actual number of firms and a given threshold.

3.1.3 The equilibrium of the full strategic policy game

The intuition for the result in this section may be argued in the following terms. Suppose that consumers were given no weight in the governments' optimisation problem and consider the SS subgame. Then, the leader would set a positive specific aid which is decreasing in the initial size of the oligopoly in the leader country. However, the subsidy level does not depend on n_2^0. This is not the case of the follower's specific state aid amount, which depends on both oligopoly sizes and would be a tax provided that n_1^0 is small enough. This is not surprising since there would only be a profit-shifting effect of the state aid policy. However, if n_1^0 is rather large, then the total state aid expenditure will also be large. In fact, the leader's social surplus is decreasing in the oligopoly size. Since in our model the leader has another policy available, it checks which policy would deliver the highest welfare, and then, under these circumstances, the leader will unambiguously opt for a merger/divestiture policy.

A substantial change arises if governments take home consumption into account, which is our case. For instance, consumers prefer a state aid policy rather than a merger policy implying a smaller number of firms; while for firms both policies result in a total profits increase. Therefore in this case, the higher the weight assigned to consumers the more likely it is that governments opt for a state aid policy. Thus, it is unclear which policy yields the highest total welfare to government 1. The next result gives the precise minimum number of firms in the leader country which makes a merger/divestiture policy socially preferable to a state aid policy.

Proposition 1 *Suppose two countries engaged in an integration process. The governments play a Stackelberg game in policies, the strategic variables being either their oligopoly size or the specific state aid subsidy, prior to Cournot competition among firms in the enlarged market area. The subgame perfect equilibrium of the game is that:*

the leader country will choose a merger/divestiture policy if the initial number of firms exceeds a certain threshold, i.e. $n_1^0 \geq \hat{n}$, where

$$\hat{n} = \frac{4(\gamma_1 + \gamma_2)^3 - (\gamma_1 + \gamma_2)^2(3\gamma_1 + 10\gamma_2)\rho - (\gamma_1 + \gamma_2)(4\gamma_1^2 - 6\gamma_1\gamma_2 - 8\gamma_2^2)\rho^2 - \gamma_2^2(3\gamma_1 + 2\gamma_2)}{2(\gamma_1 + \gamma_2)(\gamma_1 + \gamma_2 - (2\gamma_1 + \gamma_2)\rho)^2}$$

and it will choose a subsidy policy otherwise. The follower is indifferent between any of the two policies once the leader has decided which policy to follow.

Proof. : See the Appendix.

The following discussion may be helpful in the interpretation of the proposition. Since the equilibrium weighted social surplus in the state aid policy case is decreasing with the number of firms in the leader country, and the one in the merger case does not depend on it, the merger policy is chosen for a big enough initial number of firms. Also, the merger policy will be more unlikely to be chosen the higher the weight assigned to consumers. In fact, it is a sufficient condition that $\gamma_1 > 0.37\gamma_2$ for $\frac{\partial \hat{n}}{\partial \rho} > 0$. It can also be verified that the threshold is increasing in the size of country 1 and decreasing in the size of country 2. For the extreme case when consumers are not included in the social surplus function, the merger policy is always chosen (for $n_1^0 \geq 2$) and the optimal number of firms is one. For symmetric market sizes, we have that $\hat{n}$ is independent of the market size and that it is increasing with ρ.

To highlight the conflict between consumers and aggregate welfare, let us consider how consumer surplus is affected depending on the policy chosen to maximise the aggregate surplus. Then we have that

$$CS_k^{MM*} = CS_k^{MS*} = \frac{\gamma_k(a - c)^2(3(\gamma_1 + \gamma_2) - \gamma_2\rho)^2}{8(\gamma_1 + \gamma_2)^2(2 - \rho)^2} \qquad k = 1, 2$$

$$CS_k^{SS*} = CS_k^{SM*} = \frac{\gamma_k(a - c)^2(3(\gamma_1 + \gamma_2) + 2(\gamma_1 + \gamma_2)n_1^0 - \gamma_2\rho)^2}{2[(\gamma_1 + \gamma_2)(2 + n_1^0) - (\gamma_1 + 2\gamma_2)\rho]^2} \quad k = 1, 2$$

where the following is true:

Lemma 2 *Consumers are better off with a subsidy policy relative to a merger/divestiture policy if the initial number of firms is big enough. That is,*
$n_1^0 > \frac{\gamma_1(3(\gamma_1 + \gamma_2) - \gamma_2\rho)}{2(\gamma_1 + \gamma_2)[(\gamma_1 + \gamma_2) - (2\gamma_1 + \gamma_2)\rho]} \equiv \bar{n}.$

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Proof. See the Appendix.

Figure 3 illustrates the two different thresholds, $\hat{n}$ and $\bar{n}$, for the symmetric market sizes case. It specifies three regions for each given ρ. Suppose that $n_1^0 > \hat{n} > \bar{n}$. Then, the leader country chooses a merger policy whereas consumers are better off with a subsidy policy. Assume now that $\hat{n} > n_1^0 > \bar{n}$, in which case the leader country chooses a subsidy policy; and this is precisely the policy that consumers prefer. Finally, when $\hat{n} > \bar{n} > n_1^0$ again we have that consumers are better off with the policy that is not chosen by the leader country. Therefore, the best on aggregate does not necessarily coincide with the best for consumers. It is more likely that everybody's interests harmonise, the case when $\hat{n} > n_1^0 > \bar{n}$, the more weight consumer surplus is given.

3.2 Are there any social strategic incentives to propose mergers?

Here we consider the same problem as in the $(MM)-$ subgame above but assuming that the countries' economies are not integrated yet. Then, by comparing the equilibrium oligopoly sizes under both regimes, autarky and the strategic policy game under integration, we may identify whether there are any private and social incentives to propose mergers. The second stage of the game is solved in the same way as in the previous subsection but taking into account that only n_k^0 firms are initially operating in each country of size γ_k, $k = 1, 2$.

Therefore, in the first stage country k maximises the following total social surplus function,

$$\max_{n_k} TSS_k^A = \frac{\gamma_k (a - c)^2 n_k}{(n_k + 1)^2} + \frac{\rho \gamma_k (a - c)^2 n_k^2}{2(n_k + 1)^2}; \ for \ k = 1, \ 2. \qquad (28)$$

which yields the equilibrium industry size under autarky,

$$n_k^A = \frac{1}{1 - \rho}, \ \forall k \qquad (29)$$

This equilibrium value is positive for $\rho < 1$ and it is independent of market size. We find again a conflict of interests between agents: a monopoly

is the industry size that maximises aggregate profits, whereas the one that maximises consumer surplus is perfect competition. Finally, the social welfare attained at equilibrium under autarky is:

$$TSS_k^{A*} = \frac{\gamma_k (a-c)^2}{2(2-\rho)}$$

which is increasing in the weight assigned to consumers. Once we have obtained the equilibrium industry size under both regimes, we compare them in order to determine whether there is any social strategic incentive to propose mergers. In particular, whenever we find that $n^*(A) < n_1^*(MM) < n_2^*(MM)$, we will conclude that there are no strategic incentives to propose mergers.

Proposition 2 *The country that is the follower has no strategic incentive to propose mergers. However, the leader country may claim for mergers if the following two conditions are simultaneously satisfied:*
a) the follower's market size is big enough, $\gamma_2 > \frac{4}{3}\gamma_1$,
b) the weight given to consumers is small enough
$0 < \rho < \frac{-2\gamma_1^2 + \gamma_1\gamma_2 + 4\gamma_2^2 - \sqrt{4\gamma_1^4 - 4\gamma_1^3\gamma_2 + \gamma_1^2\gamma_2^2 + 12\gamma_1\gamma_2^3 + 4\gamma_2^4}}{2\gamma_2^2} \equiv \rho^- < \rho^{\max}.$
No strategic motive exists otherwise.

Proof. see the Appendix.

Note that when the leader has a bigger or equal market size than the follower, there does not exist a strategic motive to merge irrespective of the weight assigned to consumers. This result suggests that merger recommendations might not be correct when the governments involved in the economic integration process ignore the sizes of the markets.

Regarding the private incentives, we compare the equilibrium oligopoly sizes that consumers and firms would respectively prefer under the above two regimes. Concentration is always unfavourable to consumers regardless of the regime. Concerning firms, a move from autarky to integration entails an increase in the oligopoly size, hence there are no private incentives for firms to merge.

4 MAY THE COUNTRIES IMPROVE BY CENTRALISING DECISIONS?

In view of enlargement, we may assume that there is a supranational authority in addition to the authorities in each of the two countries. The objective functions of the supranational and national authorities differ since the former maximises total welfare. This section examines a situation in which a supranational authority has the possibility of deciding about the policy to follow, either a merger/divestiture policy or a state aid subsidy, thereby internalising the effects of whatever choice is made. We aim to compare the welfare equilibrium levels resulting from cooperative behaviour to those obtained when governments behave strategically.

Therefore the supranational authority's welfare function is $TSS = TSS_1 + TSS_2$ and it maximises TSS by choosing either the total number of firms in the enlarged economy, m, or the common subsidy, s, all firms will enjoy. For the merger policy case, $\lambda_1 = \lambda_2 = 0$, and noting that $m^0 = n_1^0 + n_2^0$, it chooses m to maximise

$$\max_m \frac{(\gamma_1 + \gamma_2)(a - c)^2 m(2 + \rho m)}{2(m + 1)^2}$$

and the equilibrium number of firms is given by,

$$m^* = \frac{1}{1 - \rho}$$

The aggregate social welfare surplus resulting under the subsidy case is,

$$
\begin{aligned}
TSS_1^{SS} + TSS_2^{SS} &= \frac{(\gamma_1 + \gamma_2)[(n_1 + n_2)(a - c) + n_1 s_1 + n_2 s_2]}{2(n_1 + n_2 + 1)^2} \times \quad (30) \\
&\qquad \frac{[(2 + \rho(n_1 + n_2))(a - c) - (2 - \rho)(n_1 s_1 + n_2 s_2)]}{2(n_1 + n_2 + 1)^2}
\end{aligned}
$$

Under a policy of state aids, the equilibrium subsidy is found to be,

$$s^* = \frac{(a - c)[1 - (1 - \rho)m^0]}{(2 - \rho)m^0}$$

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It is easy to see that only when the actual number of firms is smaller than the optimal one ($m^0 < m^*$) the optimal subsidy is positive, being a tax otherwise. If we compare the above equilibrium policy levels with those obtained under autarky, that is with $n_k^*(A) = \frac{1}{1-\rho}$ and $s_k^*(A) = \frac{(a-c)[1-(1-\rho)n_k^0]}{(2-\rho)n_k^0}$, $k = 1, 2$, we conclude that *there is always a social strategic incentive to propose mergers when the policy decision is centralised* ($n_1^*(A) + n_2^*(A) > m^*$) and that *the state aid level and the state aid expenditure are also reduced* ($s_k^*(A) > s^*$, $k = 1, 2$). Finally, by substituting the optimal choices of m^* and s^* in the respective aggregate social surplus we find that both policies attain the same value $TSS^{m*} = TSS^{s*} = \frac{(\gamma_1 + \gamma_2)(a-c)^2}{2(2-\rho)}$, with obvious notation. The social welfare comparison in the economic area under a centralised decision both with the one obtained when decisions are taken by each national government, and also with that under autarky are stated in the next proposition.

Proposition 3 *A centralised decision about either merger or subsidy policy attains greater welfare than the sum of the national social welfares obtained when the decisions are strategically taken by each national government, but it cannot improve upon the aggregate social welfare under autarky.*

Proof. See the Appendix.

Therefore, when governments compete on choosing either a merger/divestiture policy or a state aid policy the aggregate surplus of the area is reduced compared with the autarky scenario, and then there are no aggregate incentives to integrate unless the decision on which policy to follow is taken in a centralised way. The reason for the above welfare equivalence is that when there are no strategic interactions, market sizes do not have any influence on the equilibrium policy choices (see footnote 12). Hence, it yields the same result to maximize each country's welfare and aggregate them than to maximize the sum of both countries' welfare.

However, when we compare welfare levels on a country by country basis we may reach different conclusions depending on the scenario considered. Although it is quite difficult to establish clear-cut comparisons for all cases we may illustrate some examples under which one of the countries gains with the strategic policy game equilibrium. For instance, evaluating the welfare levels in the strategic policy game when both governments choose a merger policy, we find that if the leader's market size, γ_1, is small and for ρ close

enough to one, then the leader is better off and the follower worse off than under a centralised decision. Similarly, for a big enough γ_2 and for ρ close enough to zero. Both countries are worse off under the strategic scenario when countries are symmetric in market size. Finally, for $\rho = \frac{1}{2}$, the follower is worse off, while the leader can be either better (worse) off if γ_1 is small (big) enough.

5 CONCLUDING REMARKS

Commisioner for Competition Karel van Miert acknowledges the importance of European Competition Policy in relation to the Central and Eastern European Countries. In his own words, "*The effective application and enforcement of EC Competition Policy within the enlargement process is crucial to the success of the European integration model*" (extracted from Competition Policy Newsletter, June 1998, page one).

There are connections and, consequently, conflicts between trade, industrial and competition policies. Basically, conflicts arise to the extent that, in an international competition environment, the frontier between trade and industrial policy objectives is ill-defined. Naturally, any of these policies modifies the allocation of resources and generates a number of distortions. This paper has studied the effects of two policies on competition intensity by taking a welfare appraisal when governments play a sequential game during an enlargement process. In particular, some state-run companies with political influence receiving aids and the current merger wave have convinced authorities that competition policy should be modernised, not only for a successful single-marget but also for the harmonisation of policies in future enlargement processes.

Several features of our model highlight the importance of the problem under consideration: sequential strategic behaviour by governments, how important should consumers be, market sizes and oligopoly sizes. For the sake of the exposition, firm size, synergies, or redistribution costs of state aids have not been contemplated. The paper can consequently be extended in any of these directions. Yet, useful policy implications have been obtained.

When governments are involved in strategic policy games, lower aggregate welfare level is attained relative to the one under a centralised policy choice. The number of firms a centralised authority would choose is smaller than the sum of those each country government would choose under autarky. The same happens with respect to both the state aid level and the amount spent. This would justify some authorities' recommendations enhancing mergers and decreasing state aids. Since it is well known that the importance of antitrust policy may be mitigated by the presence of more competition in a larger market, we can conclude that our findings abound on the potential role played by industrial/trade policies as (partial) substitutes for antitrust policy.

6   APPENDIX: PROOFS.

6.1   Proof of Lemma 1

First we prove that $n_1^*(MM)$ is positive. The denominator is positive as long as $\rho < \frac{\gamma_1+\gamma_2}{2\gamma_1+\gamma_2} \equiv \rho^{\max}$. We have to prove that the numerator is also positive given this condition. If $\gamma_1 > \frac{3}{2}\gamma_2$, the numerator is positive for all ρ. If $\gamma_1 \leq \frac{3}{2}\gamma_2$, then we find as a sufficient condition that $2(\gamma_1+\gamma_2)^2+(\gamma_1+\gamma_2)(2\gamma_1-3\gamma_2)\rho > 0$ for $\rho = \rho^{\max}$, that is for $2(\gamma_1+\gamma_2)^2+(\gamma_1+\gamma_2)(2\gamma_1-3\gamma_2)\left(\frac{\gamma_1+\gamma_2}{2\gamma_1+\gamma_2}\right) > 0$ which is true for any $\gamma_1, \gamma_2 > 0$.

Besides, looking at the reaction function in (9) it is easy to check that $n_1 < n_2(n_1)$ for all possible ρ, therefore, $n_2^*(MM) > n_1^*(MM) > 0$.

Regarding the derivatives of the equilibrium values we have that:

$$\frac{dn_1^I}{d\gamma_1} = \frac{\gamma_2\rho[7(\gamma_1+\gamma_2)^2+2(\gamma_1+\gamma_2)(2\gamma_1+\gamma_2)\rho+\gamma_2(4\gamma_1+3\gamma_2)\rho^2]}{2(\gamma_1+\gamma_2)^2[\gamma_1+\gamma_2-(2\gamma_1+\gamma_2)\rho]^2}$$

$$\frac{dn_1^I}{d\gamma_2} = -\frac{\gamma_1}{\gamma_2}\frac{dn_1^I}{d\gamma_1}$$

$$\frac{dn_1^I}{d\rho} = \frac{(6\gamma_1+5\gamma_2)(\gamma_1+\gamma_2)^2+2(\gamma_1+\gamma_2)\gamma_2^2\rho-(2\gamma_1+\gamma_2)\gamma_2^2\rho^2}{2(\gamma_1+\gamma_2)[\gamma_1+\gamma_2-(2\gamma_1+\gamma_2)\rho]^2}$$

$$\frac{dn_2^I}{d\gamma_1} = \frac{\gamma_2\rho[(\gamma_1+\gamma_2)^2+2(\gamma_1+\gamma_2)(2\gamma_1+3\gamma_2)\rho-\gamma_2(4\gamma_1+3\gamma_2)\rho^2]}{2(\gamma_1+\gamma_2)^2[\gamma_1+\gamma_2-(2\gamma_1+\gamma_2)\rho]^2}$$

$$\frac{dn_2^I}{d\gamma_2} = -\frac{\gamma_1}{\gamma_2}\frac{dn_2^I}{d\gamma_1}$$

$$\frac{dn_2^I}{d\rho} = \frac{(6\gamma_1+5\gamma_2)(\gamma_1+\gamma_2)^2-2(\gamma_1+\gamma_2)(6\gamma_1^2+11\gamma_1\gamma_2+6\gamma_2^2)\rho+(6\gamma_1^3+17\gamma_1^2\gamma_2+20\gamma_1\gamma_2^2+8\gamma_2^3)\rho^2}{2(\gamma_1+\gamma_2)[\gamma_1+\gamma_2-(2\gamma_1+\gamma_2)\rho]^2}$$

By inspection, $n_1^*(MM)$ is increasing with γ_1 and decreasing with γ_2. For $\frac{dn_1^I}{d\rho}$ to be positive it suffices to check that $2\gamma_2^2(\gamma_1 + \gamma_2)\rho - \gamma_2^2(2\gamma_1 + \gamma_2)\rho^2$ is positive for all $\rho \in (0, 1)$, which is true.

Now we prove that $n_2^*(MM)$ is increasing with γ_1 and decreasing with γ_2. Looking at the numerator of $\frac{dn_2^I}{d\gamma_1}$ it suffices to check that $[2(\gamma_1 + \gamma_2)(2\gamma_1 + 3\gamma_2)\rho - \gamma_2(4\gamma_1 + 3\gamma_2)\rho^2]$ is positive for all $\rho \in (0, 1)$, which is true. Finally, n_2^{MM} is increasing with ρ since $(\gamma_1 + \gamma_2)^2(6\gamma_1 + 5\gamma_2) - 2\gamma_2^2(\gamma_1 + \gamma_2)\rho$ is positive for all $\rho \in (0, 1)$. $\blacksquare$

6.2 Proof of Proposition 1

We have that $TSS_1^{MM*} > TSS_1^{SS*}$ if and only if the next polynomial in ρ is positive:

$$\Phi(\rho; n_1^0) = 2(\gamma_1 + \gamma_2)^3(n_1^0 - 2) + (\gamma_1 + \gamma_2)^2(3\gamma_1 + 10\gamma_2 - 4(2\gamma_1 + \gamma_2)n_1^0)\rho +$$
$$2(\gamma_1 + \gamma_2)(3\gamma_1^2 - 3\gamma_1\gamma_2 - 8\gamma_2^2 + (4\gamma_1^2 + 4\gamma_1\gamma_2 + \gamma_2^2)n_1^0)\rho^2 + \gamma_2^2(3\gamma_1 + 2\gamma_2)\rho^3$$

We first find that it is increasing with n_1^0 since $\frac{d\Phi}{dn_1^0} = 2(\gamma_1 + \gamma_2)[(\gamma_1 + \gamma_2)^2$
$-2(\gamma_1 + \gamma_2)(2\gamma_1 + \gamma_2)\rho + (4\gamma_1^2 + 4\gamma_1\gamma_2 + \gamma_2^2)\rho^2] > 0$ for any $\rho \in (0, 1)$. Therefore, we can find an oligopoly size such that $\Phi(\rho) > 0$ for a given ρ.

We find the precise value for which a merger policy is chosen by solving $\Phi(\rho; n_1^0) = 0$. Denote by $\hat{n}$ such a bound where
$\hat{n} = \frac{4(\gamma_1 + \gamma_2)^3 - (\gamma_1 + \gamma_2)(3\gamma_1 + 10\gamma_2)\rho - (\gamma_1 + \gamma_2)(3\gamma_1^2 - 3\gamma_1\gamma_2 - 8\gamma_2^2)\rho^2 - \gamma_2^2(3\gamma_1 + 2\gamma_2)\rho^3}{2(\gamma_1 + \gamma_2)(\gamma_1 + \gamma_2 - (2\gamma_1 + \gamma_2)\rho)^2}$.

Therefore, if $n_1^0 < \hat{n}$ then $\Phi(\rho; n_1^0) < 0$ being optimal a subsidy policy, while for $n_1^0 \geq \hat{n}$ then $\Phi(\rho; n_1^0) \geq 0$ and the merger policy is chosen. ∎

6.3 Proof of Lemma 2

We want to see for which n_1^0 the $CS_i^{MM*} < CS_i^{SS*}$. Simple algebra leads us to the following inequality: $n_1^0 > \frac{(3(\gamma_1 + \gamma_2) - \gamma_2\rho)}{2(\gamma_1 + \gamma_2)((\gamma_1 + \gamma_2) - (2\gamma_1 + \gamma_2)\rho)} \equiv \bar{n}$. ∎

6.4 Proof of Proposition 2

We first prove that it is always true that $n_2^*(A) < n_2^*(MM)$. This is equivalent to proving that the following expression is positive for the referred interval $(0 < \rho < \rho^{\max})$.

$$2(\gamma_1 + \gamma_2)^2 - (\gamma_1 + \gamma_2)(2\gamma_1 + \gamma_2)\rho + (2\gamma_1^2 + \gamma_1\gamma_2 - 2\gamma_2^2)\rho^2 - \gamma_2^2\rho^3$$

Call that function of γ_2, $\Psi(\gamma_2)$. Then, $\Psi(\gamma_2) > 0$ is easily proven by finding the first and second derivatives Ψ', Ψ'' with respect to γ_2. Checking that $\Psi'' > 0$ it is proven that Ψ' is increasing with γ_2 in the relevant interval, $\Psi'' = 2(1 - \rho) + 2 - 4\rho^2 + 2\rho^3 > 0 \ \forall \rho \in (0, 1)$. Therefore, if $\Psi'(0) > 0$, it is proven that $\Psi(\rho)$ is increasing in the relevant interval, which is true since $\Psi'(0) = 4\gamma_1 - 3\gamma_1\rho + \gamma_1\rho^2 > 0 \ \forall \rho \in (0, 1)$. Finally, it suffices to show that $\Psi(0) > 0$ to prove that the polynomial is positive for the relevant interval, $\Psi(0) = 2\gamma_1^2 - 2\gamma_1^2\rho + 2\gamma_1^2\rho^2$, therefore, $n_2^*(A) < n_2^*(MM) \ \forall \rho \in (0, 1)$

Next, we find when $n_1^*(A) < n_1^*(MM)$. This is equivalent to finding when the following polynomial in ρ is positive for the referred interval ($0 < \rho < \rho^{\max}$).

$$\Gamma(\rho) \equiv 4\gamma_1^2 + \gamma_1\gamma_2 - 3\gamma_2^2 + (-2\gamma_1^2 + \gamma_1\gamma_2 + 4\gamma_2^2)\rho - 8\gamma_2^2\rho^2$$

The two roots obtained from $\Gamma(\rho) = 0$ are denoted by ρ^-, ρ^+, where,

$$\rho^- \equiv \frac{-2\gamma_1^2 + \gamma_1\gamma_2 + 4\gamma_2^2 - \sqrt{4\gamma_1^4 - 4\gamma_1^3\gamma_2 + \gamma_1^2\gamma_2^2 + 12\gamma_1\gamma_2^3 + 4\gamma_2^4}}{2\gamma_2^2}$$

$$\rho^+ \equiv \frac{-2\gamma_1^2 + \gamma_1\gamma_2 + 4\gamma_2^2 + \sqrt{4\gamma_1^4 - 4\gamma_1^3\gamma_2 + \gamma_1^2\gamma_2^2 + 12\gamma_1\gamma_2^3 + 4\gamma_2^4}}{2\gamma_2^2}$$

Besides, we know that $\Gamma(\rho) < 0$ if $\rho < \rho^-$ or $\rho > \rho^+$. First, we prove that $\rho^{\max} < \rho^+$. That happens if and only if

$$4\gamma_1^3 - 7\gamma_1\gamma_2^2 - 2\gamma_2^3 - (2\gamma_1 + \gamma_2)\sqrt{4\gamma_1^4 - 4\gamma_1^3\gamma_2 + \gamma_1^2\gamma_2^2 + 12\gamma_1\gamma_2^3 + 4\gamma_2^4} > 0$$

and it happens to be always negative ($-16\gamma_1^2\gamma_2^2(3\gamma_1^2 + 4\gamma_1\gamma_2 + \gamma_2^2) < 0$), therefore $\rho^{\max} < \rho^+$.

Next, we find under wich conditions ρ^- is positive, that is, $-2\gamma_1^2 + \gamma_1\gamma_2 + 4\gamma_2^2 - \sqrt{4\gamma_1^4 - 4\gamma_1^3\gamma_2 + \gamma_1^2\gamma_2^2 + 12\gamma_1\gamma_2^3 + 4\gamma_2^4} > 0$. Which is equivalent to, $4\gamma_1^2(\gamma_1 + \gamma_2)(-4\gamma_1 + 3\gamma_2) > 0$. Therefore, if $\gamma_2 > \frac{4}{3}\gamma_1$, then $\rho^- > 0$. Finally, we check if $\rho^- < \rho^{\max}$, that is equivalent to find when $4\gamma_1^3 - 7\gamma_1\gamma_2^2 - 2\gamma_2^3 + (2\gamma_1 + \gamma_2)\sqrt{4\gamma_1^4 - 4\gamma_1^3\gamma_2 + \gamma_1^2\gamma_2^2 + 12\gamma_1\gamma_2^3 + 4\gamma_2^4}$ is positive, and this is true.

Summing up, if $\gamma_2 < \frac{4}{3}\gamma_1$, then $\rho^- < 0 < \rho^{\max} < \rho^+$, which means that $n_1^*(A) < n_1^*(MM)$ for all $\rho \in (0, \rho^{\max})$, the leader country has no strategic motive to propose mergers. But, if $\gamma_2 > \frac{4}{3}\gamma_1$, then $0 < \rho^- < \rho^{\max} < \rho^+$, which means that $n_1^*(A) > n_1^*(MM)$ for all $\rho \in (0, \rho^-)$ the leader has a strategic motive to propose merges, and $n_1^*(A) < n_1^*(MM)$ for all $\rho \in (\rho^-, \rho^{\max})$, the leader does not propose mergers.

6.5 Proof of Proposition 3

We only have to prove that $TSS^{m*} = TSS^{s*} = \frac{(\gamma_1 + \gamma_2)(a-c)^2}{2(2-\rho)}$ is greater than both $TSS_1^{MM*} + TSS_2^{MM*}$ or $TSS_1^{SS*} + TSS_2^{S*}$. Therefore, we first find the

latter expressions:

$$TSS_1^{MM*} + TSS_2^{MM*} = \frac{(a-c)^2(3(\gamma_1 + \gamma_2)^2 + 2(\gamma_1 + \gamma_2)\gamma_2\rho - \gamma_2^2\rho^2)}{8(\gamma_1 + \gamma_2)(2 - \rho)}$$

$$TSS_1^{SS*} + TSS_2^{SS*} = \frac{(a-c)^2(\gamma_1 + \gamma_2)}{2[2(\gamma_1 + \gamma_2)(2 + n_1^0) - (\gamma_1 + 2\gamma_2)\rho]^2} \times [(\gamma_1 + \gamma_2)^2(6 + 4n_1^0)$$
$$+ (\gamma_1 + \gamma_2)(3\gamma_1 + 2\gamma_2 + 4(\gamma_1 + \gamma_2)n_1^0(2 + n_1))\rho$$
$$- 4(\gamma_1 + \gamma_2)\gamma_2(1 + n_1^0)\rho^2 + \gamma_2^2\rho^3]$$

Firstly, we have that $TSS^{m*} - (TSS_1^{MM*} + TSS_2^{MM*}) > 0$ if $(\gamma_1 + \gamma_2)^2 - 2(\gamma_1 + \gamma_2)\gamma_2\rho + \gamma_2^2\rho^2 > 0$, which is true since the latter expression is decreasing in ρ, and we have that for $\rho = 1$, $(\gamma_1 + \gamma_2)^2 - 2(\gamma_1 + \gamma_2)\gamma_2 + \gamma_2^2 = \gamma_1^2 > 0$.

Secondly, we have that $TSS^{s*} - (TSS_1^{SS*} + TSS_2^{SS*}) > 0$ if $(1 - \rho)^2(2(\gamma_1 + \gamma_2)(1 + n_1) - \gamma_2\rho)^2 > 0$ which is true. ∎

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