

Topics in Political Economics and Industrial Organization

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January 10th, 2007

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Introduction

This thesis contains three chapters which deal with different issues. The first two chapters are devoted to the study of merger policy in a international Cournot oligopoly setting, while the last one deals with the relationship between political institutions and economic outcomes.

In the first chapter we study how trade policy can influence firms' choice between domestic and cross-border mergers.

We set up a sequential merger formation game where firms can submit merger proposals to the antitrust authority. One of the main novelties of this work is the inclusion of the Antitrust Authority as an active player in the merger formation game. We find that the equilibrium market structure depends both on the level of trade costs and on the fact that active Antitrust Authorities are incorporated in the game. Moreover, we show that whenever mergers occur in equilibrium, they occur in waves and the merger wave comprises at least one cross-border merger. We also analyze how the equilibrium market structures are affected by the presence of lobbying efforts, which affect the Antitrust Authority's objective function.

The second chapter investigates the possible theoretical foundation for the common belief that smaller countries might be more penalized when the merger approval decision is taken by a supranational Antitrust Authority.

Analyzing a very simple framework, where we allow for national bilateral merger proposals, we show that two different kinds of discrepancy between the decisions made by a national Antitrust Authority and a supranational one might arise. More specifically we obtain that a supranational Antitrust Authority might approve mergers that could be welfare detrimental for the country where they take place or it might block a merger that would be beneficial from a national perspective.

This second type of contrast arises only in the case of a merger proposal in the small country. This fact supports the idea that smaller countries might be discriminated by a supranational Antitrust Authority.

In the last chapter we investigate whether the impact of constitutions on economic outcomes (Persson and Tabellini, 2004) is direct. Persson and Tabellini (2004) estimate a reduced form and interpret it in the light of the theories underlining the importance of constitutions for politicians' incentives. We claim that behind their reduced form, the structural model goes through electors' behavior (namely, voter turnout in elections). Through a cross-country and a panel analysis we provide evidence to show that citizens' behavior plays a crucial role in understanding how institutions affect policy outcomes. We conclude that voter turnout is the channel through which forms of government affect economic policies.

Chapter 1

Cross-Border Merger Waves

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Abstract

This paper proposes a sequential merger formation game with cost synergies to study how trade policy can influence firms' choice between domestic and cross-border mergers in an international Cournot oligopoly. We find that the equilibrium market structure depends heavily on: *(i)* the level of trade costs; and *(ii)* whether or not active antitrust authorities are incorporated within the sequential merger game. In addition, it is shown that whenever mergers occur in equilibrium, they occur in waves and the merger wave comprises at least one cross-border merger. We also analyze how the equilibrium market structures are affected by the presence of lobbying efforts.

Keywords: Endogenous mergers; Merger waves, tariff-jumping FDI.

JEL classification: F10; F13; L13; L41.

1 Introduction

Cross-border mergers, i.e., mergers where the acquiring and acquired companies stem from different nations, have clearly become an increasingly important characteristic of the industrial organization of most advanced countries. According to the UNCTAD's 2004 World Investment Report (henceforth WIR 2004), cross-border mergers constitute the key driver of global FDI since the late 1980s. In particular, "during the 1990s, cross-border mergers and acquisitions became a widely used mode of transnational corporation entry and expansion in virtually all industries. Indeed, they drove the FDI boom during the second half of the 1990s." (UNCTAD's WIR 2004, p. 111).¹ Moreover, there is considerable evidence that cross-border mergers tend to occur in waves (see, for instance, Gaughan (2002), Gugler *et al.* (2003) and UNCTAD's 2004 WIR (p. 142)).

Despite the obvious empirical relevance of cross-border mergers waves, previous literature has devoted very scarce attention to this topic.^{2,3} In this paper, an international Cournot oligopoly model is used to study the interplay between trade policy and the way merger waves shape the industrial structure. In particular, we analyze how trade policy can influence firms' choice between domestic and cross-border mergers in a sequential merger formation game with cost synergies *à la* Perry and Porter (1985).

Apart from discussing the relationship between trade policy and merger formation, we regard the main contribution of this paper as being two-fold. First, while most of the existing models on mergers do not deal with the dynamics of the merger processes, as they simply compare the pre-merger situation with a post-merger situation,⁴ this paper considers a sequential merger formation process which takes into account that a merger might trigger other mergers. This allows us to study the formation of merger waves. Second, and perhaps most importantly, we incorporate active Antitrust Authorities within our merger formation game. In particular, and consistent with what happens in most countries, we assume that whenever firms plan to be involved in a merger, they must notify the merger project to an Antitrust Authority (henceforth AA), which can either authorize or block the merger. The AA decision is taken in order to maximize total welfare, measured by the sum of consumers' and producers' surplus. In such a context, analyzing the optimal merger decisions involves not only a standard merger profitability analysis, but also a study of the strategic interaction between the merging firms and the AA which is called to take a decision on the merger proposal.

A relevant question that should be posed at this point is what should be the allocation of jurisdiction in merger control in our model. Shall a merger proposal be reviewed at the level of a supra-national AA (denoted SNAA) or should the merger proposal revision

¹Gugler *et al.* (2003), in the largest cross-national comparison of the effects of mergers to date, analyze a total of 11574 worldwide merger deals during the period 1981 to 1998. They find that roughly one fifth of the deals are cross-border mergers (22%). In addition, their analysis shows that there is an upward trend in the percentage of mergers which are cross-border (this percentage rises from 21.2% in 1991-92 to 25.5% in 1997-98). Interestingly, this upward trend is particularly pronounced for EU countries, where the percentage of all mergers in the sample which were cross-border rose from 24.2% in 1991-92 to 39.8% in 1997-98.

²Two noteworthy exceptions are Neary (2004) and Salvo (2004).

³There exists, however, a strand of the literature on Multinational Enterprises (MNEs) that studies the choice between greenfield and acquisition FDI. See, for example, Caves (1996) and Nobäck and Persson (2002).

⁴Exceptions are Nilssen and Sorgard (1998), Gowrinsankaran (1999), Fauli-Oller (2000), Macho-Stadler *et al.* (2002) and Salvo (2004).

be conducted by a national AA (denoted NAA)? We assume that there exists a SNAA (say, a community-wide merger authority) in addition to two other NAAs, one for each (member) country. The SNAA examines merger proposals involving firms located in more than one country and maximizes total welfare, whereas NAAs examine merger proposals involving only firms from their specific country and maximize national welfare (the sum of consumers' and producers' surplus for *national* consumers and producers).⁵

We contrast two different games. In the first one, which we call the *laissez-faire* model, following Horn and Persson (2001), we analyze the role of national and cross-border mergers as determinants of market structure in an international Cournot duopoly model. The analysis of the endogenous determination of mergers is only based on a profitability analysis and the merger formation game does not incorporate active Antitrust Authorities. We depart from Horn and Persson (2001), however, in the way the merger process is treated. While in Horn and Persson (2001) the merger process is treated as a (static) cooperative game of coalition formation, where the players are free to communicate and write binding agreements, in this paper the merger process is modelled as a sequential noncooperative game of coalition formation. The sequentiality which characterizes the merger formation will allow us to discuss not only whether mergers occur in waves in equilibrium, but also how equilibrium merger waves are formed. In a second game, we depart from the *laissez-faire* model in two ways. On the one hand, active AAs are explicitly modelled. On the other hand, we do not rule out by assumption the merger to complete monopoly, as it is standard in the previous literature. Given the presence of efficiency gains arising from the mergers, some mergers to monopoly turn out to be welfare enhancing and, therefore, end up being allowed by the AA which controls mergers.⁶

The analysis discloses that the equilibrium market structure depends heavily on: (i) the level of trade costs; and (ii) whether or not active Antitrust Authorities are incorporated within the sequential merger game. In addition, it is shown that whenever mergers occur in equilibrium, they occur in waves and the merger wave comprises at least one cross-border merger. Also, and perhaps most importantly, even though in the *laissez-faire* model the equilibrium outcome seems to offer some theoretical support for the observation that trade liberalization induces waves of cross-border mergers, the richer model where AAs are encompassed as active players of the merger formation game shows that no mergers (and, therefore, no cross-border merger waves) occur in equilibrium when trade physical costs are at a sufficiently low level.

To understand this last result we should point out that total welfare (the AA's objective function) is affected by a merger through three different channels. Firstly, there

⁵In Europe, for example, the European Commission (EC) Merger Regulation makes a distinction between mergers that have and mergers that do not have a "Community dimension". Mergers that have a Community dimension involve large firms that operate in several Member States and must be notified to the EC in advance. Mergers that instead do not have a Community dimension are examined by the relevant Member State AA. This example is used to motivate our modelling strategy in the current paper. (see Council Regulation (EC) No 139/2004 of January 2004 on the control of concentrations between undertakings (the EC Merger Regulation), *Official Journal of the European Union* L24, 29.01.2004, pages 1-22.)

⁶It is worth noting at this point that there is empirical evidence that mergers to monopoly indeed occurred and played a very important role in the shaping of the industry structure of advanced economies. According to Gaughan (2002), the first merger wave, which occurred in the period between 1897 and 1904, featured a transformation of the US economy from one of many small companies to larger companies, sometimes monopolistic firms dominating an industry. For that reason, it has been said that the first merger wave was a *merger toward monopoly* period.

is the so called *tariff-jumping effect* of cross-border mergers; it stems from the fact that the international firm resulting from the merger is able to avoid paying the trade physical cost since it owns a plant in each country.

Secondly, a merger in this setting gives rise to endogenous *efficiency gains* since it brings the individual capital of the merging firms under a single larger (and, hence, more efficient) resulting firm. These two first effects have a positive impact on welfare as they are increasing firms' profits.

Lastly, there is an effect on prices: in this setting, a merger leads to an increase in the market price due to the output contraction by the merging parties and this has the well known negative effect on welfare, the so called *dead-weight loss*.⁷

It turns out that for sufficiently low values of the trade cost, the so called *tariff-jumping effect* of cross-border mergers plays no significant role in the welfare analysis of that merger and the positive efficiency gain effect is countervailed by the negative effect of increase in price, which in turn implies that any merger proposal is blocked by the relevant AA evaluating it.

The paper continues as follows. Section 2 introduces the basic model, which is chosen as the simplest possible setting where the elements we are interested in could emerge. Section 3 analyses the *laissez-faire* model where the merger formation game is only based on a merger profitability analysis. Section 4 analyses the richer setting where active Antitrust Authorities are incorporated within the proposed merger formation game. In Section 5, we study some extensions to the richer model with active Antitrust Authorities. In particular, amongst other robustness checks, we study whether the full equilibrium outcome of the sequential merger game will result in the socially optimal market structure and analyze how the equilibrium market structures are affected by the presence of lobbying efforts. Finally, Section 5 concludes the paper by discussing the results obtained.

2 Basic model

We consider an international oligopoly with four ex-ante identical firms located in two countries, a national country A and a foreign country B . Firms 1 and 2 are located in country A , whereas firms 3 and 4 are located in country B .

The industry is assumed to be symmetric in terms of market demand. We adopt the segmented market hypothesis, where firms compete *à la* Cournot, maximizing profits by choosing sales in each market independently. Demand is assumed to be linear, with the inverse demand function in market j , $j = A, B$, given by

$$p^j(X^j) = a - X^j, \tag{1}$$

where p^j and X^j denote, respectively, price and total sales in country j , and $a > 0$ is a demand parameter.

Following Perry and Porter (1985), we assume that what distinguishes firms is the amount of capital they own. The total supply of capital in the industry is assumed to be fixed, which is normalized to be one.⁸ Let k_i be the fraction of the industry capital stock

⁷As noted by Perry and Porter (1985) mergers “result in an increase in price to consumers [...] because there are [now] fewer firms in the industry.” (p. 225)

⁸As pointed out by Perry and Porter (1985), “this suppresses de novo entry into the industry” (p. 220).

owned by firm i . In addition, let x_i^j denote the quantity sold by firm i in market j . The cost function of a firm that produces x_i units of output, where $x_i = x_i^A + x_i^B$, and owns a fraction k_i of the capital stock is given by⁹

$$C_i(x_i, k_i) = \frac{2(x_i)^2}{k_i}, \quad (2)$$

where $k_i \in \{1/4, 1/2, 3/4, 1\}$ and $\sum_i k_i = 1$. Notice that the marginal cost function is linearly increasing in output and rotates about the origin as the proportion of capital owned by firm i (k_i) increases or decreases. So, in this setting any merger gives rise to endogenous efficiency gains. A merger brings together the capital of the merging firms under a larger resulting firm whose marginal cost is lower than that of any of the merging parties for any positive given level of output.

Assume that firms play a sequential merger formation game before Cournot competition takes place in the oligopolistic international market. The game starts from a status quo symmetric industry structure where each of the four firms is endowed with $1/4$ of the industry capital stock. Two types of firms can result from this game: national and international firms. A merged entity is national if it is composed of merging parties which all belong to the same country. A merged firm is instead international if it results from the combination of merging parties coming from both countries. Assume also that the physical trade costs associated with exporting one unit of output from one country to the other are exogenous and equal t , where $t < a$.

In what follows, we make the following assumptions.

Assumption 1 Assume that $a > 19t$.

Assumption 2 Only bilateral mergers can occur and each production plant continues to exist after a merger.

The first assumption is simply to ensure that at the status quo industry structure trade between countries takes place. With regards to the second assumption, two comments are in order. First, the fact that we restrict attention to bilateral mergers does not imply that merger waves are ruled out. It simply implies that merger waves must consist of a series of bilateral mergers. Second, the fact that each production plant continues to exist after a merger implies that in case there is a cross-border merger, the resulting international firm is able to serve the two markets without incurring any trade cost (this is the so called *tariff-jumping effect* of cross-border mergers).

Let us now introduce some notation regarding the identification of different market structures which can result from the merger formation game. Let a market structure M_i be a partition of the set of firms $N = \{1, 2, 3, 4\}$ into coalitions. Due to the symmetry of the model, the feasible possible final market structures can be divided in the following nine categories of market structures:

1. No merger: $M_A = \{1, 2, 3, 4\}$.
2. One domestic national merger: $M_B = \{1, 2, 3, 4\}$.
3. One foreign national merger: $M_C = \{1, 2, 3, 4\}$.

⁹This is a special case of the cost structure proposed by Perry and Porter (1985). A similar cost structure was used by Vasconcelos (2005) to analyze the possible pro-collusive effects of a merger.

4. One cross-border merger without bias: $M_D = \{13, 2, 4\}$.
5. Cross-border merger with a domestic bias: $M_E = \{123, 4\}$.
6. Cross-border merger with a foreign bias: $M_F = \{134, 2\}$.
7. Two national mergers: $M_G = \{12, 34\}$.
8. Two cross-border mergers: $M_H = \{13, 24\}$.
9. Complete Monopoly: $M_I = \{1234\}$.

In what follows, we study two distinct merger formation models. In the first one, in order for a merger to take place, it has to be desired by parties. So, the outcome of the merger formation game will depend only on a merger profitability analysis. In the second model, we study a richer (and more realistic) game where in order for a merger to go through, it has to be not only desired by parties, but also accepted by the relevant AA.¹⁰ So, the outcome of the merger game depends both on a profitability analysis and on the strategic interaction between the merging parties and the AAs.

3 The *laissez-faire* model

In this section, we follow the previous literature where Antitrust Authorities are not incorporated in the merger formation game and merger to monopoly is ruled out by assumption (see, for instance, Horn and Persson (2001)). In particular, we analyze a very simple sequential merger formation model where the merger process is fully endogenized.¹¹ In particular, starting from a situation with four ex-ante identical firms, any two firms merger is allowed and the merger process follows the following rules. In the first stage, firm 1 is given the opportunity to merge with its national rival firm 2 or with a foreign firm (say, firm 3). If firm 1 decides not to merge, product market competition takes place between the four firms in the status quo industry structure. If instead firm 1 does merge with a rival, then, in the second stage, one of the firms not involved in the first merger is given the opportunity to merge with any of its rivals. If the game arrives at the second stage, we let firm 2 be the firm which has the opportunity of merging at that stage in case it was not involved in the merger that took place in the first stage. Otherwise, firm 3 is the one which has the power to decide whether to merge with a rival in the second stage.

The game is illustrated in Figure 1, which presents the possible market structures that can arise when this merger formation game is played.

In the analysis that follows, we seek the subgame perfect Nash equilibrium (henceforth, SPNE) of this game in pure strategies, following the usual backward induction procedure.

¹⁰Some extensions to this richer model (e.g. the effect of lobbies) are studied in section 5.

¹¹Notice, however, that the way we model the merger process is different from Horn and Persson (2001). While in their paper, the merger process is treated as a (static) cooperative game of coalition formation, in the current paper it is modelled as a sequential noncooperative game of coalition formation.

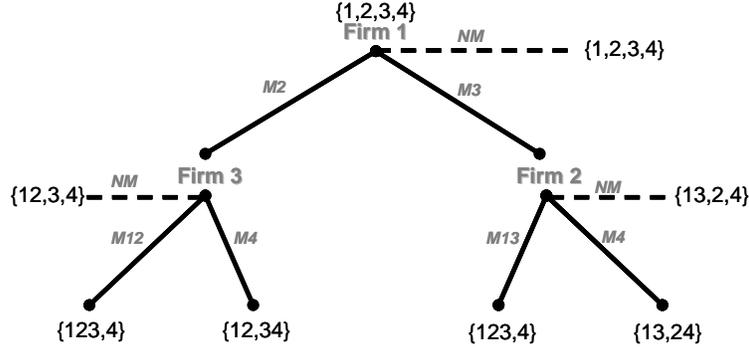


Figure 1: *Laissez-Faire* Merger Game

Analysis of Stage 2 If the game arrives at the second stage, then a merger involving firm 1 has occurred at the first stage. In addition, the specific subgame which is played at the second stage depends obviously on which firm merged with firm 1 at that first stage of the game. Two different scenarios should be distinguished, which we discuss in turn.

SCENARIO 1: MERGER PROPOSAL BY FIRM 3

If firm 1 has merged with its national rival firm 2 at the previous stage, then, at the second stage, firm 3 has to decide between the following three different options: (i) do not merge (*NM*) and remain in the industry structure $M_B = \{12, 3, 4\}$; (ii) merge with the merged entity which resulted from the previous merger stage (*M12*), inducing a final market structure of the type $M_E = \{123, 4\}$; and (iii) merge with firm 4 (*M4*), the other outsider of the previous merger, leading to a final market structure of the type $M_G = \{12, 34\}$.

Some additional notation should be introduced at this point. Let Π_{i, M_K} denote the profit earned by firm i when the equilibrium market structure is M_K . We also assume that the profit of a merged entity is divided in proportion to the capital of its constituent firms. The following definition will play a central role in the identification of equilibrium market structures.

Definition 1 Market structure M_K is said to be strictly preferred to market structure M_T by firm i , denoted $M_K \succ_i M_T$, if and only if $\Pi_{i, M_K} > \Pi_{i, M_T}$.

Now, making use of the equilibrium profits presented in Appendix A, some algebra shows that:

- $M_B \succ_3 M_G$ if $a < 44.771t$,
- $M_E \succ_3 M_B$ if $a < 2937.035t$,
- $M_E \succ_3 M_G$ if $a < 1032.548t$.

Therefore, in case firm 3 is called to play at the second stage of the game, it will take the following decisions:

- If $19t < a < 1032.548t$, firm 3 will merge with the firm resulting from the merger at the previous stage (M_{12}), leading to the final market structure $M_E = \{123, 4\}$.
- If instead $a \geq 1032.548t$, firm 3 will decide to merge with firm 4, giving rise to a final market structure composed of two national monopolies, $M_G = \{12, 34\}$.

The intuition that underlies this result is as follows. The no merger decision is clearly a strictly dominated strategy for firm 3. In addition, when firm 3 compares Π_{3, M_E} with Π_{3, M_G} , there are two profit effects at work: the share effect and the magnitude effect.

Firm 3's share of the merged entity's profits is $1/2$ in market structure M_G , whereas it is only $1/3$ in case M_E occurs. However, the profit magnitude effect works in favour of market structure M_E . It is important to notice that this profit magnitude effect can be decomposed into three different sub-effects (and all these sub-effects benefit market structure M_E). First, there is the merged entity size sub-effect: in market structure M_E , the merged entity is larger than in M_G , which means that it is more efficient (see equation (2)); this in turn implies that the merged entity (aggregate) profits will be larger. Second, the profits of the merged firm will be enhanced by the tariff-jumping sub-effect if an international firm results from the merger, as it is the case when firm 3 merges with firm 12 and the induced market structure is M_E . Finally, the merged entity's profit level will be also affected by the outsiders' reaction - free riding sub-effect.¹² It is important to note that only the two last profit magnitude sub-effects depend on the level of trade costs t .

Consider first a given demand parameter a and take a low value for t (say, in the limit, zero); it turns out that the share effect dominates the magnitude effect and, therefore, firm 3 decides to merge with firm 4 and the resulting market structure is M_G . Now, as t increases, both the share effect and the merged entity size sub-effect are not affected. However, the tariff-jumping sub-effect and the free riding sub-effect become more and more relevant, making market structure M_E more and more attractive for firm 3. In particular in market structure M_E , as t increases, trade costs savings become more important and the outsider becomes weaker as it has to pay higher trade costs per unit of output exported to country A . So, when t is sufficiently high, the profit magnitude effect dominates the share effect and firm 3 opts for a merger with firm 12 (inducing a market structure M_E).

SCENARIO 2: MERGER PROPOSAL BY FIRM 2

If firm 1 opted for a cross-border merger (with firm 3) at the first stage, then the firm which has to take a merger decision at the second stage is firm 2. This firm can take three different decisions: (i) do not merge (NM) and remain at the market structure $M_D = \{13, 2, 4\}$; (ii) merge with the merged entity resulting from the merger at stage 1 (M_{13}), leading to the market structure $M_E = \{123, 4\}$; and (iii) merge with firm 4 (M_4), inducing a final market structure of the type $M_H = \{13, 24\}$.

Now, making use of the equilibrium profits presented in Appendix A, simple algebra shows that $M_H \succ_2 M_D$ for all parameter values. The no merger decision by firm 2 is a strictly dominated strategy. In addition, some algebra shows that $M_E \succ_2 M_H$ if $a < 46.703t$. Hence, the behavior of firm 2, when it is called to take a merger decision at the second stage, can be summarized as follows:

¹²It is well known that in a Cournot oligopoly, merger profitability depends crucially on how aggressively non-participants respond to the merger (Salant, Switzer and Reynolds (1983)).

- If $19t < a < 46.703t$, firm 2 will merge with the merged entity resulting from the previous stage merger (M_{13}), leading to a final market structure $M_E = \{123, 4\}$.
- If instead $a \geq 46.703t$, then firm 2 will opt for a merger with firm 4, inducing a final market structure composed of two international firms which result from a wave of two cross-border mergers, $M_H = \{13, 24\}$.

Key to this result is again the comparison between the share and the profit magnitude effects induced by a merger. The no merger decision is again a strictly dominated strategy for firm 2. In addition, the share effect clearly favours market structure M_H , whereas the profit magnitude effect tends to benefit market structure M_E .

Consider first the case in which t is low. As in the previous scenario, the share effect dominates the magnitude effect and, therefore, firm 2 decides to merge with firm 4 and the resulting market structure is M_H . However, as t increases, only the free riding sub-effect is affected:¹³ the outsider firm 4 in market structure M_E becomes weaker and weaker as it has to pay higher trade costs per unit of output exported to country A . So, when t is sufficiently high, the profit magnitude effect dominates the share effect and firm 2 opts for a merger with firm 13 (leading to a market structure M_E).

Analysis of Stage 1 At the first stage, firm 1 is given the opportunity to decide whether or not to merge.

Simple algebra shows that, for all parameter values, $M_E \succ_1 M_A$ and $M_H \succ_1 M_A$ and, as explained above, either M_E or M_H is always the final equilibrium market structure when firm 2 is the firm taking a merger decision at the second stage (i.e., when firm 1 decides to merge with firm 3 at the first stage). In other words, the status quo market structure $M_A = \{1, 2, 3, 4\}$ will never prevail in equilibrium since no merger (NM) is a strictly dominated strategy for firm 1. Another interesting point disclosed by the equilibrium analysis of the first stage is that, for all parameter values, $M_H \succ_1 M_G$.¹⁴

Having said this, it is clear that firm 1's decision at the first stage will be between a merger inducing a final market structure $M_E = \{123, 4\}$ and an alternative merger leading a final market structure of the type $M_H = \{13, 24\}$. Very simple algebra shows that $M_E \succ_1 M_H$ if and only if $a < 46.703t$. Therefore, firm 1's decision at the first stage of the game can be summarized as follows:

- If $19t < a < 46.703t$, firm 1 is indifferent between merging with firm 2 (M_2) or with firm 3 (M_3) since, in both cases, the ultimate market structure the merger will lead to is $M_E = \{123, 4\}$.
- If instead $a \geq 46.703t$, then firm 1 will decide to merge with firm 3 at stage 1 (M_3). This cross-border merger is going to be followed by a subsequent cross-border merger involving firms 2 and 4, and the final induced market structure is $M_H = \{13, 24\}$.

Figure 2 illustrates the full equilibrium outcome of this two stage game.

¹³In the current scenario, both possible mergers would lead to the creation of an international firm and, therefore, the tariff-jumping sub-effect plays no role in firm 2's choice.

¹⁴In both market structures, firm 1 belongs to a merged entity owning 1/2 of the industry capital. However, in market structure M_H firm 1 is part of an international firm which avoids paying the export tariff by locating production behind the tariff wall.

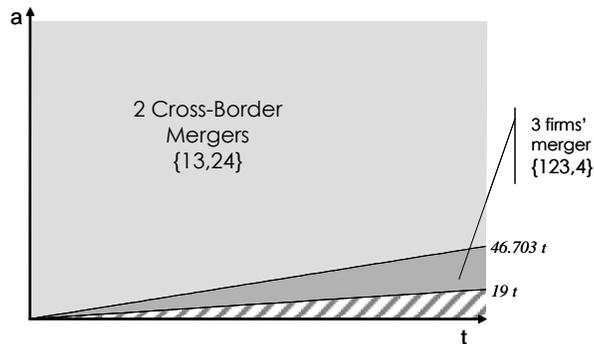


Figure 2: Equilibria of the *Laissez-Faire* Game

Three notes are in order at this point. First, notice that a wave of mergers *always* occurs in equilibrium and the final equilibrium market structure induced by the merger wave crucially depends on the level of trade physical costs. Second, while cross-border mergers are always part of the merger wave that occurs along the equilibrium path, merger waves composed of two national mergers (leading to a final market structure $M_G = \{12, 34\}$) never constitute an equilibrium outcome.¹⁵ Lastly, this result seems to provide a theoretical rationale for the observation that cross-border merger waves tend to be triggered by trade liberalization processes. Interestingly, however, this result will not anymore hold when we will enrich the merger formation process so as to encompass active AAs in the sequential merger game.

4 The model with active Antitrust Authorities

In this section, starting from the same status quo industry structure $M_A = \{1, 2, 3, 4\}$, our aim is to investigate how trade policy influences firms' choices between domestic and cross-border mergers in a situation where every merger proposal has to be submitted for approval to the relevant AA. So, in this context, the outcome of the merger formation game will depend not only on a merger profitability analysis, but also on the strategic interaction between potential merger parties and the AAs. Apart from incorporating AAs as active players of our sequential merger formation game, in this section we also change the sequential merger formation model presented in the previous section so as to allow firms to propose a merger leading to complete monopolization of the industry.

Two preliminary remarks are in order at this point. First, we assume that there are no administrative costs that firms must incur to submit a merger proposal to the relevant AA. Second, in the current section, both the SNAA and the NAAs are assumed to assess the merger according to the total welfare standard.¹⁶

¹⁵It worth remarking at this point that if the merger to monopoly was not *a priori* ruled out by assumption, then the final equilibrium outcome would be a monopoly market structure for all $a > 19t$.

¹⁶In section 5.1 we will allow the AAs to have a more general objective function, which can attribute different weights to profits and consumers' surplus.

Before Cournot competition takes place, firms play a six-stage game with the AAs, involving the following sequence of actions:

- In the *first stage*, firm 1 is given the opportunity to merge either with its national rival firm 2 or with the foreign firm 3. In the former case, it will have to ask Country A NAA (denoted ANAA) for authorization. In the latter, it will have to ask the SNAA for authorization. If no merger is proposed, the game ends and Cournot competition takes place among the four firms.
- In the *second stage*, the relevant AA chooses whether to accept or to refuse the merger proposal. If it does not authorize it, then product market competition occurs between the four firms in the status quo industry structure; otherwise the game moves to the following stage.
- In the *third stage*, if the relevant AA has approved the merger at stage 2, then one of the firms not involved in the first merger is given the opportunity to propose another merger. We let firm 3 be the firm which has the opportunity to propose a new merger with one of the other two firms in the industry, in case it was not involved in the previous merger. Otherwise, firm 2 is the one which has the power to propose a new merger with one of the other two firms in the industry. If no merger is proposed, then the merger game stops and market competition occurs. If instead there is a merger proposal, that merger proposal has to be submitted to the relevant AA for authorization.
- In the *fourth stage*, the relevant AA decides whether to authorize the merger proposed in the previous stage. If it vetoes the merger, the merger game stops and product market competition occurs. Otherwise, the game moves to the following stage in which a last merger round takes place.
- In the *fifth stage*, the firm not involved in the (second) merger proposed in the third stage (and approved in the fourth stage by the relevant AA) is given the opportunity to seek a merger to complete monopoly. If this firm decides not to propose a merger to monopoly, the merger game stops and market competition takes place. Otherwise, it will have to ask the SNAA for authorization.
- In the *sixth stage*, the SNAA decides whether or not to authorize the merger to complete monopoly and, after its decision has been taken, product market competition occurs.

The possible market structures that can arise when this (richer) merger formation game is played are illustrated in Figure 3.

As in the previous section, we will seek the SPNE in pure strategies, so that we proceed by solving the game by backward induction.

Analysis of Stage 6 If the game arrives at the sixth stage, then the SNAA has to decide whether or not to allow a merger between the two remaining firms in the industry leading to a complete monopolization of the industry, $M_I = \{1234\}$.

We now need to introduce some additional notation. Let TW_{M_K} denote total welfare under market structure M_K . In addition, let W_{j,M_K} , where $j = A, B$, denote the country

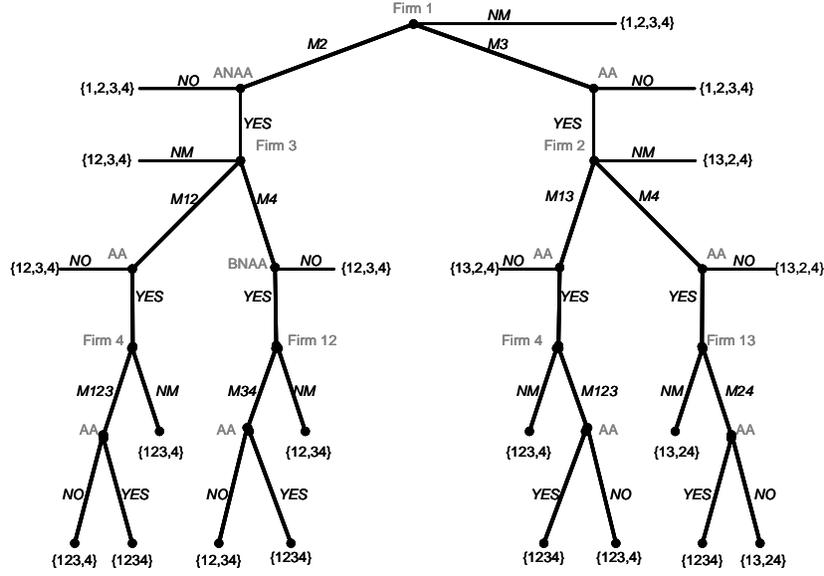


Figure 3: The Merger Game with Active AAs

j national welfare (the sum of consumers' and producers' surplus for *national* consumers and producers).

Definition 2 (i) Market structure M_K is said to dominate market structure M_T from the SNAA point of view, denoted $M_K >_{SN} M_T$, if and only if $TW_{M_K} > TW_{M_T}$; and (ii) Market structure M_K is said to dominate market structure M_T from the point of view of country j NAA, $j = A, B$, denoted $M_K >_j M_T$, if and only if $W_{j,M_K} > W_{j,M_T}$.

Now, as illustrated in Figure 3, the SNAA can face a merger to monopoly proposal in three different situations, which we discuss in turn.

First, the SNAA might have to decide on a proposal by firm 4 to merge with firm 123. Since $M_I >_{SN} M_E$ only if $a < 27.98t$, the SNAA will authorize this merger if $a < 27.98t$ and will veto it otherwise.¹⁷

¹⁷It may not be completely clear why the AA could accept a merger proposal that would lead to the complete monopoly market structure M_I . The intuition for this result is as follows. In such a merger, we have different aspects affecting total welfare. On the one hand, there is a negative impact on welfare due to the fact that the merged entity contracts output so as to increase the market price, therefore reducing consumer surplus. On the other hand, welfare is enhanced because the resulting monopolist will be more efficient than the pre-existing firms and, if at least one merging party is a national firm, there are also gains stemming from tariff-jumping.

When $t = 0$, if there is a merger to complete monopoly, the unique welfare gain from this merger stems from the reduction in the merged entity costs due to the fact that it operates with the *whole* industry capital. However, this efficiency gain is not enough to more than compensate the negative impact of the merger on consumer surplus. Now, as t increases, the gains from the merger are not only due to the efficiency gain, but also to the tariff jumping argument. So, for sufficiently high values of t , the SNAA realizes that a merger to complete monopoly is welfare enhancing.

Second, the SNAA might have to decide on a merger involving two national monopolists towards complete monopolization of the industry. Some algebra shows that $M_I \succ_{SN} M_G$ only when $a < 127.93t$. Hence, this merger to monopoly will be approved when $a < 127.93t$ and rejected otherwise.

Lastly, the SNAA might be called to decide on a merger between two international firms, resulting from two previous cross-border mergers. Some algebra shows, however, that, for all parameter values, the total welfare in the complete monopoly $M_I = \{1234\}$ is always lower than the total welfare associated with market structure $M_H = \{13, 24\}$, $M_H \succ_{SN} M_I$. Hence, after a wave of two cross-border mergers, the SNAA will *never authorize* a further merger to complete monopoly.¹⁸

Analysis of Stage 5 If the game arrives at the fifth stage, a duopolistic structure has emerged from the previous stages of the game, and the firm not involved in the most recent of the previous mergers has to decide whether or not to seek a merger to monopoly. We will again have to distinguish three cases.

First, if firm 4 was not involved in any of the previous mergers, then it can decide at this stage either not to propose any further merger, and remain at market structure $M_E = \{123, 4\}$, or to propose a merger with firm 123. Simple algebra shows that $M_I \succ_4 M_E$ if $a < 395.2195t$. However, from the previous analysis, the SNAA will approve such a merger only if $a < 27.98t$. Hence, firm 4 will decide to propose a merger to monopoly if $a < 27.98t$ and will propose no merger otherwise.¹⁹

Second, if there was a wave of mergers creating two national monopolies, then firm 12 (the national monopoly created by the first merger) has to decide whether to seek a merger leading to a complete monopoly. It is easy to show that this firm always prefers to be in a complete monopoly market structure than in a market structure composed of two national monopolies, $M_I \succ_{12} M_G$ for all parameter values. However, firm 12 anticipates its merger proposal to monopoly will only be accepted by the SNAA if $a < 127.93t$. Hence, the firm seeks a merger to complete monopoly only if $a < 127.93t$.

Lastly, if a wave of cross-border mergers occurred in the previous stages of the game, then the first international firm created by this wave - firm 13 - anticipates that the SNAA will never approve a further merger to complete monopoly. For this reason, firm 13 will not make any merger proposal.

Analysis of Stage 4 In the *fourth* stage, the relevant AA has to decide whether to accept a merger proposed by one of the outsiders to the first merger. Four different cases must be considered here: two cases in which the merger is proposed by firm 3 and two other cases in which the merger is proposed by firm 2. These cases are analyzed in the discussion that follows.

First, in case the outsider to the first merger is firm 3 and it proposed a merger with the merged entity which resulted from the previous merger (M_{12}), then the merger proposal is reviewed by the SNAA. The SNAA anticipates that if it approves the merger proposal, then there are two different possible scenarios regarding the evolution of the merger formation process: (i) If $a < 27.98t$, then this merger will be followed by a

¹⁸Notice, in particular, that the tariff-jumping argument does not apply to this specific merger since the two firms in market structure M_H are both international.

¹⁹We are assuming that whenever a firm anticipates that a proposal is going to be rejected, then it does not even make it.

subsequent merger leading to a complete monopoly market structure $M_I = \{1234\}$; and (ii) If instead $a \geq 27.98t$, then this merger will not be followed by another merger (and the induced market structure will therefore be $M_E = \{123, 4\}$). If the merger is not approved, the final market structure will be $M_B = \{12, 3, 4\}$. Now, some algebra shows that $M_E \succ_{SN} M_B$ if $a < 244.481t$ and $M_I \succ_{SN} M_B$ if $a < 107.09t$. So, the SNAA will decide to approve the merger if $a < 244.481t$ and to veto it otherwise.

Second, if the outsider to the first merger is firm 3 and it proposed to merge with firm 4 ($M4$), then the merger proposal should be reviewed by Country B NAA (denoted BNAA). If the merger is rejected, the final market structure will be $M_B = \{12, 3, 4\}$. If however the merger is approved, then BNAA anticipates that: (i) If $a < 127.93t$, this merger will be followed by a subsequent one leading to complete monopolization of the industry; and (ii) If instead $a \geq 127.93t$, then this merger will not be followed by other merger and the final industry structure will be composed of two national monopolies, $M_G = \{12, 34\}$. In addition, simple algebra shows that $M_B \succ_B M_G$ for all parameter values and $M_I \succ_B M_B$ only if $a < 63.55t$. So, BNAA will decide to approve the merger (expecting that the merger process will end up in a complete monopoly ultimate market structure) if $a < 63.55t$ and reject the merger otherwise (in which case the final industry structure is $M_B = \{12, 3, 4\}$).

Third, in case the outsider to the first merger is firm 2 and it proposed to merge with the merged entity resulting from the first merger ($M13$), then the SNAA is called to make a decision on this merger proposal. The SNAA knows that if it rejects the merger, the induced final market structure is going to be $M_D = \{13, 2, 4\}$. It also anticipates that when it accepts the merger, two different cases can occur: (i) If $a < 27.98t$, then the merger under analysis will be followed by a subsequent one leading to market structure $M_I = \{1234\}$; and (ii) If instead $a \geq 27.98t$ the merger will not be followed by a subsequent merger, which implies that the final market structure will be $M_E = \{123, 4\}$. Moreover, simple algebra shows that, for all parameter values, $M_D \succ_{SN} M_E$ and $M_D \succ_{SN} M_I$, which in turn implies that it is optimal for the SNAA is to (always) reject the merger proposal under analysis. A merger involving firms 13 and firm 2 would induce the creation a larger (and, hence, more efficient) international firm, but the resulting cost synergies wouldn't be sufficient to more than compensate the loss in consumers' surplus resulting from the output contraction (so as to raise price) by the merged entity.

Lastly, if the outsider to the first merger is firm 2 and if this firm proposed to merge with firm 4 ($M4$), then it is again the SNAA that has to make a decision on the merger proposal. The SNAA knows that if it accepts the merger, then the induced final market structure is $M_H = \{13, 24\}$, whereas if it rejects it the merger game stops and the equilibrium industry structure is $M_D = \{13, 2, 4\}$. Since $M_H \succ_{SN} M_D$ if $a < 479.34t$, the SNAA will approve the cross-border merger between firms 2 and 4 in this specific region of parameter values and will reject it otherwise.

Analysis of Stage 3 In the *third* stage, we have to check whether the outsider to the first merger will use the opportunity to propose a subsequent merger or not. We have to consider two different cases.

First, consider the case a merger between firm 1 and 2 has occurred; firm 3 has now the opportunity to propose a new merger. Firm 3's preferences over the ultimate market structures its decision may lead to are as follows: (1) for all parameter values, $M_I \succ_3 M_B$ and $M_I \succ_3 M_E$ and (2) $M_E \succ_3 M_B$ if $a < 2937.035t$. Hence, firm 3, if called to play at

stage 3, will take the following decisions:

- If $a < 27.98t$, then firm 3 is indifferent between merging with firm 12 (M_{12}) or merging with firm 4 (M_4) since in both cases the ultimate market structure the merger will lead to is $M_I = \{1234\}$.
- If $27.98t \leq a < 63.55t$, firm 3 decides to merge with firm 4 and the ultimate market structure this merger will lead to is again the complete monopoly one, $M_I = \{1234\}$.
- If $63.55t \leq a < 244.481t$, then firm 3 decides to merge with the merged entity resulting from the previous merger round (M_{12}) and the induced market structure is $M_E = \{123, 4\}$ since no further merger would be proposed along the equilibrium path.
- If instead $a \geq 244.481t$, then firm 3 anticipates that no merger would be approved by the relevant AA in the following stage of the game and, therefore, decides not to propose a merger at this stage, which in turn implies that the final market structure is $M_B = \{12, 3, 4\}$.

Second, let us consider the case a merger between firm 1 and 3 has occurred, then firm 2 has the opportunity to propose a merger. Notice that, as explained above, a merger with firm 13 (M_{13}) would never be approved by the SNAA in the following stage of the game, which means that, at this stage, firm 2's decision amounts to a decision on whether or not to merge with firm 4. Simple algebra shows that, for all parameter values, firm 2 strictly prefers market structure M_H to market structure M_D , $M_H \succ_2 M_D$. As a result, it is very easy to conclude that firm 2 will only decide to propose a merger with firm 4 at stage 3 if $a < 479.34t$. This merger would not be followed by a subsequent merger to complete monopoly, which means that the final industry structure would be composed of two international firms with one half of the industry capital each (resulting from a wave of two cross-border mergers), $M_H = \{13, 24\}$.

Analysis of Stage 2 In the *second* stage, in case firm 1 decided to submit a merger at the previous stage, the relevant AA is called to make a decision on the merger proposal. Two separate cases should be considered, depending on whether firm 1 decided to propose a merger with its national rival firm 2 or with foreign firm 3.

First, in case firm 1 proposed a merger with firm 2, then ANAA is called to make a decision at stage 2. ANAA anticipates that if it approves the merger, then there are three possible induced final market structures this merger will lead to: $M_I = \{1234\}$ (for $a < 63.55t$), $M_E = \{123, 4\}$ (for $63.55t \leq a < 244.481t$), and $M_B = \{12, 3, 4\}$ (for $a \geq 244.481t$). Now, comparing each of these possible market structures with the initial one ($M_A = \{1, 2, 3, 4\}$) in terms of (country A) national welfare, one has that: (1) $M_A >_A M_B$ for all parameter values; (2) $M_E >_A M_A$ if $34.27t < a < 93.65t$; and (3) $M_I >_A M_A$ if $23.29t < a < 84.50t$ ²⁰. As a result, if called to play at stage 2, ANAA will decide as follows:

²⁰The intuition of why, for a given demand parameter a , the complete monopoly market structure M_I is not preferred to the status quo initial situation M_A is as follows. In any case, a merger to monopoly has the obvious implication that the merged entity will contract output so as to increase the market price, therefore reducing consumer surplus. Let us take a low value for the trade physical cost t (say, $t = 0$). When $t = 0$, if there is a merger to complete monopoly, the unique gain from this merger stems from the reduction in the merged entity costs due to fact that it operates with the *whole* industry capital (tariff-jumping arguments play no role in the analysis of the welfare effects of the merger). However, this

- Accept the merger if $23.29t < a < 93.65t$, where in anticipates that the ultimate market structure this merger will lead to is $M_I = \{1234\}$ when $23.29t < a < 63.55t$ and M_E when $63.55t < a < 93.65t$.
- Reject the merger otherwise.

Second, in case firm 1 proposed a merger with firm 3, then this merger is reviewed by the SNAA at stage 2. The SNAA anticipates that if it approves the merger, then this merger can induce two possible final market structures: $M_H = \{13, 24\}$ if $a < 479.34t$, or $M_D = \{13, 2, 4\}$ otherwise. Comparing now these two possible final market structures with the initial one ($M_A = \{1, 2, 3, 4\}$) in terms of total welfare, one may conclude that: (1) $M_H >_{SN} M_A$ if $a < 470.92t$; and (2) $M_D >_{SN} M_A$ if $a < 462.79t$. Hence, the SNAA will decide to approve the merger (anticipating that the ultimate market structure this merger will lead to is $M_H = \{13, 24\}$) if $a < 470.92t$ and will veto it otherwise.

Analysis of Stage 1 In the *first stage* of the game, firm 1 is given the opportunity to propose a merger either with its national rival firm 2 or with the foreign firm 3, or not propose any merger.

If firm 1 proposes a merger with firm 2, then it anticipates that there are three possible final induced market structures this merger will lead to: (1) $M_I = \{1234\}$ if $23.29t < a < 63.55t$, (2) $M_E = \{123, 4\}$ if $63.55t < a < 93.65t$ and (3) $M_A = \{1, 2, 3, 4\}$ otherwise. If instead firm 1 proposes a merger with firm 3, it anticipates that, as explained above, this merger will only be accepted by the SNAA if $a < 470.92t$ and it will be followed by a subsequent cross-border merger (by firms 2 and 4) leading to the final market structure $M_H = \{13, 24\}$.

Now, studying firm 1's preferences over the possible final induced market structures, one may conclude that: (1) for all parameter values, $M_E \succ_1 M_A$, $M_H \succ_1 M_A$ and $M_I \succ_1 M_H$; and (2) $M_H \succ_1 M_E$ if $a > 46.73$. Hence, one can summarize firm 1's optimal decisions at the first stage of the game as follows:

- If $19t < a < 23.29t$, firm 1 will decide to merge with firm 3 ($M3$) and the final induced market structure this merger will lead to is $M_H = \{13, 24\}$.
- If $23.29t \leq a < 63.55t$, firm 1 will opt for merging with firm 2 ($M2$) and the final induced market structure this merger will lead to is $M_I = \{1234\}$.
- If $63.55t \leq a < 470.92t$, firm 1 will decide to merge with firm 3 ($M3$) and the final induced market structure this merger will lead to is $M_H = \{13, 24\}$.
- If instead $a \geq 470.92t$, firm 1 will propose no merger (NM) since it anticipates that no merger would be accepted by the relevant AA in the following stage of the game.

This completes the analysis of the whole game, whose full equilibrium outcome is summarized by Figure 4.

efficiency gain is not enough to more than compensate the negative impact of the merger on consumer surplus. Now, as t increases, the gains from the merger are not only due to the efficiency gain, but also to the tariff jumping argument of cross-border mergers. But, the higher the value of t is, the lower are firms exports at the initial market structure M_A . This in turn implies that for t sufficiently high, exports have very little relevance in the initial market structure and the tariff-jumping argument becomes not significantly important again (as it is the case for t sufficiently small).

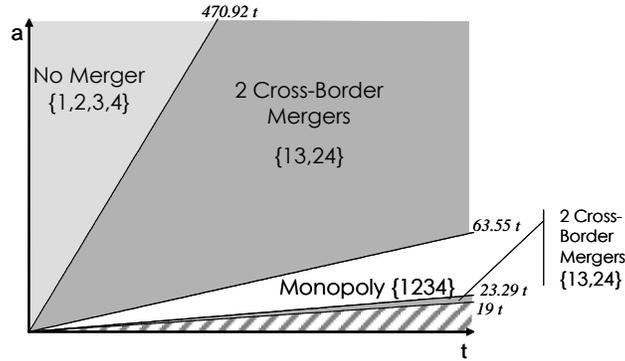


Figure 4: Equilibria of the Game with AAs

The results are very different from the ones regarding the benchmark *laissez-faire* model presented in the previous section. In particular, four important messages can be obtained from the analysis of Figure 4. Firstly, notice that whenever mergers occur in equilibrium, they occur in waves. Secondly, the equilibrium merger wave comprises at least one cross-border merger. Thirdly, for $23.29t \leq a < 63.55t$, a wave of three mergers occurs in equilibrium leading to a complete monopolization of the industry. Lastly, and perhaps more importantly, the analysis reveals that no merger will occur for sufficiently low values of the trade physical cost t , which contrasts with the common wisdom that cross-border merger waves tend to be triggered by trade liberalization processes.

The intuition that underlies this last result is simple. When evaluating the welfare impact of a given merger, the relevant AA at the second stage takes into account the relative magnitude of the three following countervailing effects induced by the merger. First, since quantities are strategic substitutes, after the merger, the merging parties contract output. Each merging party internalizes the negative externality it inflicts on the other merger participants when it makes its output decision and, as a result, the combined output of the insiders decreases, leading to an increase in prices in market A for a national merger and to an increase in prices in both countries for a cross-border merger. Second, any merger gives rise to endogenous efficiency gains since it brings the individual capital of the merging firms under a single larger (and, hence, more efficient) resulting firm. Third, in case of a cross-border merger, there is the so called tariff-jumping effect of the merger, which stems from the fact that international firms are able to avoid paying the trade physical cost since they have a plant in each country. This gain is clearly reduced as the trade tariff falls.

Now, if we take the demand parameter a as given and consider a sufficiently low value for the trade cost t , then clearly the third effect plays no significant role in the welfare analysis performed by the relevant AA. In addition, it turns out that, for small values of the trade cost t , the positive efficiency gain effect is countervailed by the negative effect on consumers' surplus. This in turn implies that, starting from the no merger industry structure $M_A = \{1, 2, 3, 4\}$ and considering the cases in which the physical trade cost assumes sufficiently low values, any merger proposal will be blocked by the relevant AA at the second stage of the game.

5 Extensions

In this section, we present some extensions to the model with active Antitrust Authorities introduced in Section 4.

5.1 Lobbying

In this section, we study the effect of having an objective function for the AAs that may attribute different weights to consumers' surplus and firms' profits. In particular, country j NAA objective function is given by:²¹

$$U^j = \alpha \Pi^j + (1 - \alpha) CS^j, \quad (3)$$

where Π^j denotes the profit of plants located in country j , CS^j represents the consumers' surplus regarding consumers in country j and $\alpha \in [0, 1]$.²²

The parameter α represents the AA's bias that can spring from lobbying activities by producers or by consumers:

- If $\alpha = 1/2$, then the authority is neutral and maximizes total welfare. So, this special case of the extended version of the model boils down to the case addressed in Section 4.
- If $\alpha > 1/2$, then the AA is more industry-oriented. Notice that in the extreme where $\alpha = 1$ the AA is solely interested in maximizing the level of profits.
- If instead $\alpha < 1/2$, then the AA has a pro-consumer bias. Notice in particular that the extreme case where $\alpha = 0$ represents an AA that is only interested in maximizing consumers' surplus, regardless of the level of profits of the firms.

In what follows, for tractability reasons, we set $a = 1$ and, consequently, Assumption 1 implies that $t < 1/19 \simeq 0.052632$. The game we analyze in this section is the same six-stage game proposed in Section 4, but where now the AAs have the modified objective function described in eq. (3). From the analysis of the SPNE of this game, one can derive its full equilibrium outcome which is represented in Figure 5.

The intuition underlying this result is as follows. As the value of α increases, the AAs become more and more industry-friendly and the equilibrium outcome is a more and more concentrated market structure. In particular, three different subcases can be distinguished. First, for sufficiently low values of α , the AAs' and the firms' interests are not aligned. The latter are, as usual, concerned about their individual profits whereas the former aim essentially at maximizing consumers' surplus. Now, since, as explained above, in this setting, any merger gives rise to a negative impact on consumer welfare, every merger proposal is going to be blocked by the relevant AA. Second, for $\alpha = 1/2$ the results are obviously qualitatively the same as the ones derived in Section 4.²³ Lastly, for sufficiently high values of α , the relative weight of consumers' surplus on the AAs

²¹This definition of the AAs' objective function resembles the one introduced by Barros and Hoernig (2004)

²²Obviously, the SNAA objective function is equal to $U^A + U^B$.

²³The intuition behind the fact that, given an intermediate value of α , a merger to complete monopoly is only going to be allowed for values of t in a closed interval is the one explained in footnote 17.

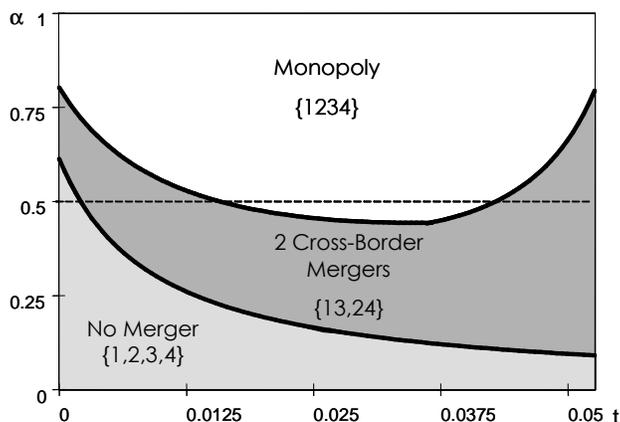


Figure 5: Equilibria of the Game with Lobbies

objective function is limited, which implies that the AAs' and the firms' interests are closely aligned. As a result, the final equilibrium outcome is a completely monopolized industry.

5.2 Efficiency Levels

As mentioned above, our cost structure is a special case of the one proposed by Perry and Porter (1985). The cost function of a firm owning k_i units of capital is:

$$C_i(x_i, k_i, e) = \frac{e(x_i)^2}{2k_i}, \quad (4)$$

where $k_i \in \{1/4, 1/2, 3/4, 1\}$, $\sum_i k_i = 1$ and $e \geq 0$. In the previous analysis we have implicitly assumed that $e = 4$. So, the idea of this section is to test whether the results are robust to changes in the parameter e . Notice that from (4), simple algebra shows that

$$\frac{\partial^2 C_i}{\partial x_i \partial k_i}(x_i, k_i, e) = -\frac{ex_i}{k_i^2}. \quad (5)$$

So, e measures the level of endogenous efficiency gains induced by a merger. The higher the value of e , the larger the reduction in marginal costs resulting from a merger.

Analyzing the SPNE of the six-stage game presented in section 4 for different values of e , one may conclude that there are two different classes of equilibrium outcomes.

First, for $e = 0$ (constant marginal costs), $e = 1$ and $e = 2$ the results are qualitatively the same: given a demand parameter a , the equilibrium market structure is “no merger” for low values of the trade cost t and a wave of two cross-border mergers for t sufficiently high. The following figure illustrates the full equilibrium outcome of the merger game when $e = 2$.

Second, for $e > 4$ we obtained an equilibrium outcome qualitatively equivalent to the one presented in Figure 4 ($e = 4$).

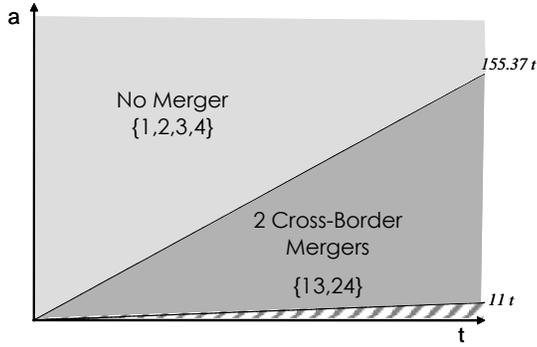


Figure 6: Equilibria of the Game with AAs ($e = 2$)

So, regardless of the value of e , we have that: (i) No mergers occur in equilibrium whenever the trade physical costs are sufficiently low; and (ii) whenever mergers occur in equilibrium, they encompass cross-border merger waves. In addition, when the level of endogenous efficiency gains e is sufficiently high, it may as well happen that the final equilibrium outcome of the merger game is a complete monopolized industry. So, our qualitative results proved to be robust to changes in the level of efficiency,

5.3 Social Optimum Market Structures

In this section we investigate what would be, from an ex-ante point of view, the SNAA first-best choice if it could choose amongst all market structures that can result from the merger game. The outcome of this exercise is illustrated in Figure 7.

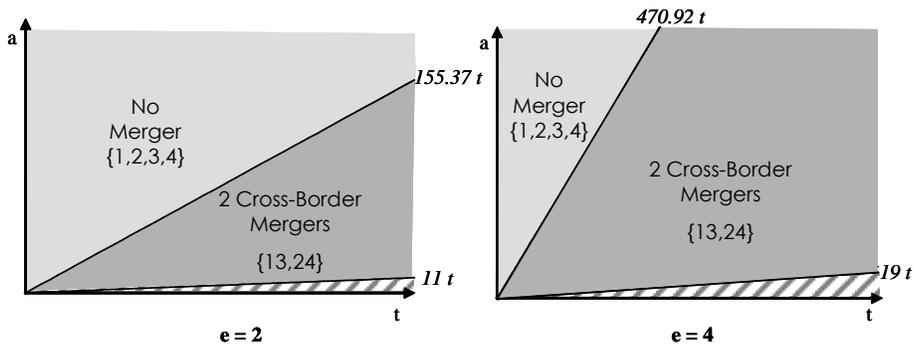


Figure 7: SNAA First-Best Market Structures

Now, comparing figures 4, 6 and 7, one concludes that when $e = 2$, our endogenous merger game leads to the socially optimum market structure. However, if efficiency gains are sufficiently strong (say, $e \geq 4$), the proposed merger game introduces a distortion from the SNAA first-best scenario since, for some region of the parameter values, the resulting market structure is the complete monopoly (as explained in the previous section), which is never a socially optimal market structure.²⁴

5.4 Myopic Antitrust Authorities

In the previous analysis it has been implicitly assumed that the AAs were forward looking, i.e., whenever faced with a merger proposal, the relevant AA was able to correctly anticipate the *ultimate* market structure this merger would lead to. So, it is natural to wonder what would be the equilibrium outcome of the proposed six-stage game if instead the AAs were myopic. By analyzing a modified version of our endogenous merger game, where the AA which is called to decide upon a given merger proposal judges it without considering that further mergers might occur, one concludes that the full equilibrium outcome of this game is the one presented in Figure 8.

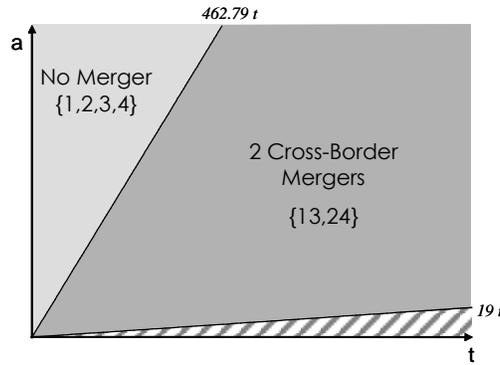


Figure 8: Equilibria of the Game with myopic AAs

Notice that this different assumption does not change the final results in a drastic way. It is worth remarking, however, that in Figure 8 there is no region of parameter values where the final equilibrium market structure is the complete monopoly. Remember that in Section 4 the merger wave leading to complete monopoly is always started with a national merger between firm 1 and 2. However, if this national merger proposal is submitted to a myopic ANAA, it will always be rejected. The reason is that the ANAA considers that the induced market structure would be $M_B = \{12, 3, 4\}$, which is always dominated by $M_A = \{1, 2, 3, 4\}$ from a welfare point of view. ANAA fails to anticipate that this merger would be followed by subsequent ones and the resulting ultimate market structures obtained in this process could be preferred to the status quo industry structure $M_A = \{1, 2, 3, 4\}$.

²⁴Even if complete monopolization of the industry is *a priori* forbidden, it is straightforward to show that there still exists a distortion from the SNAA first-best choice.

6 Conclusion

In this paper we use an international Cournot oligopoly model to study the interplay between trade policy and the way merger waves shape the industrial structure. In particular, we analyze how trade policy can influence firms' choice between domestic and cross-border mergers in a sequential merger formation game with cost synergies *à la* Perry and Porter (1985).

Apart from discussing the relationship between trade policy and merger formation, our main contribution here probably lies in the attempt of going beyond a static setting when analyzing the effects of mergers, and in explicitly considering the role of Antitrust Authorities in a sequential merger game.

It is shown that the equilibrium market structure depends heavily on: (i) the level of trade costs; and (ii) whether or not active Antitrust Authorities are incorporated within the sequential merger game. In addition, we show that whenever mergers occur in equilibrium, they occur in waves and the merger wave comprises at least one cross-border merger. Also, and perhaps most importantly, in a model where AAs are encompassed as active players of the merger formation game, no mergers (and, therefore, no cross-border merger waves) occur in equilibrium when trade physical costs are at a sufficiently low level, which contradicts the common belief that trade liberalization induces waves of cross-border mergers.

We also identify conditions for the full equilibrium outcome of the sequential merger game to result in the socially optimal market structure and analyze how the equilibrium market structures are affected by the presence of lobbying efforts.

Appendix A: Equilibrium profits, quantities, and welfare

Market structure A	
Profits	
$\Pi_{1,MA} := \frac{34}{1369} a^2 - \frac{34}{1369} a t + \frac{693}{1369} t^2$	$\Pi_{2,MA} := \frac{34}{1369} a^2 - \frac{34}{1369} a t + \frac{693}{1369} t^2$
$\Pi_{3,MA} := \frac{34}{1369} a^2 - \frac{34}{1369} a t + \frac{693}{1369} t^2$	$\Pi_{4,MA} := \frac{34}{1369} a^2 - \frac{34}{1369} a t + \frac{693}{1369} t^2$
Welfare	
$CS_{A,MA} := \frac{2}{1369} (2a - t)^2$	$CS_{B,MA} := \frac{2}{1369} (2a - t)^2$
$W_{A,MA} := \frac{76}{1369} a^2 - \frac{76}{1369} a t + \frac{1388}{1369} t^2$	$W_{B,MA} := \frac{76}{1369} a^2 - \frac{76}{1369} a t + \frac{1388}{1369} t^2$
$TW_{MA} := \frac{152}{1369} a^2 - \frac{152}{1369} a t + \frac{2776}{1369} t^2$	
Market structure B	
Profits	
$\Pi_{12,MB} := \frac{9801}{197192} a^2 - \frac{9801}{197192} a t + \frac{313013}{394384} t^2$	
$\Pi_{3,MB} := \frac{4913}{197192} a^2 - \frac{4913}{197192} a t + \frac{113377}{394384} t^2$	$\Pi_{4,MB} := \frac{4913}{197192} a^2 - \frac{4913}{197192} a t + \frac{113377}{394384} t^2$
Welfare	
$CS_{A,MB} := \frac{1}{2} \left(\frac{67}{628} a - \frac{28}{157} t \right)^2$	$CS_{B,MB} := \frac{1}{2} \left(\frac{67}{628} a + \frac{45}{628} t \right)^2$
$W_{A,MB} := \frac{43693}{788768} a^2 - \frac{13553}{197192} a t + \frac{319285}{394384} t^2$	$W_{B,MB} := \frac{43793}{788768} a^2 - \frac{16637}{394384} a t + \frac{455533}{788768} t^2$
$TW_{MB} := \frac{43743}{394384} a^2 - \frac{43743}{394384} a t + \frac{1094103}{788768} t^2$	
Market structure D	
Profits	
$\Pi_{13,MD} := \frac{297}{98596} a t + \frac{9801}{197192} a^2 + \frac{9}{197192} t^2$	
$\Pi_{2,MD} := -\frac{2601}{98596} a t + \frac{4913}{197192} a^2 + \frac{99973}{197192} t^2$	$\Pi_{4,MD} := -\frac{2601}{98596} a t + \frac{4913}{197192} a^2 + \frac{99973}{197192} t^2$
Welfare	
$CS_{A,MD} := \frac{1}{2} \left(\frac{67}{628} a - \frac{17}{628} t \right)^2$	$CS_{B,MD} := \frac{1}{2} \left(\frac{67}{628} a - \frac{17}{628} t \right)^2$
$W_{A,MD} := \frac{43743}{788768} a^2 - \frac{10949}{394384} a t + \frac{400199}{788768} t^2$	$W_{B,MD} := \frac{43743}{788768} a^2 - \frac{10949}{394384} a t + \frac{400199}{788768} t^2$
$TW_{MD} := \frac{43743}{394384} a^2 - \frac{10949}{197192} a t + \frac{400199}{394384} t^2$	

Market structure E	
Profits	
$\Pi_{123,ME} := \frac{124146}{1661521} a^2 + \frac{3762}{1661521} a t + \frac{831017}{14953689} t^2$	$\Pi_{4,ME} := \frac{41650}{1661521} a^2 - \frac{45220}{1661521} a t + \frac{3433508}{14953689} t^2$
Welfare	
$CS_{A,ME} := \frac{1}{2} \left(\frac{134}{1289} a - \frac{697}{3867} t \right)^2$	$CS_{B,ME} := \frac{1}{2} \left(\frac{134}{1289} a + \frac{592}{3867} t \right)^2$
$W_{A,ME} := \frac{91742}{1661521} a^2 - \frac{85874}{4984563} a t + \frac{4781495}{89722134} t^2$	$W_{B,ME} := \frac{92010}{1661521} a^2 - \frac{52570}{4984563} a t + \frac{11657237}{44861067} t^2$
$TW_{ME} := \frac{183752}{1661521} a^2 - \frac{46148}{1661521} a t + \frac{9365323}{29907378} t^2$	
Market structure G	
Profits	
$\Pi_{12,MG} := \frac{18}{361} a^2 - \frac{18}{361} a t + \frac{185}{361} t^2$	$\Pi_{34,MG} := \frac{18}{361} a^2 - \frac{18}{361} a t + \frac{185}{361} t^2$
Welfare	
$CS_{A,MG} := \frac{1}{2} \left(\frac{2}{19} a - \frac{1}{19} t \right)^2$	$CS_{B,MG} := \frac{1}{2} \left(\frac{2}{19} a - \frac{1}{19} t \right)^2$
$W_{A,MG} := \frac{20}{361} a^2 - \frac{20}{361} a t + \frac{371}{722} t^2$	$W_{B,MG} := \frac{20}{361} a^2 - \frac{20}{361} a t + \frac{371}{722} t^2$
$TW_{MG} := \frac{40}{361} a^2 - \frac{40}{361} a t + \frac{371}{361} t^2$	
Market structure H	
Profits	
$\Pi_{13,MH} := \frac{18}{361} a^2$	$\Pi_{24,MH} := \frac{18}{361} a^2$
Welfare	
$CS_{A,MH} := \frac{2}{361} a^2$	$CS_{B,MH} := \frac{2}{361} a^2$
$W_{A,MH} := \frac{20}{361} a^2$	$W_{B,MH} := \frac{20}{361} a^2$
$TW_{MH} := \frac{40}{361} a^2$	
Market structure I	
Profits	
$\Pi_{1234,MI} := \frac{1}{10} a^2$	
Welfare	
$CS_{A,MI} := \frac{1}{200} a^2$	$CS_{B,MI} := \frac{1}{200} a^2$
$W_{A,MI} := \frac{11}{200} a^2$	$W_{B,MI} := \frac{11}{200} a^2$
$TW_{MI} := \frac{11}{100} a^2$	

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Chapter 2

Merger Policy with Asymmetric Countries

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Abstract

This paper proposes a simple model of exogenous mergers with cost synergies to provide a theoretical foundation for the common belief that smaller countries might be more penalized by a supranational Antitrust Authority's merger policy. The analysis discloses that *(i)* the supranational Antitrust Authority could *approve* a merger that is welfare detrimental for the country where it takes place even in absence of asymmetries among countries; moreover *(ii)* only in the case the merger is proposed in the small country, the supranational Antitrust Authority could *block* mergers that would improve welfare in that country. This supports the idea that smaller countries might be more penalized than the others when the decision is taken by a supranational Antitrust Authority.

Keywords: Merger policy, tariff-jumping.

1 Introduction

After the European Commission decided to block the Volvo/Scania merger in 2001, Göran Persson - the Swedish Prime Minister at the time - expressed his concerns in connection with that decision, arguing that: “the present rules are disadvantageous to us since we tend to dominate our market fraction to such a great extent”. He also added: “there is a structural error in the EU’s competition rules”.²⁵

This paper addresses such concerns from a theoretical perspective.

First, we are going to evaluate, in a very simple framework where we allow for national bilateral merger proposals, the possibility of a discrepancy between the decisions made by a national Antitrust Authority (henceforth AA) and a supranational one.

Then we will address the issue regarding the impact of the asymmetry in country size on AAs’ decision.

The main problem that emerges from Persson’s concerns is in fact a combination of these two elements: the possibility that the contrast among the supranational and the national interest is particularly strong in the case of smaller countries; that is, the possibility that the contrast depends on the relative size of the country where the merger proposal is made.

A branch of the literature on merger policy has focused the attention on ‘strategic’ merger policies, i.e. national policies with the objective of fostering international competitiveness of domestic firms (possibly) in contrast with the supranational welfare. Barros and Cabral (1994) and Head and Ries (1997) extend the concept of the ‘external effects’ of a merger introduced by Farrell and Shapiro (1990) in an open economy framework: they consider the effects of the merger on other agents both in the domestic country and in other countries. Even if this literature addresses also the problem of the possible contrast between the national and the supranational socially optimal merger policy, its focus is mainly on the single country strategic incentives to accept/refuse a merger in an open economy framework.

In this paper we have a different approach, we first want to study the possible contrasts among the decisions by the different levels of AAs and then underline how they might differ according to the relative size of the country where the merger is proposed. In order to do this, we set up a simple international Cournot oligopoly model with two asymmetric countries, where mergers are motivated not only by the increase in concentration, but also by efficiency gains. In this framework we will show two kind of contrast among the merger approval decisions made by a supranational AA and the ones made by a national one: either the supranational AA could approve a merger that would be welfare detrimental from the point of view of the country where it would take place (*Type I contrast*), or it could block a merger that would be beneficial for the country where it would take place (*Type II contrast*).

We will also show that the first type of contrast arises even in absence of market asymmetries. We will finally underline the fact that, in case the merger is proposed in the small country, the problem of the contrast gets more relevant both from a qualitative point of view (the second type of contrast is present only in this case) and from a quantitative one (the region of contrast in this second case is larger). The fact that the contrast among the AAs is stronger in the case of a merger proposal in the small country supports the idea that smaller countries might be penalized when the merger approval decision is made by

²⁵Quoted in Dagens Industri on 20 Sept 2001.

a supranational AA.

In the next section we will introduce a simple international Cournot oligopoly with two asymmetric countries. We will then study two possible scenarios: a national bilateral merger proposal in the big country (section 3) and a national bilateral merger proposal in the small one (section 4). In both cases we will assume firms have to notify the merger proposal to an AA, which can either authorize or block the merger. The AA decision is taken in order to maximize consumers' surplus.²⁶

In these two scenarios we will compare the approval decision by the two possibly relevant AAs.

Directly from section 3 it will be shown that there might be a contrast between the supranational AA's decision and what the national AA would choose: the supranational AA would approve mergers that would decrease the big country consumers' surplus. Moreover it will be clear that this contrast is still present even without considering market asymmetries.

In section 4 the second research question will be addressed more in detail, showing that the contrast between AAs is present in the second scenario as well, but it is more relevant than in the case of a merger in the big country both from a quantitative and from a qualitative perspective.²⁷ This provides theoretical foundation for the claim that smaller countries might be penalized when the merger approval decision is made by a supranational AA.

²⁶In the extension section we will relax this assumption and let the AAs' objective function be Total Welfare.

²⁷As it has been underlined before, in the second scenario we are going to find a larger area of contrast (quantitative perspective) and a different kind of contrast, the *Type II contrast* (qualitative perspective).

2 Basic features of the model

We consider an international oligopoly with six firms located in two asymmetric countries, A and B . The asymmetry among countries is given by their demand size:

$$P_i = a_i - X_i, \quad (1)$$

where $a_B = 1$, and $a_A = a \geq 1$ so that country A is larger than country B . Firms 1, 2 and 3 are located in country A , whereas firms 4, 5 and 6 are located in country B .

We adopt the segmented market hypothesis, where firms compete *à la* Cournot, maximizing profits by choosing sales in each market independently.

Following Perry and Porter (1985), we assume that firms' cost functions differ according to the amount of capital they own.

The total supply of capital in the industry is assumed to be fixed, which is normalized to be 6.²⁸

Let k_i be the fraction of the industry capital stock owned by firm i .

In addition, let x_i^j denote the quantity sold by firm i in market j .

The cost function of a firm that produces x_i units of output, where $x_i = x_i^A + x_i^B$, and owns k_i units of the capital stock is given by

$$C_i(x_i, k_i) = \frac{cx_i}{k_i}, \quad (2)$$

where $k_i \in \{1, 2, 3, 4, 5, 6\}$ and $\sum_i k_i = 6$. So, in this model mergers are characterized by the presence of endogenous efficiency gains: by merging, firms put together their capital endowment and observe a reduction in marginal cost for any given level of output. We assume a completely symmetric distribution of capital in the initial situation: each of the six firms is endowed with 1/6 of the industry capital stock ($k_i = 1, i = 1..6$).²⁹

Given these assumptions, the efficiency gains associated to a bilateral merger in the status quo industry structure³⁰ can be quantified as:

$$|\Delta MC| = \frac{c}{2} \quad (3)$$

Notice that the higher the value of marginal costs, c , the higher the efficiency gains introduced by a merger.

²⁸As pointed out by Perry and Porter (1985), "this suppresses de novo entry into the industry" (p. 220).

²⁹For the time being we will not deal with asymmetries in the cost function among firms; this will be the subject of a further work where we will assume that firms located in the big country own a larger share of capital than the firms located in the small one.

³⁰That is, where each firm holds one unit of capital.

We also introduce physical trade costs associated with exporting one unit of output from one country to the other; these costs are exogenously fixed at $t = \frac{1}{32}$.³¹ We study the decision of the two possibly relevant antitrust authorities regarding two possible merger proposals: a national bilateral merger proposal in the big country (Scenario 1, section 3) and one in the small country (Scenario 2, section 4). In order to ensure that in any of the possible market structures trade between countries takes place, we also impose that $c \leq \frac{7}{12} \approx 0.5833$.

Finally, we assume that there are two country national AAs and a supranational AA, which might be asked to approve or reject the merger proposal. All these AAs maximize consumers' surplus.³²

3 Scenario 1: Merger in the BIG country (A)

We start our analysis by looking at a bilateral merger proposal in the big country (A) in order to evaluate the possible contrast between the approval decision made by the supranational AA and the decision made by country A 's national AA.

In order to do that, we first study the elements that affect merger profitability and we identify the region in the space (a, c) such that a bilateral merger in the big country is profitable for the insiders to such a merger (i.e. the region where the bilateral national merger is proposed).

We then analyze firms' behavior in such a region, in terms of output decision by insiders and outsiders; this way we will be able to assess whether the merger leads to an expansion or a contraction in output in each of the two countries.

Lastly, we focus on the impact that such changes in firms' output choice have on consumers' surplus both at a national and at a supranational level. This way we will be able to study the decisions made by the supranational AA and country A 's national AA upon such a merger proposal and we will finally analyze any possible contrast between them.

3.1 Merger profitability

A merger is proposed by the firms whenever it is profitable for the merging parties, that is, whenever the aggregate profit earned by the merged entity is higher than the sum of what the parties would earn separately.³³

³¹We have chosen this value for the trade costs this way: we computed the equilibrium fixing $c = \frac{1}{2}$ and we found that the range of t such that exports are nonnegative is $[0, \frac{1}{16}]$. We then decided to have the average admissible trade cost.

³²We will check for the robustness of our results to this hypothesis in section 5.1, where we will relax the assumption that the antitrust authorities have consumers' surplus as objective function and we will solve again the model considering total welfare maximizers antitrust authorities.

³³For simplicity, we assume that there is no cost associated to the procedure of merger proposal making.

In order to study when a bilateral national merger is proposed, we provide an analysis of the different effects that play a role in determining merger profitability³⁴.

We can distinguish three effects:

- **Insiders' output contraction effect**

This effect is computed assuming that there are *no* efficiency gains³⁵ from the merger and that the outsiders can *not* react to the merger by expanding output.³⁶ The only change with respect to the initial situation is the reduction in the number of firms operating on the market (from 6 to 5).

This profit effect is positive in both countries. Since the two merging parties internalize the negative externality that each of them provides to the other when making an output decision, the aggregate output of insiders decreases, causing a price increase and a rise in profits.

- **Magnitude effect**

To compute this second profit effect we still impose that the outsiders can *not* react to the merger by expanding output, but we now allow the merged entity to enjoy the efficiency gains.³⁷

As the previous effect, the magnitude effect on profits is positive in both countries. The intuition for this result is quite simple: thanks to the larger capital owned by the merged entity, it can produce more efficiently; by this effect, insiders expand their output in both countries. Notice that the net effect on quantity depends on the two parameters c and a_i ³⁸, as will be described in detail in the next section, but the net effect on profit is always positive.

- **Outsiders' reaction effect**

The last profit effect is the one due to the reaction to the merger by the outsiders. We compute it by allowing the outsider to optimally choose their output.³⁹

This third profit effect can either be positive or negative. The sign of this effect depends on the two parameters c and a_i ; more specifically, it depends on the ratio between the two: $\frac{c}{a_i}$. This variable captures the relative inefficiency level of outsiders with respect to market size, that means the outsiders' inability to react

³⁴We use the same classification adopted by Salvo (2004).

³⁵In analytical terms, this means that the newly merged entity is assumed to hold one unit of capital only. This implies that there are no efficiency gains from the merger as it is clear from the cost function (equation (2)).

³⁶They are assumed to maintain their pre-merger output levels.

³⁷Analytically we consider the case with five firms, one of which (the newly merged entity) has two units of capital.

³⁸This result differs substantially from Salvo (2004) where the net effect on quantities is always negative.

³⁹This is nothing but the real final situation after the bilateral national merger takes place: there are five firms, one of which has two units of capital and each firm can optimally set its own quantity.

considering the size of the market. A low level of $\frac{c}{a_i}$ means high outsiders' efficiency that can be reflected in a reaction detrimental to the insiders' profits. If the parameter $\frac{c}{a_i}$ grows⁴⁰, the outsiders get less and less efficient and their reaction might even be profit improving for the insiders.⁴¹

Concluding, the first two effects on merger profitability are always positive, while the last one can be either positive or negative and it is increasing in the parameter $\frac{c}{a_i}$.

So we expect to have merger proposals in the bottom-right region: for very low values of $\frac{c}{a_i}$,⁴² the outsiders' reaction effect is strongly negative and it dominates the first two positive effects; for high levels of $\frac{c}{a_i}$,⁴³ the last effect gets positive rendering the merger profitable for insiders.

Figure 1 shows the set of parameters such that two firms located in the big country have incentives to submit a merger proposal to the AAs, that is as long as

$$a \leq -\frac{3}{32} + \frac{291}{46}c + \frac{1}{184}\sqrt{-25921 + 374808c + 1467504c^2}$$

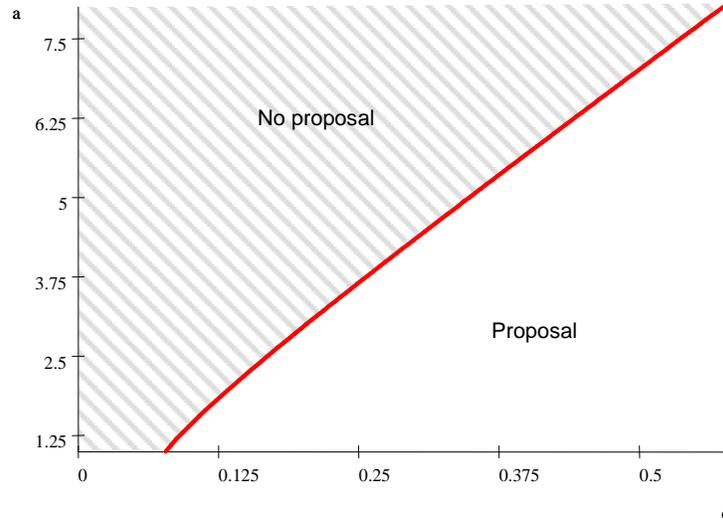


Figure 9: *Scenario 1* . Proposal region

⁴⁰Graphically this means that we move to the bottom-right, in case we are considering country A, or to the right, if we are considering country B.

⁴¹In the quantity choice analysis in next section, this mechanism will be explained more in detail.

⁴²Which graphically means in the top-left region.

⁴³Which graphically means in the bottom-right region.

3.2 Optimal quantity choice

We can now study how the three effects we have introduced in the previous paragraph operate on quantities as well.⁴⁴

While the first two effects are directly related to insiders' quantity choice, the analysis of the third one will disclose the outsiders' reaction effect so that we will be able to conclude on the overall impact of the merger on the aggregate quantity supplied in the two markets.

• Insiders' output contraction effect

Since through the bilateral merger the two firms internalize the externality that each of them provides to the other when making an output decision, the aggregate output level of insiders decreases in each of the two countries.

So the insiders' aggregate output change due to the output contraction effect, ΔX_{con}^{ins} , is always negative:

$$\Delta X_{con}^{ins} < 0 \quad (4)$$

We can analyze more in depth how this output contraction depends on the two relevant parameters, a_i and c .

In order to understand it, we should first consider that this effect depends crucially on the pre-merger output level: the higher the pre-merger output level, the higher the externality each firm provides to the other in the status quo; this in turn means that a higher contraction is needed when the merger takes place. Given this relationship between the pre-merger output level and the size of the insiders' output contraction effect, we can now look at the two parameters we are interested in.

The higher the market size, a_i , the higher the pre-merger output levels, that is, the higher the externality each firms confers upon the other in the status quo in each market, so the higher the size of output contraction after the merger.⁴⁵

The level of marginal costs c is also relevant in determining the relevance of this first effect on output as it is affecting the pre-merger level of production: the higher the marginal cost, the higher the inefficiency in the initial situation, that means the lower the production in the status quo; as underlined before, the lower the pre-merger output level, the lower the externality between the two merging parties in the initial situation, so the lower the need for output contraction by insiders after the merger.⁴⁶ We can now summarize these two relationship as follows:

$$\frac{\partial \Delta X_{con}^{ins}}{\partial \frac{c}{a_i}} > 0 \quad (5)$$

⁴⁴The procedure to compute these effects is exactly the same as the one explained in the previous paragraph.

⁴⁵Remember that, since we are dealing with output contraction, that is $\Delta X_{con}^{ins} < 0$, in analytical terms the relation between this change in output and market size can be represented as: $\frac{\partial \Delta X_{con}^{ins}}{\partial a_i} < 0$

⁴⁶Again, since we are dealing with output contraction, that is $\Delta X_{con}^{ins} < 0$, in analytical terms this relation between the change in output and marginal cost can be written as: $\frac{\partial \Delta X_{con}^{ins}}{\partial c} > 0$

- **Magnitude effect**

The increased level of efficiency gained by merging leads the merging parties to expand their output. This effect depends positively and linearly on c .⁴⁷ Analytically, let's call ΔX_{mag}^{ins} the change in insiders' aggregate output caused by the magnitude effect, simple algebra shows that:

$$\Delta X_{mag}^{ins} = \frac{1}{2}c > 0 \quad (6)$$

As it is apparent from the previous equation that the magnitude effect on quantities depends on marginal costs only (and not on market size). So in this case we have that:

$$\frac{\partial \Delta X_{mag}^{ins}}{\partial c} = \frac{1}{2} > 0 \quad (7)$$

At this point it is worth noting that the first two effects have a contrasting impact on the change in insiders' quantity (the insiders' output contraction effect is always negative and the magnitude effect is always positive); according to which of the two effects prevails on the other, the aggregate effect on insiders' quantity can be either positive or negative: let's call $\Delta X_{con+mag}^{ins}$ the aggregate change in insiders' quantity due to the first two effects, we then have:

$$\Delta X_{con+mag}^{ins} = \Delta X_{con}^{ins} + \Delta X_{mag}^{ins} \leq 0 \quad (8)$$

As introduced in the discussion of the single effects, the overall impact of these first two effects on insiders' quantity choice depends on the relative efficiency gains, $\frac{c}{a_i}$: both changes are increasing in the relative efficiency gains (see equations (5) and (7)); so we can conclude that the change in insiders' quantity due to the first two effects is also increasing in the relative efficiency gains:

$$\frac{\partial \Delta X_{con+mag}^{ins}}{\partial \frac{c}{a_i}} > 0 \quad (9)$$

This means that in the space (a, c) we will observe an output contraction by the insiders in the top-left region (i.e. for low values of $\frac{c}{a}$) and an output expansion in the bottom right-region (i.e. for high values of $\frac{c}{a}$).⁴⁸

⁴⁷ Given the assumption of linear costs.

⁴⁸ This is the case for the aggregate output in the two countries and for country A ; for country B , instead this means that we will observe an insiders' output contraction in the left region (for low values of c) and an expansion in the right region (for high values of c).

- **Outsiders' reaction effect**

We can now analyze the outsiders' reaction to the two possible situations (insiders' output contraction or expansion) that can arise once the first two effects are considered:

- In case there are low relative efficiency gains $\frac{c}{a_i}$ (which graphically means, in the top-left region for country *A* and in the left region for country *B*), the output contraction negative effect dominates the magnitude positive effects and the outsiders will observe an output *contraction* by insiders.

The outsiders will free ride on the increase in price by expanding their output. As the outsiders' output increases, the insiders react by further contracting output, then the outsiders will further expand output until the equilibrium is reached. This is the most standard result in the merger analysis: the insiders to the merger contract output and the outsiders expand it in order to exploit the increase in price.

Notice that the reaction by the outsiders is increasing the size of the first two effects: if after considering the first two effects, there was an output contraction (as in this case), then the overall effect on aggregate output, after considering the reaction by outsiders, will be an even stronger contraction.

This reaction effect on output will be stronger as the relative efficiency gains decrease; the reason is twofold: on the one hand, a lower level of $\frac{c}{a_i}$ implies a stronger output contraction by the insiders and as a consequence a larger reaction by the outsiders; on the other hand, as pointed out before, the variable $\frac{c}{a_i}$ might also be considered representative of the relative level of inefficiency of the outsiders; the lower it is, the stronger the outsiders' reaction will be.

Concluding, in case of low relative efficiency gains, when the first two effects lead to output contraction by insiders, the outsiders' reaction effect turns out to introduce a stronger contraction in the insiders' output and an output expansion by the outsiders. The effect on aggregate output will be a contraction.

- In case the relative efficiency gains for insiders, $\frac{c}{a_i}$, are high (which graphically means, in the bottom-right region for country *A* and in the right region for country *B*), the (positive) magnitude effect dominates the (negative) insiders' output contraction effect and the outsiders to the merger will observe an output *expansion* by insiders.⁴⁹

The idea is that the insiders' gains in terms of (relative) efficiency are so high that it is more convenient for them to expand output, facing a price reduction, than inducing a price increase by an output contraction. This changes drastically the situation for outsiders: the output expansion introduces a price drop which will induce the outsiders to reduce their production. As the outsiders' output decreases, insiders react by further expanding output, then outsider will further contract their output until the equilibrium is reached.

This reaction effect on output will be stronger as the relative efficiency gains increase; again, the reason is twofold: on the one side, a higher level of $\frac{c}{a_i}$ implies a stronger output expansion by the insiders and as a consequence a

⁴⁹ A similar result is presented in Motta (2004): in the analysis of a product differentiation model, a high level of efficiency gains leads to a price reduction. The conclusion is that "when there are large enough efficiency gains consumer surplus will increase with the merger".

larger reaction by the outsiders; on the other side, considering $\frac{c}{a_i}$ as a proxy for the relative level of inefficiency of the outsiders, the higher it is, the more the outsiders will have to contract output.

Concluding, in presence of high relative efficiency gains, i.e. when the first two effects lead to output expansion by insiders, the outsiders' reaction effect induces a stronger expansion in the insiders' output and an output contraction by the outsiders. The effect on aggregate output will be an expansion.

We can finally summarize the results of this analysis on aggregate quantity choice in the two countries in the following figure:

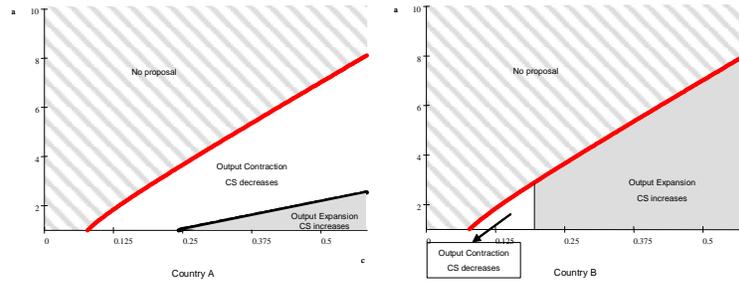


Figure 10: *Scenario 1* . Aggregate quantity choice

As anticipated in the previous analysis, the white region represents the set of parameters such that the value of relative efficiency gains, $\frac{c}{a_i}$, is so low that the insiders find it profitable to contract output⁵⁰ and the outsiders free ride on the increase in price so to introduce an even stronger aggregate output restriction. This obviously implies an increase in price and the corresponding decrease in consumers' surplus.

On the other side, the grey region represents the situations where relative efficiency gains are so high that the magnitude effect is stronger than the insiders' output contraction effect; this leads the insiders to expand output and the outsiders to react by decreasing their production. The aggregate effect on quantities is an output expansion; this causes a drop in price which means a higher consumers' surplus.

⁵⁰The output contraction effect dominates the magnitude effect, so the aggregate change in insiders' quantity is negative, after considering these first two effects.

3.3 Antitrust Authorities' decisions: REGION α

We can finally analyze the choice made by the two possibly relevant Antitrust Authorities (country A 's AA and a supranational AA) in order to check whether there might be any contrast among their decisions and, if so, in which "direction".

Remember that the objective function of both Authorities is consumers' surplus: country A 's national AA will consider country A 's consumers' surplus only, while the supranational AA will consider the sum of the consumers' surpluses of the two countries (i.e. the world's consumers' surplus).

Analyzing the choice of these two different AAs regarding the merger proposal by two firms located in the big market, we obtain the following result:

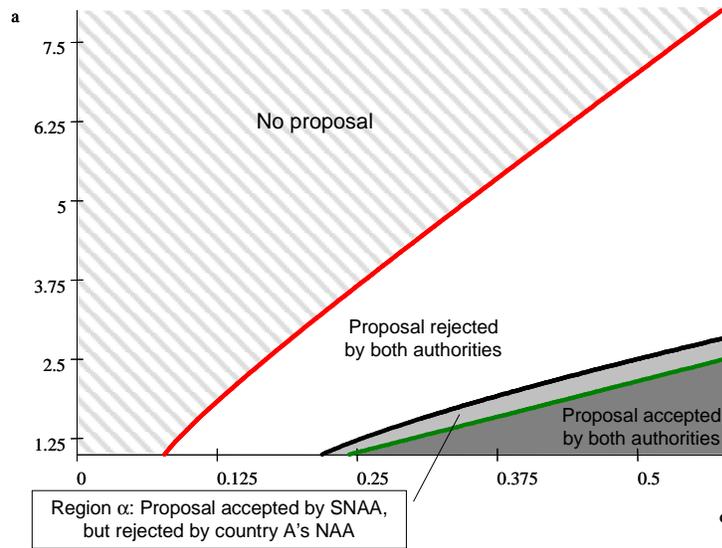


Figure 11: *Scenario 1* . AAs' decisions

In the region where mergers' proposals might be made by two firms located in the big country (A), we can define three regions according to the possible agreement/disagreement between the two AAs: we have two regions of agreeing AAs' choices and one where the two AAs would make contrasting decisions.

On the one side we have the two regions of agreeing decisions, the white and the dark grey one.

The white region in the figure represent the set of parameters such that a national bilateral merger in country A would lead to output contraction both in country A and in the world.⁵¹ This means that consumers' surplus (that is the AAs' objective function) would be reduced by the merger both in country A and at a supranational level. This is why both AAs would reject a merger proposal in this region.

⁵¹ The relative efficiency gains in this region are so small that the magnitude effect on quantities cannot offset the negative insiders' output contraction effect.

In the bottom right region (the dark grey one), a national merger between two firms located in country A leads to output expansion both in country A and in the world;⁵² so in this region such a merger is increasing consumers' surplus both at a national and a supranational level and both AAs will approve the bilateral domestic merger in country A .

On the other side, we have a region of contrasting decisions. In this region, which we label region α , the merger proposal by the two firms located in country A is improving world's consumers' surplus (and so it would be accepted by the supranational AA), while it is detrimental for country A 's consumers' surplus (so it would be rejected by country A 's national AA).

This is the region we were looking for: a possible set of parameters such that the decision made by the supranational AA on a national merger proposal in a certain country is in contrast with the national interest of that country. This is the first type of contrast we discovered (we call it *Type I contrast*):⁵³ the supranational AA approves a national bilateral merger that is welfare detrimental for the country where it takes place (country A). Notice, however, that this contrast between AAs has the opposite "direction" with respect to the one suggested by Persson's concerns: the supranational AA is not blocking mergers that would be welfare improving for the single country, but it is approving mergers that decrease welfare in the country where the merger is proposed.

Anyway, the relevant question is what is driving the contrast between the national and the supranational interests. In order to analyze this topic we can consider the AAs' decisions imposing perfect symmetry among country size.⁵⁴ Notice that even in presence of complete symmetry among country in terms of size, there might arise a contrast between the different level of AAs in the approval/rejection decision.

Since the difference in choice between the two AAs is due to the different impact on the single countries' consumers' surpluses, we need to look at what is determining the difference in the quantity choice between the two countries. Let's first focus on insiders: given the situation of complete symmetry, the only difference in the choice of domestic output level and exports level stands in the fact that, in order to export, the firm has to pay a transportation cost.

What is the effect of these costs on the insiders' quantity choice?

First of all, we have to look at the possible differences in the initial situation. In this setting (with $a = 1$) both countries have size 1, but, in order to export to country B , the insiders have to pay $t > 0$; this implies that in the status quo their output levels in country B will be lower than their sales in country A . This in turn means that the negative externality they have to correct in exports when merging is lower, than the one they need to correct for the sales in country A . So we expect them to have a higher output contraction in the domestic country. We can then conclude that the insiders' output contraction effect will be stronger in country A .

The second effect (i.e. the magnitude effect) is not affected by country size; while the last one, that is the outsiders' reaction effect, is strenghtening the insiders' output contraction effect.

⁵²The relative efficiency gains in this region are so high that there will be an aggregate output expansion, as explained in the previous section.

⁵³We are going to introduce a second type of contrast in the analysis of the second scenario: a bilateral domestic merger in the small country (in the next section).

⁵⁴This analytically means that we set $a = 1$ and graphically it means that we consider the horizontal axis only.

Concluding, even in presence of countries with the same size in demand, a discrepancy in the choice made by the national AA and the one made by the supranational AA might arise; this is due to the fact that the insiders have incentives to make a stronger output contraction in their domestic country with respect to the one they do in the foreign one.

4 Scenario 2: Merger in the SMALL country (B)

We now focus on a national bilateral merger proposal in the small country (B). As before, we first consider when a merger is profitable for its insiders, in order to identify the set of parameters in the space (a,c) such that the merger is proposed. We then consider firms' output choice and its impact on consumers' surplus in the two countries. Finally, we compare the approval/rejection decision taken by country B 's national AA with the supranational AA's decision.

4.1 Merger profitability

As in the previous case, a merger is proposed whenever it is profitable for the merging parties, that is, whenever the aggregate profit earned by the merged entity exceeds the sum of what the two parties would earn separately.

We do not replicate at this point the merger profitability analysis we have done in the previous section, as the results are perfectly analogous to what we have obtained before: the insiders' output contraction effect and the magnitude effect on merger profitability are always positive, while the outsiders' reaction effect can have either a positive or a negative impact on merger profitability. As in the previous case, this last effect is increasing in the parameter $\frac{c}{a_i}$.

So we expect to have merger proposals in the bottom-right region.

On the one hand, for very low values of $\frac{c}{a_i}$, the outsiders' efficiency is very high, so their ability to react, hurting the insiders' profits, is very strong. In this case the outsiders' reaction effect dominates the first two positive effects. So in this parameter region, the top-left area, the (possible) insiders are not going to propose any merger.

On the other hand, for high levels of $\frac{c}{a_i}$, the outsiders have such a low level of efficiency that their reaction improves the insiders' profits. So the three effects are all positive and makes the merger profitable for the insiders. So in this set of parameters, the bottom-right region, the (possible) insiders will propose a national bilateral merger.

The following figure shows the set of parameters such that two firms located in the small country have incentives to submit a merger proposal to the AAs, that is as long as

$$a \leq \frac{1}{8} + \frac{291}{46}c + \frac{1}{736}\sqrt{-648025 + 7496160c + 23480064c^2}$$

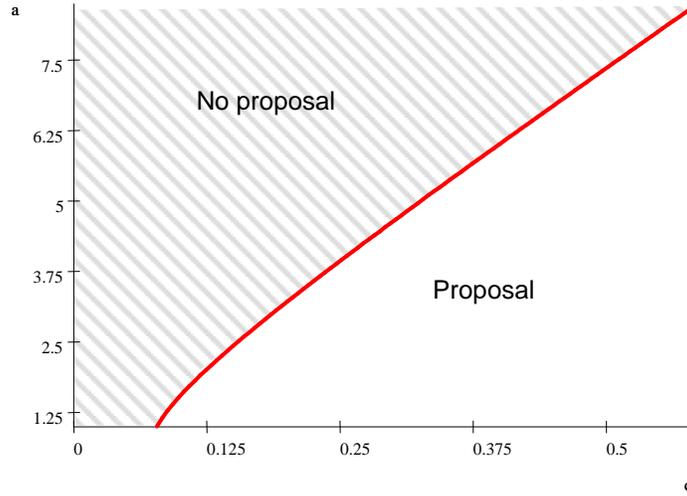


Figure 12: *Scenario 2* . Proposal region

4.2 Optimal quantity choice

As in the discussion about merger profitability, we are not going to replicate at this point the analysis run in the previous section, since the results are qualitatively the same.

In presence of low relative efficiency gains, $\frac{c}{a_i}$, the positive magnitude effect (that is the effect of being more efficient) cannot compensate for the output contraction effect. So the aggregate change in insiders' quantity is negative. The outsiders reaction to this output restriction by insiders is an output expansion in order to free ride on the increased price. This reaction by outsiders will imply an even stronger output contraction by insiders and the global effect on aggregate output will be negative.

This restriction in output causes an increase in price and the corresponding decrease in consumers' surplus.

On the contrary, in case of high relative efficiency gains, the magnitude effect dominates the insiders' output contraction effect, so the insiders will expand their output. The outsiders' reaction will cause an even stronger output expansion by insiders; the global effect on aggregate output will be positive.

Since the aggregate effect on quantities is an output expansion, there is a drop in price which means a higher consumers' surplus.

We can now summarize this results in the following figure:

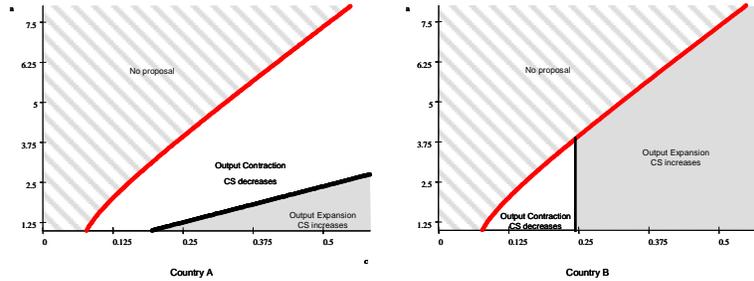


Figure 13: *Scenario 2* . Aggregate quantity choice

4.3 Antitrust Authorities' decisions: REGION β and γ

We can finally analyze the choice made by the two possibly relevant Antitrust Authorities (country B 's AA and a supranational AA) in order to check whether there might be any contrast among them in the approval/rejection decision on a national merger proposal between two firms in the small country (B). Remember that the objective function of both Authorities is consumers' surplus, country B 's national Antitrust Authority will consider country B 's consumers' surplus, while the supranational Antitrust Authority will consider the sum of the two country's consumers' surpluses.

The choices of the two different AAs regarding the merger proposal of two firms located in the small country is represented in the following picture:

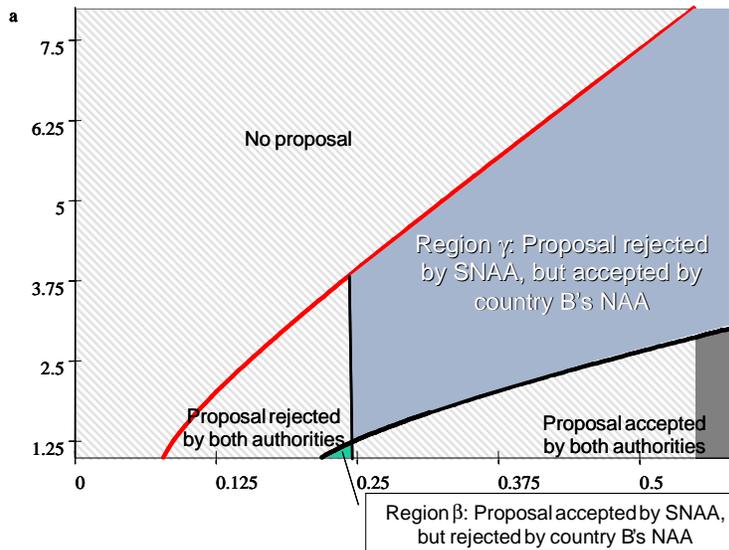


Figure 14: *Scenario 2* . AAs' decisions

Interestingly in this case a new region arises: in the region where mergers' proposals might be made by two firms located in the small country (B), we can define four regions according to the possible agreement/disagreement between the two AAs; the two regions of agreeing AAs' choices and *two* other regions where the two AAs would make contrasting decisions.⁵⁵

On the one side we have, as in the previous case, the two regions of agreeing decisions, the white one and the dark grey one.

The white region in the figure represent the set of parameters such that a national bilateral merger in country B would lead to output contraction both in country B and in the world.⁵⁶ This means that consumers' surplus (the AAs' objective function) would be reduced both in country B and at a supranational level. This is why, for this set of parameters, both AAs would reject the merger proposal in analysis.

In the bottom right region (the dark grey one), a national bilateral merger in country B leads to output expansion both in country B and in the world; so in this area such a merger is increasing consumers' surplus both in country B and at a supranational level. So in this region both AAs will approve the proposal for a bilateral domestic merger in country B .

On the other side, we now have two regions where the choice made by the supranational AA is in contrast with the one made by country B 's national AA.

As in the previous case with region α , we have a set of parameters, region β , where the merger proposal by the two firms operating in country B is improving world's consumers' surplus (and so it is accepted by the supranational AA), while it is detrimental for country B 's consumers' surplus (so it is rejected by country B 's national AA). As before in this set of parameters the decision made by the supranational AA on a national merger is in contrast with the national interest of that country. This is what we have called *Type I contrast*: the supranational AA approves a national bilateral merger that is welfare detrimental for the country where it takes place (country B).

Differently from the previous analysis, in the case of a merger proposal by two firms located in the small country, we can have another kind of contrast among the decision by the two AAs: *Type II contrast*. In region γ , the merger proposal by the two firms operating in country B is decreasing world's consumers' surplus (and so it is rejected by the supranational AA), while it has a positive impact on country B 's consumers' surplus (so it is accepted by country B 's national AA).

Concluding, the analysis of this second scenario, where the merger proposal is made by two firms located in the small country, has shown that there is a substantial difference both in quantitative and in qualitative terms between the choices in the two scenarios.

In the first scenario, there is only one possible kind of contrast between the supranational AA and the relevant national AA, *Type I contrast*, that is a situation where the supranational AA would approve a merger that is decreasing the consumers' surplus in the country where the merger takes place. In the second scenario, another kind of contrast might arise, *Type II contrast*, that is a situation where the supranational AA would block a merger that would increase consumers' surplus in the country where the merger would take place.

This second type of contrast has two important features: the first being the fact that

⁵⁵In the previous case there was only one region where the two AAs were in contrast with each other.

⁵⁶The relative efficiency gains in this region are so small that the magnitude effect on quantities cannot offset the negative insiders' output contraction effect.

it does depend substantially on the asymmetry among the two countries; moreover this contrast is only present in case of a merger proposal in the small country.

5 Extension: Total Welfare as AAs' target

In order to analyze the possible contrast among the decisions of the two AAs in the two different scenarios we do not need to study again firms' behavior as the proposal region and the choice regarding the output level do not depend on the AAs' objective function.

We can summarize in the following figure the combination of the decisions made by the two relevant AAs in each of the two scenarios:

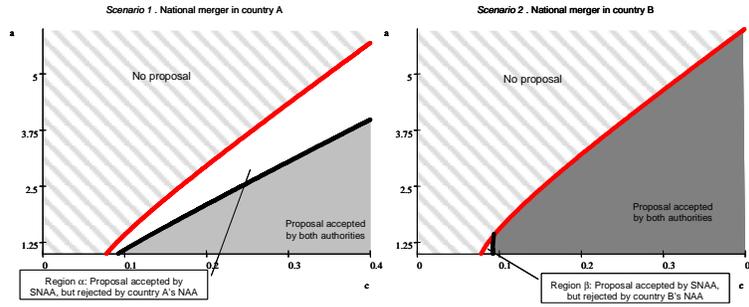


Figure 15: Total Welfare maximizer AAs' decision in the two scenarios.

First of all, notice that in both scenarios, we have only two regions, one of agreement and one of contrast between the two AAs' decisions.

This is due to the fact that in this particular framework, whenever the merger is proposed, it is accepted by the supranational Antitrust Authority. This rules out the possibility of having both AAs rejecting the merger or *Type II contrast* (that is the supranational AA blocking a merger that would increase consumers' surplus in the country where the merger would take place).

In the dark grey region in both scenarios, the merger is increasing total welfare both at in the country where the merger would take place and at a supranational level, so both AAs will approve the bilateral domestic merger proposal.

On the contrary, in region α (β), the merger proposal by the two firms located in country A (B) is improving world's total welfare (and so it is accepted by the supranational AA), while it is welfare decreasing total welfare in country A (B), so it is rejected by country $A(B)$'s national AA.

Concluding, also in this special case where the AAs are total welfare maximizers, there might be a contrast among the two different AAs, *Type I contrast*.

6 Conclusions

This paper addresses the concerns regarding the possible systematic bias of a supranational AA in favor of big countries from a theoretical perspective.

Adopting a simple international oligopoly with two asymmetric countries, we have shown that, in case the AAs analyze the merger proposals on the basis of their impact on CS, then there might arise two kind of contrast among merger approval decisions made by a supranational AA and the ones made by a national one: either the supranational AA would approve a merger that would be welfare detrimental from the point of view of the country where it would take place (*Type I contrast*), or it would block a merger that would be beneficial for the country where it would take place (*Type II contrast*).

We have studied two possible scenarios: a national bilateral merger in the big country and a national bilateral merger in the small one.

We have shown that the first type of contrast arises in both scenarios, even in absence of market asymmetries; while the second arises only in the case the merger is proposed in the small market. So we can conclude that market asymmetries among countries affect the contrast that might arise between a supranational AA and the country national AA regarding the approval/rejection decision on national bilateral merger proposals.

Concluding, we have shown a merger proposal in the small country is followed by a stronger contrast between AAs than a merger proposal in the big one. This provides a theoretical support for the idea that smaller countries might be penalized when the merger approval decision is made by a supranational AA.

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Chapter 3

Political Institutions, Voter Turnout and Policy Outcomes

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Abstract

We question whether the impact of constitutions on economic outcomes (Persson and Tabellini, 2004) is direct. We show that voter turnout is the channel through which forms of government affect economic policies. We provide evidence of the existence of two relationships: the first links constitutions to voter turnout; the second connects voter turnout to policy outcomes. Presidential regimes are found to induce less voter participation in national elections. We then analyze the impact of constitutional variables and voter participation in shaping fiscal policies. Higher participation induces an increase in government expenditure, total revenues and welfare state spending. We conclude that forms of government affect policy outcomes entirely through electoral participation. Citizens' political behavior rather than politicians' incentives becomes the driving force connecting institutions to policy outcomes.

JEL: D72, E60, H00

1 Introduction

The impact of political institutions on policy outcomes has gained much attention in the literature over the last years. Theoretical research has shown how forms of government and electoral rules can shape fiscal policies⁵⁷. Torsten Persson and Guido Tabellini (2004) were the first to empirically examine the economic impact of constitutions on a large set of democracies. In line with the theoretical research, Persson and Tabellini show that presidential regimes lead to smaller governments than parliamentary systems. Further, a majoritarian electoral rule induces smaller government spending, smaller welfare programs and higher budget surplus relatively to a proportional rule.

Taking the work of Persson and Tabellini (2004)⁵⁸ as our starting point, we question whether the impact of constitutions on economic outcomes is direct. PT estimate a reduced form and interpret it in the light of the theories underlying the importance of constitutions for politicians' incentives. We claim that behind PT's reduced form, the structural model goes through electors' behavior and voter turnout: we show indeed that the way forms of government influence policies is entirely mediated by voter participation. More specifically, we provide evidence that presidential regimes have a negative impact on electoral participation. On the other hand, voter turnout positively and significantly affects total government expenditure, government revenues and welfare state. Our results deepen the explanation for PT's findings: forms of government affect policies entirely through voter turnout.

The novelty of this work stands in the introduction of citizens' political behavior, rather than politicians' incentives, as the driving force connecting institutions to policy outcomes.

The rest of the paper is organized as follows: section 2 summarizes PT's results and explains how this comment extends their analysis. In sections 3 to 6, we empirically investigate the interaction of voter turnout with constitutional variables and its role in explaining fiscal policies. Finally, in section 7 we summarize our results and conclude the paper.

2 Constitutional Rules and Fiscal Policy Outcomes

PT empirically estimate the effect of electoral rules and forms of government on fiscal policy outcomes. Concluding their paper, PT point out that they "*have not been able to identify whether constitutional rules operate through a direct effect (...) or through indirect effects via altered political representation*" (PT p. 42).

The aim of this paper is to show that voter turnout is the channel through which constitutional rules affect economic policies. Therefore, we test the existence of two relationships, the first connecting political institutions to voter turnout and the second linking voter turnout to economic policies.

From an empirical point of view, the first link has been widely studied with regards to the effects of the electoral rule on turnout decisions. Among others, Blais (2000) shows that turnout is higher in proportional systems. Proportional rules are indeed usually associated with a larger number of parties and more competitive elections. To the best of

⁵⁷See Persson and Tabellini (2000) for an extensive review of the theoretical literature on this topic.

⁵⁸From now on, we will refer to Persson and Tabellini (2004) as PT.

our knowledge, there is no study of the effects of political regimes on turnout⁵⁹. We empirically show that forms of government do significantly affect turnout rates. Presidential regimes induce less participation relative to parliamentary systems. This result is robust even when we relax the conditional mean independence and we instrument government regimes.

Regarding the second relationship between voter turnout and policy outcomes, many studies have analyzed related topics. The abolition of poll taxes and literacy tests in the US is found to have a positive impact on welfare state (Husted and Kenny, 1997). Further, as the franchise was extended to individuals from the lower part of the income distribution, government spending increased in Europe (Aidt, Dutta, Loukoianova, 2005). A similar argument might be applied to voter participation in presence of universal franchise. Empirical studies (Blais, 2000, Wolfinger and Rosenstone, 1980) show that the median income of electors is higher than the median income of the actual voting age population. This bias in voter representation might eventually lead to a bias in policy choices (Lijphart, 1997). In line with this reasoning, Mueller and Stratmann (2003) have analyzed the effects of turnout rate on policy outcomes. Voter participation is found to have a negative effect on income inequality and a positive impact on the size of government. Unlike Mueller and Stratmann, however, we focus on the *interaction* between electoral participation and constitutions in influencing a number of economic variables such as total government, revenues, welfare state and budget surplus. The Instrumental Variable analysis shows that higher turnout rates lead to larger broad programs, higher government revenues and more generous welfare states.

We conclude that forms of government affect electors' behavior in terms of turnout at elections. This in turn affects economic policies. Therefore, the impact of forms of government on policy outcomes is entirely mediated by voter participation.

3 Voter Turnout

Most of the data we use come from the two data sets employed by PT. The first one is a cross-country data set containing information on 85 countries classified as democracies in the 1990s, where observation units are average values over the period 1990-1998. The second data set is a panel containing annual data on a subset of 60 countries over the period 1960 to 1998.

The quality of a democracy is defined on the basis of two indexes. For the cross-country data set, the measure is the Gastil Index of Political and Civil Rights produced by Freedom House. The Gastil Index takes values from 1 to 7, where low values correspond to better democracies. In the 85-country data set, both free and semi-free democracies are included (Gastil Index less or equal to 5). In the panel data set, instead, we employ a modified version of the Polity IV index⁶⁰.

The voter turnout rate is defined as the proportion of votes at national elections to the voting age population⁶¹.

⁵⁹The only exception is the work by Powell (1982). He finds lower turnout rates in countries with a presidential regime *and* a majoritarian system; the explanation provided is that these countries have a weaker party system and less mobilizing voting laws.

⁶⁰See Persson and Tabellini (2003) for a detailed description of the data.

⁶¹See Data Appendix.

Table 1 reports the descriptive statistics regarding the relation between institutions and voter turnout on the basis of the 60-country panel data set.

Insert Table 1 here

First, we compare turnout rates on the basis of the electoral rule. In line with PT, countries in which the lower house is elected through a plurality rule are classified as majoritarian ($Maj=1$). Therefore, non-majoritarian electoral rules include both mixed and proportional systems. Participation is lower in countries with a plurality rule. The difference between voter turnout in majoritarian and non-majoritarian systems is still positive and statistically significant when we consider the averages over the 1990s. This finding is consistent with the empirical evidence in the political science literature we mentioned in Section 2.

In the last row of Table 1, we compare voter turnout in presidential and parliamentary systems. A country is coded as presidential if the government is not subject to a vote of confidence by the Parliament ($Pres=1$). If a vote of confidence is present, the country is defined as parliamentary. Participation in elections is higher in parliamentary systems than in presidential systems and the difference is statistically different from zero. The average turnout in presidential systems amounts to 58% against a much higher rate of 75% in parliamentary systems. This substantial difference holds also when we restrict our attention to the larger cross-country data set.

These stylized facts are the starting point of our analysis: from Table 1 it appears that there exists a correlation between voter turnout and political institutions. In the next section, we will show that constitutions do shape voter turnout.

4 Do constitutions shape voter turnout?

The focus of this section is to address two main issues; firstly, to analyze the relationship between constitutions and voter turnout and, secondly, to identify the exogenous instruments for electoral participation required to assess its impact on economic policies.

The data set employed in this section is the extended 85-cross-country data set.

We focus on two sets of determinants: *constitutional variables*, as expressed by the form of government and the electoral rule (*Presidential, Majoritarian*) and *socio-economic variables*.

$$Turnout_i = \alpha_0 + \alpha_1 * maj_i + \alpha_2 * pres_i + \beta \mathbf{X}_i + \varepsilon_i \quad (6)$$

where \mathbf{X}_i represents the vector of controls. We are mainly interested in the effects of constitutions on electoral participation, *i.e.* in the sign and the statistical significance of the coefficients α_1 and α_2 .

First, we assume that institutions and voter turnout are conditional mean independent. Under this assumption, the OLS estimator is unbiased and consistent for eq.(6). We then relax this assumption, allowing for an Heckman correction.

Insert Table 2 here

Column 1 in Table 2 shows the baseline specification where average voter turnout is regressed on the two constitutional variables, majoritarian rule and presidential regime, and a set of socio-economic variables.

Constitutions and electoral laws might regulate voting, in some cases by introducing sanctions for those who abstain. Empirical studies (Powell, 1982, Jackman, 1987, Blais, 2000) show that voting laws are indeed effective in inducing higher voter participation. We include a dummy variable which takes a value of 1 in presence of compulsory voting laws and 0 otherwise⁶². We control for the percentage of legislators elected in national districts rather than in subnational districts⁶³. This variable should capture the distance between voters and candidates. The prior is that the higher the share of candidates elected at national districts, the lower the electoral participation.

Education is a key variable in explaining voter turnout at a micro level. Wolfinger and Rosenstone (1980) and Blais (2000) empirically show that the propensity to vote does increase substantially with education. Therefore, we insert the country's education level measured by the total enrollment in primary and secondary education as a percentage of the relevant age group in the population.

The log of total population is included in order to proxy the weight of one single vote whereby the larger the population the lower the weight. Being a member of a group or a social network has been found to have a positive impact on voter turnout. Groups may provide both higher social pressure to vote and a bigger chance of influencing results. For example, union members are found to turn out more than non-union members as shown by Freeman (2003) and Blais (2000). We take these group effects into account by inserting union density among the socio-economic determinants⁶⁴. In addition, we control for the presence of a federal structure, the real GDP per capita, the Gini index of income distribution, the quality of democracy (*Gastil Index*), and the degree of ethno-linguistic fractionalization of the country (*Avelf*)⁶⁵. We were concerned that the results could be biased towards particular geographical areas or colonial origin. Colonial history is indeed relevant for the institutional setup of a country (Hall and Jones, 1999, Persson and Tabellini, 2003, Acemoglu, Johnson and Robinson, 2001, Acemoglu, 2005). To this end, we control for continents (*Latin America, Asia, Africa, OECD*) and colonial variables (English colonies, Spanish-Portuguese colonies and other colonies).

Unsurprisingly, compulsory voting laws seem to be effective in inducing higher turnout. The proxy for the education level has a positive although not statistically significant impact on voter participation.

In line with our prior, the higher the share of legislators elected at national districts rather than at subnational districts, the lower the turnout rate. Countries which are more ethnolinguistically homogenous, *i.e.* those having a lower *Avelf index*, are associated to higher voter turnout: as pointed out by Blais (2000), voting acts as a way of "*expressing one's sense of belonging to the larger community*" (p. 52).

The coefficient on the quality of democracy (*Gastil Index*) is not statistically significant but it has the expected negative sign: lower values of the *Gastil Index* are associated to better democracies. Federal countries, instead, are associated to lower electoral participation.

Union density has a positive and highly significant impact on political participation. Unions seem to induce a higher turnout rate, which supports the view that social networks

⁶²See Data Appendix for a description of the Compulsory Voting variable.

⁶³See Persson and Tabellini (2003).

⁶⁴See Data Appendix for a description of the Union Density variable.

⁶⁵The index of ethno-linguistic fractionalization takes values between 0 (homogeneous) and 1 (strongly fractionalized). See Persson and Tabellini (2003).

are likely to generate contagion effects on voting.

The estimated coefficient on real per capita GDP positively affects voter turnout, although the coefficient is not statistically significant. When analyzed at a micro level, participation and income are usually found to be positively correlated. However, in cross-country studies such relationship becomes less clear⁶⁶. Unexpectedly, population has a positive and significant impact on voter turnout, while the Gini index of income distribution is not significant.

The electoral rule does not significantly affect participation rates, although the sign of the estimated coefficient on the electoral system is as expected.

Presidential regimes negatively affect voter turnout rates at the 1% significance level. This result holds in more sophisticated specifications and it is actually what mainly supports the idea of this work. The form of government seems to effectively shape voter turnout.

The conclusion we draw from this baseline analysis is that, after controlling for socio-economic variables, forms of government affect voter participation. On the other hand, the electoral rule as defined by the dummy variable *Maj* has no role in explaining turnout in contrast with our priors. However, this result is very likely to be driven by the way majoritarian systems are defined.

In the second column, we investigate the role of electoral rules in influencing voter turnout by adopting a continuous measure of district magnitude, *Magn*, instead of the binary variable *Maj*. District magnitude captures the size of electoral districts in terms of the number of seats assigned to each district. It takes values between 0 and 1, where 1 represents single-member districts, as in the U.K. system, and 0 corresponds to systems characterized by one single national district, as the Israelian system.

The new result regards indeed the electoral rule, which is now relatively effective in influencing participation: district magnitude does affect electoral turnout. The higher the number of seats in the district, the higher the voter participation. This result is in line with the political science literature, as proportional systems are very highly correlated with district magnitude. On the other hand, presidential regimes still negatively affect voter turnout at 1% level

Next, we generalize the link between voter turnout and constitutional variables, by relaxing the conditional mean independence assumption and allowing institutional variables to be endogenously determined. Persson and Tabellini (2003, 2004) propose as instruments for constitutional variables the following set of variables: the date of origin of the current constitution, the age of the democracy, the distance from the equator, and the fraction of the population speaking English or any other European language. Acemoglu (2005) has recently pointed out a few shortcomings in the use of this set of instruments for constitutions. In particular, some concerns arise regarding the validity of the distance from the equator variable and the fraction of the population speaking English or any other European language. These variables should capture the penetration of European conquerors (Hall and Jones, 1999) and their impact in shaping the quality of institutions rather than the type of institutions. We deal with this critique by introducing a new instrument for presidential regimes. We create a dummy taking value 1 if the country was a monarchy in the past but it is not any more. For example, Italy, which used to be a monarchy, is assigned value 1. The rationale is that the likelihood of adopting a

⁶⁶See Mueller and Stratmann (2003).

parliamentary regime is higher if a country has been a monarchy in the past⁶⁷.

As the endogenous explanatory variable, *Pres*, is binary, we can make use of the *dummy endogenous variable model* by Heckman (1978)⁶⁸. In column 3, we report the results of the second stage regression of the two-stages Heckman estimation, when Presidential system is treated as the endogenous variable. The specification is rich as it includes all the covariates and the geographical and colonial history variables. The estimated correlation coefficient between the error terms in the first and the second stage is quite low (ρ is equal to 0.020), which means that the conditional mean independence is likely to hold. The coefficient estimates are indeed very close to the OLS estimates. Presidential regimes still negatively affect voter turnout. All the other covariates maintain their significance as in previous columns. We have also run a similar exercise by treating *Maj* as the endogenous variable. However, the estimates do not differ from the previous specification, therefore we do not show the results.

Finally, in the last column, we perform the same exercise, *i.e.* treating presidential regimes as the endogenous variable, but introducing the district magnitude instead of the electoral formula.

Presidential regime and smaller electoral district still negatively affect voter turnout, and the estimated coefficients are very similar to the OLS estimates.

This evidence sheds light on what we consider the *first* relationship between constitutions and voter turnout. The effect of forms of government on voter turnout is robust even when we relax the conditional mean independence and we instrument constitutions. This shows that presidential regimes do induce less turnout. The impact of the electoral formula as described by the bivariate variable *Maj* is somehow less strong than that of the form of government. However, once a continuous measure of electoral systems is introduced, the relationship between electoral systems and turnout appears clear: proportional systems are associated to higher voter participation. Having proved the first link, we now turn to the second one in order to understand the impact of voter turnout on economic policies.

5 Voter Turnout and Policy Outcomes: a cross-country analysis

A first attempt to study the relationship between voter turnout and economic policies has been recently done by Mueller and Stratmann (2003). Their conclusions support our argument that electoral participation induces larger government size. However, the main point of our analysis is more subtle. Unlike Mueller and Stratmann, we are not solely interested in showing the impact of voter turnout on different measures of policy outcomes. Our idea grounds on the relation between participation and constitutions. To this end, it is crucial to study the *interaction* between constitutional variables and voter participation in affecting fiscal policies.

We investigate whether turnout can account, *inter alia*, for government expenditure, welfare state, and government budget surplus. In this section, we present the results

⁶⁷Out of 33 presidential regimes in our sample, only 4 countries used to be a monarchy. See Data Appendix for details.

⁶⁸See also Wooldridge (2002).

obtained from using the cross-country data set. In Section 6, we extend the analysis over time by using the panel data set.

PT empirically show the effects of political institutions on economic policy. Majoritarian elections and presidential systems are found to negatively and significantly influence total government spending. We depart from their analysis to show that voter turnout is actually the channel through which presidential regimes affect policy outcomes.

Participation is treated as endogenous. It is indeed very likely that, in countries with more generous economic policies, citizens are more willing to turn out in order to keep their status quo. Again, good instruments must be found. Most of the determinants of voter turnout are endogenous to policy outcomes and they cannot be used as valid instruments. On the basis of the analysis conducted in Section 4, we concentrate on a set of four instruments.

Compulsory voting laws can be confidently used as instrument as there is wide agreement on their effectiveness in stimulating voter turnout.

The share of legislators elected at national district level rather than subnational electoral district does have an impact on electoral participation, as the more distant candidates and voters are, the lower participation.

In Section 4 we have shown that more ethnolinguistically homogenous countries are associated to higher voter turnout. Therefore, we introduce the *Avelf Index* as instrument for participation at elections.

Finally, the presidential dummy is included as exogenous instrument⁶⁹. Table 3 reports the estimation results.

Insert Table 3 here

The first stage consists of regressing participation rates on the *Avelf index*, the compulsory voting laws dummy, the presidential regime dummy and the share of legislators elected at national districts, together with all the other expenditure determinants. In the second stage, we regress fiscal policies on the fitted participation variable and on the set of control variables. The variables which we control for are: electoral rule, per capita income, trade, log of population, age of democracy, quality of democracy, colonial history, dummy variables for federal countries, OECD countries and continents, and two demographic variables measuring the age proportion of the population.

We first regress central government spending as a percentage of GDP on the electoral rule and voter turnout. Participation positively affects total government expenditure at 1% significance level. A higher participation rate has led to an increase in the size of governments in the 1990s.

In column 2, we consider another measure of government size. The dependent variable is central government revenues as percentage of GDP. Turnout does affect revenues as well and its impact is positive and significant at 5% level.

Next, we investigate the role of voter turnout in explaining central government spending on social services and welfare as a percentage of GDP. The estimated coefficient is positive, as expected, and it is significant at 5% level. This result is remarkable as it supports the idea that a higher turnout rate means a larger participation of the lower end

⁶⁹Table A in the Appendix shows that the impact of the form of government on policy outcomes is not significant once we control for voter turnout instrumented by the remaining three instruments. Therefore the form of government can be used as a valid instrument for participation.

of the income distribution, hence a larger representation of people who are more likely to benefit from more redistributive policies (Lijphart, 1997).

Interestingly, the introduction of voter participation reduces both quantitatively and qualitatively the impact of the electoral rule in influencing the size of government and welfare state, with respect to the findings by PT.

Finally, we consider government surplus as the dependent variable. Keeping a specification similar to the ones implemented before, we regress budget surplus as a percentage of GDP on constitutional variables, participation rates and the set of usual controls. The electoral rule seems to play a major role in explaining budget surplus. Majoritarian systems are associated with higher budget surplus, while voter turnout does not have any effect.

In line with our priors, we conclude that voter turnout affects government size, measured both as government expenditure and revenues, and welfare state. These results prove the existence of the second link, connecting participation to fiscal variables. Forms of government affect policy outcomes entirely through voter turnout. We provide further evidence by extending the analysis over time.

6 Panel Data analysis

In this section we analyze the impact of voter turnout on policy outcomes over time⁷⁰. We employ the 60-country panel data set to test the impact of the turnout rate on the four measures of policy outcomes⁷¹. It is not possible to instrument voter turnout as the four instruments used in the previous section are either time invariant or vary very little over time. Similarly, constitutions are not included as regressors, as they are invariant over time.

The policy outcome is regressed on voter turnout, trade openness, the log of real per capita GDP, and the two demographic variables measuring the age proportion of the population. Due to the high persistence of economic outcomes, we allow the one-period lagged policy to enter the specification. We include both time and country effects. In order to take into account geographical and colonial dummies and different persistences of the economic outcome, we interact the Latin America dummy and the British colony dummy with the lagged economic policy.

Particular concern arises regarding the quality of democracy. More than one third of the countries in the sample had autocracy spells over the whole time period considered⁷². To make sure that the variable voter turnout is not actually capturing the impact of the quality of a democracy, we include a dummy variable, *Democracy*, which takes 1 in presence of an uninterrupted democratization lasting until the end of the sample. The variable *Democracy* is created on the basis of the Polity IV index.⁷³ The results are reported in Table 4.

⁷⁰Mueller and Stratmann (2003) present a similar study in order to provide evidence for the increase in government spending and the reduction of inequality that arises in presence of high political participation.

⁷¹In the panel data set, the turnout series is such that whenever elections take place, either executive or legislative, the participation variable is updated up to the next following election.

⁷²Argentina, Bolivia, Brazil, Chile, Dominican Republic, Ecuador, El Salvador, Fiji, Gambia, Greece, Guatemala, Honduras, Mexico, Nepal, Nicaragua, Paraguay, Peru, Philippines, Portugal, Spain, Thailand, Turkey, Uruguay.

⁷³See Data Appendix.

Insert Table 4 here

In the first column in Table 4 the dependent variable is central government spending. Voter turnout does affect government expenditure over time. The impact is positive and highly statistically significant also when we adjust standard errors for within-cluster correlation.

In the second column, the dependent variable is central government revenues. Interestingly, it appears that over time turnout has affected revenues as well. Higher participation rates have induced not only more generous broad spending programs, but also have led to higher taxation. This result is in line with the findings in the cross-country analysis.

The same specification is applied to the third measure of policy outcomes, namely the welfare state. We expect the welfare state to be larger the higher the turnout. This is indeed the way redistribution can actually take place and in which participation can have its direct effects. The panel analysis confirms our prior. The estimated coefficient on turnout is positive and significant at 1%, also when we estimate the standard errors with clustered regressions. Higher participation rates lead to larger redistribution, hence to more generous welfare state.

Finally, in line with the cross-country analysis, turnout does not have any impact on government surplus (column 4).

These results provide evidence that electoral participation has affected government spending, revenues and welfare state also over time.

7 Conclusions

Departing from PT, we show that citizens' behavior plays a crucial role in understanding how institutions affect policy outcomes. We empirically identify two relationships. The first links political institutions, in terms of forms of government and electoral rules, to voter turnout. The second connects voter turnout and policy outcomes.

We investigate the first relationship by regressing average voter turnout over the 1990s on institutional and socio-economic variables. Presidential regimes are found to induce less electoral participation, once we control for all the other socio-economic covariates. Further, this finding holds when we relax the conditional mean independence assumption and we instrument political institutions.

The second part of this paper is devoted to understand whether and in which direction political participation affects policy outcomes. Both the cross-country and panel analysis provide evidence of the positive and significant impact of voter turnout on government spending, revenues and welfare state.

We conclude that the effect of forms of government on policy outcomes as found by PT is entirely mediated by voter participation in elections.

Data Appendix

Voter turnout: Voter turnout rate is defined as the ratio between the number of votes and the voting age population, which includes all citizens above the legal voting age. It is rescaled by multiplying it by 10. Voter turnout is calculated at National Presidential and Parliamentary elections. *Source:* Institute of Democracy and Electoral Assistance (IDEA), <www.idea.int>.

Union density: Union density is measured as the percentage of union memberships on the non-agricultural labour force. It is computed as the average of two observations: an observation in the '80s and an observation in the '90s. If only one data point exists, only that year is taken into account. *Source:* World Labour Report 1997-1998, ILO, <www.ilo.org>

Compulsory Voting laws: dummy variable, equal to 1 if voting has been made compulsory by law, regardless of the level of enforcement, 0 otherwise. *Source:* International Institute of Democracy and Electoral Assistance (IDEA), <www.idea.int>.

Legislators in National Districts: percentage of legislators elected at national districts rather than subnational districts. *Source:* Seddon et al. (2001).

Monarchy: dummy variable, equal to 1 if a country was a monarchy in the past but it is not any more. *Source:* <www.royaltymonarchy.com>

Democracy: dummy variable, equal to 1 in presence of an uninterrupted democratization lasting until the end of the sample, 0 otherwise. It is created on the basis of the Polity IV index. *Source:* Giavazzi and Tabellini (2005).

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Table 1
Voter Turnout: Summary Statistics

	Variable	Mean	St.Dev.	Min.	Max.	Obs.
1	Majoritarian System Turnout 1960-1998	65.85	13.85	13.43	98.76	634
	Prop / Mixed System Turnout 1960-1998	70.58	17.69	14.46	98.02	1352
2	Presidential System Turnout 1960-1998	58.32	17.49	13.43	97.52	739
	Parliamentary System Turnout 1960-1998	75.24	12.32	25.59	98.76	1291

Table 2
Determinants of Voter Turnout

DEP. VAR.	(2)	(3)	(4)	(5)
			<i>VOTER TURNOUT</i>	
<i>PRESIDENTIAL</i>	-2.279 (0.594)***	-2.087 (0.553)***	-2.255 (0.798)***	-2.083 (0.738)***
<i>MAJORITARIAN</i>	-0.249 (0.629)		-0.250 (0.458)	
<i>LEGISLATORS IN NATIONAL DISTRICTS</i>	-1.836 (0.713)**	-2.000 (0.560)***	1.107 (0.344)***	1.105 (0.323)***
<i>EDUCATION</i>	0.022 (0.018)	0.016 (0.016)	0.023 (0.015)	0.016 (0.014)
<i>AVELF</i>	-2.201 (1.179)*	-2.896 (1.164)**	-2.206 (0.989)**	-2.897 (0.957)***
<i>COMPULSORY</i>	1.104 (0.427)**	1.104 (0.409)**	1.107 (0.344)***	1.105 (0.323)***
<i>(LOG)POPULATION</i>	0.334 (0.180)*	0.426 (0.162)**	0.334 (0.146)**	0.426 (0.137)***
<i>UNION DENSITY</i>	0.025 (0.011)**	0.022 (0.009)**	0.025 (0.012)**	0.022 (0.011)**
<i>GASTIL INDEX</i>	-0.139 (0.285)	-0.101 (0.273)	-0.137 (0.251)	-0.101 (0.235)
<i>GINI INDEX</i>	-0.039 (0.031)	-0.051 (0.029)*	-0.039 (0.026)	-0.051 (0.025)**
<i>FEDERAL</i>	-1.176 (0.552)**	-1.100 (0.456)**	-1.178 (0.468)**	-1.101 (0.428)**
<i>REAL GDP PER CAPITA</i>	0.352 (0.539)	0.418 (0.477)	0.353 (0.383)	0.418 (0.358)
<i>DISTRICT MAGNITUDE</i>		-1.410 (0.678)**		-1.410 (0.535)***
Continents & Colonies Estimation	Yes OLS	Yes OLS	Yes Heckman, two stages	Yes Heckman, two stages
Sample	1990s	1990s	1990s	1990s
Endogenous variable			Pres	Pres
Rho			0.020	0.003
Adj. R2	0.49	0.54		
Obs.	55	55	55	55

Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

First stage specification of Heckman (columns 3-4) includes *EURFRAC*, *ENGFRAC*, *CON2150*, *CON5180*, *CON81*, *AGE*, *Monarchy*. Rho is the estimated correlation coefficient between the error terms in the first and second stage.

Table 3
Policy outcomes and Voter Turnout: IV estimates

DEP. VAR.	(1)	(2)	(3)	(4)
	<i>CENTRAL GOVERNMENT SPENDING</i>	<i>CENTRAL GOVERNMENT REVENUES</i>	<i>WELFARE STATE</i>	<i>GOVERNMENT SURPLUS</i>
<i>VOTER TURNOUT</i>	4.293 (1.526)***	4.566 (1.865)**	1.640 (0.768)**	-0.356 (0.498)
<i>MAJORITARIAN</i>	-2.367 (2.306)	-0.296 (2.415)	-1.598 (1.168)	2.833 (0.776)***
Continents	Yes	Yes	Yes	Yes
Colonies	Yes	Yes	Yes	Yes
Sample	1990s	1990s	1990s	1990s
Chi-square: over-id	1.669	2.145	1.641	3.431
R2	0.60	0.40	0.77	0.42
Obs.	73	70	64	67

Robust standard errors in parentheses;

* significant at 10%; ** significant at 5%; *** significant at 1%.

All regressions include *(Log)Population, OECD, Federal, Prop65, Prop1564, Trade, Real GDP per capita, Gastil Index, Age of Democracy.*

First stage specification of 2SLS includes: *Presidential, Compulsory Voting, Legislators in National Districts, Index of Ethnic-linguistic fractionalization.*

Critical value of Chi-square(3, 0.05): 7.815.

Table 4
Policy outcomes and Voter Turnout: Panel analysis

DEP. VAR.	(1)	(2)	(3)	(4)
	CENTRAL GOVERNMENT SPENDING (CGEXP)	CENTRAL GOVERNMENT REVENUES (CGREV)	WELFARE STATE (SSW)	GOVERNMENT SURPLUS (SPL)
<i>Turnout</i>	0.209 (0.080)*** (0.099)**	0.250 (0.077)*** (0.112)**	0.100 (0.040)** (0.035)***	-0.042 (0.065) (0.077)
<i>Democracy</i>	-0.021 (0.340) (0.391)	-0.306 (0.311) (0.310)	0.202 (0.131) (0.137)	0.336 (0.352) (0.445)
<i>LCGEXP</i>	0.880 (0.024)*** (0.026)***			
<i>Laam*lcgexp</i>	-0.104 (0.061)* (0.052)**			
<i>Col_uk*lcgexp</i>	-0.201 (0.049)*** (0.078)**			
<i>LCGREV</i>		0.808 (0.028)*** (0.038)***		
<i>Laam_lcgrev</i>		-0.040 (0.049) (0.049)		
<i>Col_uk*lcgrev</i>		-0.078 (0.079) (0.052)		
<i>LSSW</i>			0.839 (0.036)*** (0.027)***	
<i>Laam*lssw</i>			-0.084 (0.082) (0.088)	
<i>Col_uk*lssw</i>			-0.176 (0.106)* (0.117)	
<i>LSPL</i>				0.749 (0.037)*** (0.038)***
<i>Laam*lspl</i>				-0.128 (0.095) (0.067)*
<i>Col_uk*lspl</i>				0.001 (0.087) (0.058)
Sample period	1960-1998	1960-1998	1960-1998	1960-1998
Adj.R2	0.96	0.97	0.99	0.73
Obs. (countries)	1467 (53)	1378 (52)	949 (53)	1424 (53)

Standard errors in parentheses (above: robust OLS; below: clustered).

* significant at 10%; ** significant at 5%; *** significant at 1%. All regressions include *TRADE*, *REAL GDP PER CAPITA*, *PROP1564*, *PROP65*, country and year fixed effects.

Appendix

Table A
Policy outcomes and Voter Turnout: IV estimates
Presidential regime as independent variable

DEP. VAR.	(1)	(2)	(3)	(4)
	<i>CENTRAL GOVERNMENT SPENDING</i>	<i>CENTRAL GOVERNMENT REVENUES</i>	<i>WELFARE STATE</i>	<i>GOVERNMENT SURPLUS</i>
<i>VOTER TURNOUT</i>	4.257 (2.191)*	4.389 (2.613)*	2.091 (1.195)*	-1.038 (0.665)
<i>MAJORITARIAN</i>	-2.405 (2.891)	-0.465 (3.100)	-1.189 (1.547)	2.264 (0.978)**
<i>PRESIDENTIAL</i>	-0.114 (4.392)	-0.551 (5.880)	1.457 (2.358)	-2.096 (1.417)
Continents	Yes	Yes	Yes	Yes
Colonies	Yes	Yes	Yes	Yes
Sample	1990s	1990s	1990s	1990s
Chi-square: over-id	1.642	2.190	0.75	5.60
R2	0.60	0.42	0.73	0.45
Obs.	73	70	64	67

Robust standard errors in parentheses;

* significant at 10%; ** significant at 5%; *** significant at 1%.

All regressions include *(Log)Population, OECD, Federal, Prop65, Prop1564, Trade, Real GDP per capita, Gastil Index, Age of Democracy*.

First stage specification of 2SLS includes: *Compulsory Voting, Legislators in National Districts, Index of Ethnic-linguistic fractionalization*.

Critical value of Chi-square(2, 0.05): 5.99.