It Takes Two to Tango: Mergers, Lobbying, and Elections*

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Abstract

We study the impact of mergers on elections and lobbying in a political agency model with adverse selection and moral hazard. Two incumbent firms can lobby a politician (P) to prevent a pro-competitive reform. P's type determines whether they care about bribes or not. A representative voter tries to infer P's type monitoring the policymaking process. We investigate the welfare implications of a merger between the two firms. In equilibrium, (i) the merger increases firms' incentives to lobby and their ability to influence politics; (ii) this additional political power reduces the chances that the pro-competitive reform is approved, hurting consumers; but (iii) it allows the voter to defeat a corruptible P with higher probability. Thus, it enhances political accountability and mitigates adverse selection. We discuss how this new trade-off interacts with traditional competition considerations in the merger's assessment.

Keywords Lobbying, Political Agency, Mergers and Acquisitions, Antitrust
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1 Introduction

Markets and politics are interconnected. Politicians set the rules of the game for firms by designing different regulations. Firms try to influence politicians to obtain favorable regulations. Lobbying is a key channel that shapes this interaction.

Lobbying is also widespread. In the US, at the federal level, 4 billion dollars were spent on lobbying in 2022, with more than $12,000$ registered lobbyists. These numbers have been steadily increasing over time and most lobbying money comes from firms.[1] In 2022, the Tech Giants successfully lobbied the US Congress to prevent a revision of antitrust laws. To this end, tech companies spent almost 300 million dollars in $2021-2022$.[2] Politicians pushing the bill were aware of big companies' political power: *"These are gigantic monopolies. And one of the great challenges with monopolies is with tremendous concentrated economic power comes political power,"* said Rep. David Cicilline, Chairman of the House Judiciary Committee's antitrust subcommittee.[3] In the EU, also in $2021-2022$, the total lobbying spending of tech companies alone was more than 200 million euros, at the time when landmark legislation to curb the power of big tech was discussed.[4]

The secular rise in lobbying money from firms follows similar patterns in industries. Empirical evidence shows that concentration and markups are increasing over time and across industries (De Loecker et al. [2020], Grullon et al. [2019], Philippon [2019]). Part of this concentration is attributable to mergers and acquisitions. In 2021, there have been almost $60,000$ M&As worldwide, for a total value of 4.5 trillion dollars.[5]

The structure of a market, which is affected by the decision to approve or to reject a merger, then dictates how firms are allowed to use both their economic power (through price mechanisms) and their power to interact with politicians (through influence activities). How do the political effects of mergers interplay with traditional market power considerations when conducting the assessment of a merger?

To answer this question, we build a political agency model with regulation, mergers, and lobbying. Our model reveals a *new* trade-off associated with

[1] Source: opensecrets.org.
[2] Source: opensecrets.org.
[3] Source: thehill.com.
[4] Source: euronews.com.
[5] Source: imaa-institute.org.

market concentration. As the market becomes more concentrated, firms have more political power, and lobbying activity increases. On the one hand, this additional political power is bad as it is used to lobby politicians to implement policies that protect large incumbents in the market, hurting consumers. On the other hand, this political influence allows voters to screen politicians' types, thereby improving electoral accountability. Our model captures how this trade-off interacts with price effects in a merger's assessment.

We consider an industry producing three differentiated goods. Goods $1, 2$ are produced by two incumbent firms with market power. Good 3 is produced by a competitive fringe.

An incumbent politician decides whether to approve a pro-competitive market reform or not. The reform, if approved, decreases the price of the fringe good. The reform can be seen as the elimination of a barrier to entry that protects incumbent firms' profits by keeping good 3's price artificially high. The reform benefits the consumer, and it is bad for the incumbent firms.

The two incumbent firms can lobby the politician to persuade them not to implement the reform (*quid pro quo lobbying*, Grossman and Helpman [1994]).[6] The politician can be of two types: *Good* or *Bad*. If the politician is *Good*, they are un-corruptible. They do not care about bribes and always implement the reform in the consumer's interest. If the politician is *Bad*, they care about bribes and re-election. As it is usual in political agency models, the *Bad* politician faces a trade-off between behaving well to try to win re-election or accepting bribes and giving up the office with some probability.

A representative voter chooses whether to re-elect the politician or not. The objective of the voter is to elect a *Good* politician. However, they do not observe the politician's type. They try to infer the type by imperfectly monitoring the political process. Imperfect monitoring creates an incentive for moral hazard. Imperfect information creates a problem of adverse selection of politicians.

We show that this game may have two types of equilibria: Pooling and Separating. In a Pooling equilibrium, both types of P implement the pro-competitive reform. However, this equilibrium is very inefficient from the voter's perspective as it prevents learning. With some probability, the voter re-elects a corruptible incumbent. Adverse selection bites. In a Separating equilibrium, the *Bad* politician does not implement the pro-competitive reform in exchange for bribes. The consumer suffers from higher prices, but the voter is able to screen the

[6] See Schnakenberg and Turner [2023] for a recent survey of this literature.

politician's type. Adverse selection is mitigated.

Before playing the lobbying game, the two firms may merge. The merger has efficiency benefits, as it reduces firms' marginal costs but also market power costs. Additionally, if the merger takes place, firms internalize higher benefits from protection and, therefore, have more incentives to lobby. It may be the case that firms have incentives to lobby *only* if the merger is approved. Then, the merger can change the nature of the political equilibrium, from Pooling to Separating.

Within this setting, we then address an important policy question: Which mergers are welfare improving? This question is related to an ongoing debate on the standards that should be followed by antitrust authorities. Should they pursue a strict *Consumer Welfare standard* within narrowly defined markets, when vetting mergers, or should they try to go beyond it, accounting also for the political architecture of market power?[7]

The answer to this question depends on the nature of the political equilibrium in our model. Suppose that the equilibrium is always Pooling, no matter if the merger is allowed or not. There is no screening of P. With some probability, the voter re-elects the *Bad* politician, but the authority cannot do anything to prevent this. Then, an antitrust authority should approve only mergers that are efficient enough to decrease prices. The consumer welfare standard is optimal.

Suppose instead that the equilibrium is always Separating, no matter if the merger is allowed or not. As in the previous case, the voter's payoff does not depend on the merger's approval. In either case, the voter successfully screens P. However, with some probability, nature draws a *Bad* politician, and the reform is not implemented. Then, a higher level of efficiencies is required (in expectations) for the merger to be pro-competitive. For this reason, the consumer welfare standard is too lenient.

Finally, suppose that the equilibrium is Separating if and only if the merger is approved. In this case, the voter would like the merger to be approved, as this allows them to defeat a corrupt politician. The authority's optimal merger policy depends on the voter's benefits from screening politician's types. If the value of screening is high enough, the authority may approve anti-competitive mergers (mergers that increase prices) to make the voter learn the politician's type and defeat a corrupt one. If the value of screening is low, the separating equilibrium is very inefficient as it induces the *Bad* politician to accept bribes

[7] This debate goes back at least to Bork [1978], and has been revamped by Khan [2016], Wu [2018], among others. See also Crandall and Winston [2002], Shapiro [2019].

in exchange for limiting competition, thereby hurting the consumer. Then, the merger would need to be very efficient to be approved. Committing to the consumer welfare standard can now result both in type I and type II errors.

We contribute to two main streams of literature. The first is the literature on the intersection of industrial organization and the political economy of regulated markets. In a recent theoretical paper, Callander et al. [2022] show that politicians have an incentive to protect firms from competition and raise barriers. However, their incentive is not perfectly aligned with the incumbent firms. Politicians strategically do not protect firms too much; otherwise, firms would stop demanding protection. The same authors show that a liberalization policy can be effective or not depending on the *ex-ante* market structure (Callander et al. [2023]). Another recent work by Akcigit et al. [2023] shows that, as firms increase in size, they tend to rely more on non-market strategies, such as political connections, to maintain a dominant position.

Our two most closely related papers are Cowgill et al. [2023] and Moshary and Slattery [2023], which focus empirically on the impact of mergers on lobbying, finding that mergers increase lobbying activity. We contribute to this literature by providing the first (to the best of our knowledge) welfare analysis of mergers that takes into account the political economy effects of market concentration.

The second is the literature about political agency with adverse selection and moral hazard. Seminal papers in this literature are Barro [1973] and Ferejohn [1986]. For a recent survey, see Ashworth [2012]. The key insight of this literature is that voters and politicians can be seen as principals and agents, respectively. Then, imperfect information generates agency problems such as adverse selection of politicians and moral hazard. We contribute to this literature by linking electoral accountability with market concentration.

The rest of the paper is organized as follows. In Section 2, we illustrate our model setup. In Section 3, we characterize the equilibrium of the model. Mergers and their welfare properties are considered in Section 4. In Section 5, we present extensions. Finally, Section 6 concludes. Proofs are relegated to the Appendix.

2 Model

We present a simple model of mergers and lobbying. We later extend the model in several directions to test the robustness of the results and explore further implications.

The model intends to capture price and non-price aspects of competition, and for this reason, it has two main blocks that interact with each other: a political economy block and a competition block. In the first one, two firms lobby a politician who can make a decision that impacts their profitability via a market mechanism, and a representative voter appoints the politician. In the second one, these firms compete against each other in the market, as affected by the politician's decision. Firms may merge or not before playing the competition game and the lobbying game. Our goal is to perform a welfare assessment of the merger by considering both price and non-price effects. With this in mind, we now detail every component of the model.

Players We consider a market with three differentiated goods $i \in \{1, 2, 3\}$. Goods $1, 2$ are produced by two incumbent firms with market power. These are the firms that can eventually lobby. A competitive fringe sells good 3, and they do not lobby.[8] A representative consumer buys the three goods. At the beginning of the game, the two firms $(1, 2)$ can merge or not. We say that $m = 1$ if the merger occurs, and $m = 0$ otherwise. The merger is exogenous but always profitable for the two firms.

There is an incumbent politician (P). P can implement a pro-competitive reform that decreases the price of the fringe good p_3, for instance, by making entry into the market by the competitive fringe easier. Incumbent firms can lobby P trying to avoid that. P has a type $\theta \in \{Good, Bad\}$. If P is *Good*, they are not interested in lobbying money, such as bribes. If P is *Bad*, they care about bribes. A representative voter chooses whether to re-elect P or replace them with a challenger. The challenger type is $\theta' \in \{Good, Bad\}$.

Policy The price of the fringe good $p_3(a)$ depends on a pro-competitive reform a. We say that the reform is implemented by P if $a = 1$ and it is not implemented if $a = 0$. We assume that $p_3(1) < p_3(0)$. Without loss of generality, let $p_3(1) = 0$

[8] This assumption is based on the idea that lobbying from the fringe might require coordination or the payment of a fixed cost that is possibly too high for very small players. If the fringe captures competition from imports, foreign firms may not have access to domestic politicians.

and $p_3(0) = \eta$, with $\eta > 0$.

There are various interpretations for a. For instance, firms $1, 2$ may be two domestic firms competing against a fringe of foreign goods whose prices depend on the level of import tariffs. Alternatively, firms $1, 2$ may describe two private firms (e.g., hospitals, schools, or pharmacies) competing with a fringe of public providers whose number and/or quality is affected by political decisions.[9] As a further example, consider the case of entry regulation. Politicians can restrict entry in many markets (e.g., retail, or ride-sharing), thereby (indirectly) controlling prices. All these examples share a crucial feature of our parsimonious model. Politicians can take actions that influence the degree of competition firms face in the market and, therefore, their market rents, and firms can lobby politicians to shape those rents. In the context of this tension, we will study how a merger between the two firms affects lobbying and, in turn, welfare.

We discuss the details of the lobbying and merger processes in the following paragraphs.

Timing and Actions The timing of the game runs as follows.

Stage 1 Nature draws θ, θ' and m. Firms $1, 2$ merge if $m = 1$, and do not merge if $m = 0$.

Stage 2 P chooses whether to implement the reform ($a = 1$) or not ($a = 0$) by committing to a mechanism $a(l_1, l_2)$.

Stage 3 Firms observe the mechanism and choose whether to lobby ($l_i = 1$) or not ($l_i = 0$). The reform a realizes.

Stage 4 Firms observe $p_3(a)$ and simultaneously set prices p_1, p_2. The consumer observes prices and chooses a consumption plan d_1, d_2, d_3.

Stage 5 The voter chooses whether to re-elect P ($r = 1$) or not ($r = 0$). Payoffs realize.

In the baseline model, we make some assumptions to keep the model as simple as possible to convey our intuition. We assume Bertrand competition as well that lobbying is binary and that P can commit to a TIOLI offer for the two firms. We then generalize the model to different bargaining and competition structures in Section 5.

[9] This example may be particularly relevant given the recent wave of mergers between US hospitals. See Gowrisankaran et al. [2015] and Schmitt [2017], among others.

Payoffs The representative consumer has a quadratic utility function *à la* Singh and Vives [1984]:

$$u(d_1, d_2, d_3) = d_1 + d_2 + d_3 - \frac{1}{2}\left(d_1^2 + d_2^2 + d_3^2\right) - \gamma\left(d_1 d_2 + d_2 d_3 + d_1 d s_3\right) . \quad (2.1)$$

The parameter $\gamma \in (0, 1)$ captures the degree of product differentiation.[10] If $\gamma = 0$, the three products are independent, and the two incumbent firms act as separate monopolists. If $\gamma = 1$, goods are perfect substitutes, and Bertrand competition brings profits down to zero. In either limiting case, firms would never lobby as the reform a does not impact their profits. Hence, we study the case when $0 < \gamma < 1$, that is, products are imperfect substitutes (Amir et al. [2017]).

The voter cares about electing a *Good* politician. Let $\theta^*(r)$ be the type of politician winning the election. Then,

$$\theta^*(r) = \begin{cases} \theta & \text{if } r = 1 \\ \theta' & \text{if } r = 0 . \end{cases} \quad (2.2)$$

The voter's payoff is:

$$v(r) = \begin{cases} -\phi & \text{if } \theta^*(r) = Bad \\ 0 & \text{if } \theta^*(r) = Good , \end{cases} \quad (2.3)$$

where $\phi > 0$ captures the benefits associated with screening. A possible interpretation for ϕ is as follows. Suppose that a *Bad* politician is re-elected. While in office, a corruptible politician may adopt policies that appeal to specific interest groups (perhaps in exchange for bribes) rather than voters. In this context, ϕ represents the anticipated cost of such actions to the voters.[11]

The profits of firms $i \in \{1, 2\}$ are:

$$\pi_i(p_i, d_i, l_i) = d_i(p_i - c) - t l_i , \quad (2.4)$$

[10]Assume that the consumer has a quasi-linear utility function, where (2.1) is the non-linear part. Then, the demand for goods 1, 2, 3 does not depend on income, and a partial equilibrium analysis is justified (Singh and Vives [1984], Motta [2004], Choné and Linnemer [2020]).

[11]The assumption of exogenous ϕ is the simplest way of capturing the value of screening by the voter. However, the same intuition could arise endogenously following standard dynamic political agency models in finite horizon where *Bad* politicians always extract public resources for themselves during the last period of office. In Section 5, we consider this case explicitly.

where d_i is the quantity sold by firm i, $c > 0$ is the (symmetric) marginal cost, and $t > 0$ is the value of the bribe. The parameter t captures how costly it is for firms to engage in lobbying and, therefore, may proxy the stringency of lobbying legislation (Schnakenberg and Turner [2019]).[12]

The *Good* politician P is a behavioral type. They always implement the reform: $a = 1$. One interpretation of this assumption is that they care about decreasing prices, as they maximize the welfare of consumers that are also voters. The *Bad* P's payoff is:

$$U_{Bad}(r, l_1, l_2) = rV + (l_1 + l_2)\,t\ , \tag{2.5}$$

where $V > 0$ captures the value of the office, if re-elected.

Merger We assume that the merger can generate merger-specific *efficiencies* from the joint production of goods $1, 2$. If the merger goes ahead ($m = 1$), marginal costs are μc, where $\mu \leq 1$. If $m = 1$, the merged entity chooses prices p_1, p_2 and lobbying efforts l_1, l_2 to maximize the joint sum of profits from selling the two goods. Notice that this framework allows for a meaningful welfare assessment, as a merger entails a trade-off: market power always increases, but there may be a countervailing force if efficiencies are large enough. In Section 3, we solve the model taking m as given. In Section 4, we perform a welfare assessment of the merger.

Information Structure The voter does not observe θ, θ'. Let $q \in [0, 1]$ be the prior belief that $\theta = Good$. Let q also be the voter's prior belief that $\theta' = Good$. We assume that m is common knowledge: everyone knows whether the merger occurred or not.

With probability $x \in (0, 1]$, the voter observes the action a. If $x = 1$, our model is analogous to one where the voter and the consumer are the same player with a payoff given by the sum of (2.1) and (2.3). In fact, if $x = 1$, the voter and the consumer have the same information.

If $x < 1$, there is imperfect monitoring (Blumenthal [2023]). We introduce this case to account for a possible distinction between the voter and the consumer,

[12]For instance, in the US, the lobbying legislation is more permissive than in the EU. Our interpretation suggests that the parameter t would be lower in the US than in the EU, as firms would have to pay lower costs to lobby, other things equal. The assumption of exogenous lobbying costs is convenient for illustrating the intuition behind our results. However, this assumption is not necessary. In Section 5, we allow P to specify t as part of the offered mechanism.

which generates moral hazard from P's side. The voter has only *some* of the consumer's information, and the politician can exploit this lack of information to their advantage. In particular, the extent of moral hazard determines how likely the politician can accept bribes and still get re-elected. Only in the limiting case when $x = 0$, the voter does never observe P's action, and the *Bad* politician does not trade-off re-election and bribes.[13]

There are various possible interpretations for x. First, x may capture the industry's relevance from the voter's perspective. The voter may not be directly interested in the consumption of goods $1, 2, 3$, but still be interested in learning θ. Second, imagine that the voter and the consumer coincide but that prices are informative only with probability x. With probability $1 - x$, the consumer/voter thinks that prices are pure noise.[14] Yet another interpretation that can still be accommodated by our model is that market issues (such as prices) are only partially salient in the voter's behavior, where x represents the degree of saliency. The parameter x might also capture the efficiency of the media system. The better the media system, the easier for voters to hold politicians accountable. All these examples convey the same intuition. When $0 < x < 1$, there is a distinction between the voter (principal) monitoring P (an agent) and the consumer, and P can use imperfect information to their advantage (as in any moral hazard problem).

3 Results

Our solution concept is Perfect Bayesian Equilibrium (equilibrium henceforth) in pure strategies. A strategies–belief pair is an equilibrium if and only if:

1. Each player's strategy maximizes their expected payoff given all the other players' strategies and beliefs;

[13]In an alternative interpretation of our model, a principal imperfectly monitors the behavior of an appointed regulator and decides whether to confirm them or not.

[14]In many real-world examples, prices can be "high" not because of a lack of competition but because of macroeconomic shocks or external factors. Therefore, if consumers (voters) observe high prices, they may be uncertain about the causes behind such prices. For instance, during the 2022-2023 inflation wave, there was an intense debate on the causes of such inflation, with some experts attributing them mainly to "external factors," such as the War in Ukraine or the Covid 19 Pandemic; and others pointing to companies' opportunistic behaviors ("greedflation"). This imperfect information makes prices not (fully) informative and hence generates imperfect monitoring from the point of view of consumers and a problem of moral hazard from the politicians' perspectives. Despite being formally more complicated, a model that features this intuition would be qualitatively equivalent to the one we propose here.

2. For any observation of P's action, the voter's belief is updated via Bayes' Rule, and their action is optimal given the equilibrium beliefs.

In the following Subsections, we take the merger m to be exogenous, and we study the impact of the merger on prices, lobbying, and elections. In Section 4, we study how these effects interplay with each other in the welfare analysis of the merger.

3.1 Preliminary Results

Let us start from the election stage (Stage 5). Let $\hat{q}$ be the voter's updated belief that $\theta = Good$. Let us assume that, in case of indifference, the voter chooses to re-elect the incumbent.[15] The voter's optimal re-election rule is:

$$r^* = \begin{cases} 1 & \text{if } \hat{q} \geq q \\ 0 & \text{otherwise} . \end{cases} \tag{3.1}$$

If the *Bad* P chooses $a = 0$ and the voter observes it, then $\hat{q} = 0$. Therefore, they are re-elected with probability $1 - x$. If they choose $a = 1$, they are re-elected with probability 1. P then faces a trade-off between behaving well *today* and ensuring re-election *tomorrow*, or accepting bribes and giving up the office (with some probability).

Let us now consider the market stage. In Stage 4, firms set prices anticipating the consumer's demand functions. The representative consumer's demands for the three goods $i, j, k \in \{1, 2, 3\}$, $i \neq j \neq k$ are:

$$d_i = \frac{1 - \gamma - p_i(\gamma + 1) + \gamma(p_j + p_k)}{(1 - \gamma)(2\gamma + 1)} . \tag{3.2}$$

We obtain (3.2) by simply maximizing (2.1) given prices and a budget constraint. As $\gamma > 0$, the demand for good i increases in the price of goods j, k.

In Appendix A.1, we obtain subgame equilibrium prices as a function of p_3 and market structure, with and without the merger m. We omit computations from the main text, and all the expressions are reported in the Appendix. The important results from Appendix A.1 are as follows. First, for any market structure m, equilibrium prices increase in p_3 (and thus decrease in a). This result stems from prices' strategic complementarity. Second, equilibrium profits

[15] Our results are robust to any change in the tie-breaking rule such that the incumbent is re-elected with strictly positive probability (Blumenthal [2023]).

of firms 1, 2 decrease in a, as they face a stronger fringe. Finally, we compare prices with and without the merger. Unsurprisingly, the merger decreases prices if and only if efficiencies are high enough, that is, if μ is low enough. If the reform is not implemented ($a = 0$), higher efficiency (lower μ) is required for the merger to be pro-competitive. This result will play a key role in the merger's welfare assessment. When the merger induces P to adopt the non-competitive policy ($a = 0$), a higher level of efficiency must be achieved by the merger to be pro-competitive. The merger can increase prices not only through market power but also through political power.

3.2 Lobbying Equilibrium

We now consider the lobbying game (Stage 2 and Stage 3). For all m, there are two possible types of equilibria: Pooling and Separating. In a Pooling equilibrium, both types of P implement the reform. The consumer enjoys lower prices, but the voter does not learn P's type and, with some probability, re-elects the *Bad* P. In a Separating equilibrium, the *Bad* P does not implement the reform and both firms lobby. With probability x the voter observes the action, and learns P's type.

We first show how a Separating equilibrium looks like, and then we discuss conditions under which such an equilibrium exists. In a Separating equilibrium, the *Bad* P commits to the mechanism $a^*(1,1) = 0$ and both firms choose $l_i^* = 1$. Suppose that P does not offer protection, then no firm wants to lobby. In the same way, if neither firm lobbies, P ensures re-election by pooling. Then, any (possibly) optimal contract implies protection in exchange for *some* lobbying.

We are left to consider the alternative mechanism $a^*(1,0) = 0$. We show that this cannot be optimal for P. In fact, P knows that if $l_i = 1$ is incentive compatible (IC) for firm i, $l_j = 1$ is also IC for firm j. Therefore, the contract $a^*(1,0) = 0$ is strictly dominated. If P can *sell* protection ($a = 0$) for $2t$, there is no reason to give out a 50% discount and accept a price of t. This result depends on the fact that P has the power of commitment to the offer. In Section 5, we show that if firms can commit to the offer, there is an equilibrium where only one firm lobbies.[16]

When is a Separating equilibrium possible? Let $p^m(a)$ be the vector of

[16]The mechanism $a^*(1,1) = 0$ also solves the coordination problem for firms as they both know they need to lobby to induce $a = 0$. When firms offer the contract and $m = 0$, there is a coordination problem arising from the multiplicity of equilibria.

equilibrium prices as a function of a and m. For $a = 0$ to be individually rational (IR) for the *Bad* P, it must be that:

$$(1 - x) V + 2t \geq V \; . \tag{3.3}$$

P knows they can ensure re-election by pooling ($a = 1$), which yields a payoff of V. By separating, P gets bribes ($2t$) but wins the office only with probability $1 - x$. P trades-off *tomorrow*'s re-election chances with *today*'s bribes.

Paying bribes must be incentive-compatible (IC) for firms. Let

$$\Delta\pi (m) = \begin{cases} \pi_i \left(p^{m=0} (0)\right) - \pi_i \left(p^{m=0} (1)\right) & \text{if } m = 0 \\ \frac{1}{2} \left[\sum_i \pi_i \left(p^{m=1} (0)\right) - \sum_i \pi_i \left(p^{m=1} (1)\right)\right] & \text{if } m = 1 \end{cases} \tag{3.4}$$

be the return for firms from protection as a function of m. We derive the expressions of $\Delta\pi (m)$ in Appendix A.2. Firms' IC is:

$$t \leq \Delta\pi (m) \; . \tag{3.5}$$

Combining P's IR and firms' IC, we obtain the following result.

Proposition 1. *In a Pooling equilibrium, both P's types implement the pro-competitive reform ($a^* = 1$). In a Separating equilibrium, a Bad P does not implement the reform ($a^* = 0$), and both firms lobby ($l_1^* = l_2^* = 1$). Moreover,*

(i) For all $m \in \{0, 1\}$, the equilibrium is Separating if and only if

$$\frac{xV}{2} \leq t \leq \Delta\pi (m) \; .$$

In a Separating equilibrium, the voter learns P's type with probability x. Otherwise, the equilibrium is Pooling, and the voter does never learn P's type.

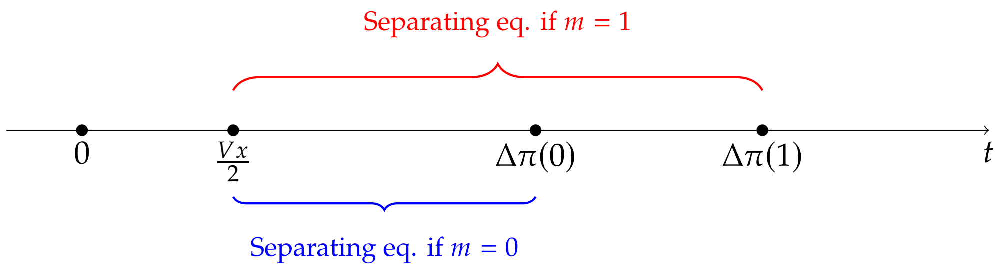
(ii) The merger increases firms' incentives to lobby:

$$\Delta\pi (1) \geq \Delta\pi (0) \, .$$

Figure 3.1 shows the findings of Proposition 1. First, a Separating equilibrium exists if and only if the cost of lobbying t is neither too high nor too low.[17] If t

[17] In Section 5, we show the conditions for the existence of a Separating equilibrium when t is endogenous.

Figure 3.1: Existence of Separating Equilibrium



is too low, bribes are not sufficiently valuable, and the *Bad* P prefers to ensure re-election by pooling. If t is too high, lobbying is not worth it for firms.

Second, a merger increases firms' incentives to lobby as it increases the returns from protection. The intuition is simple. Lobbying to fend off competition from the fringe is valuable, as it can increase rents to firms 1, 2. Without a merger, however, these rents are partly dissipated by the competition between 1, 2. With a merger, this dissipation is muted, and therefore merging firms are willing to pay more for protection. In Appendix B, we generalize this intuition to a more general setting.

We now discuss the comparative statics of the upper and lower bounds in Figure 3.1. The lower bound $\frac{Vx}{2}$ does not depend on market structure. The merger does not impact the politician's incentives to accept the bribes. This lower bound increases as x and V increase. When x is low, moral hazard bites: the *Bad* P knows that by separating, they can enjoy bribes and still be re-elected with a relatively high probability. On the contrary, as V increases, the *Bad* P has a higher incentive to ensure re-election by pooling.

From the firm's perspective, the merger increases the incentives to lobby. The upper bound $\Delta\pi(1)$ decreases in μ. The more efficient the merger, the higher the incentives to lobby, as the the returns internalized from protection are higher. In the same way, for all m, $\Delta\pi(m)$ is also increasing in η. The higher the threat from the fringe, the higher the incentives to lobby.

The equilibrium described in Proposition 1 is unique among the class of equilibria in pure strategies. The only potential multiplicity of equilibria arises when t equals either the lower or the upper bounds in Proposition 1. In this case, we select the Separating equilibrium over the Pooling one.

4 Merger Assessment

We now provide a welfare assessment of the merger. That is, we compare players' welfare if $m = 1$ and $m = 0$. Our model captures the price and non-price effects of the merger. As shown above, a merger increases firms' lobbying activity and their ability to influence policymaking. On the one hand, this political power is bad for the consumer as it further increases prices on top of the usual market power effect. On the other hand, the additional political power is good for the voter when it allows them to learn P's type. We now discuss how this new trade-off interplays with the traditional price effects in the merger's assessment.

To this end, we introduce an additional player: a benevolent antitrust authority. The competition authority decides whether to approve the merger ($m = 1$) or not ($m = 0$) by maximising the sum of consumer's and voter's payoffs. Let us recall that if $x = 1$, we can think of the voter and the consumer as a unique player. If $x < 1$, the two players are distinct as they possess different information. The objective function of the authority is based on citizens (consumers and voters) and does not take into account firms or the politician. In this regard, our authority's mandate goes beyond what competition authorities usually do. Their remit is typically to maximize the welfare of the consumers in the market affected by the transaction, which goes under the name of *Consumer Welfare standard*. It is important to remark that we are not claiming that competition authorities *do* or *should* start to consider the direct impact of mergers on elections and lobbying. We do this only to illustrate the broader welfare implications of the results we presented in the previous Section. This allows us to contribute to the debate on what antitrust authority *could* do. At the end of this Section, we provide a possible way to interpret our results in practice.[18]

Notice that we also assume that firms cannot lobby the antitrust authority. Specifically, firms $1, 2$ cannot lobby to get the merger approved. This simplifying assumption is also based on the empirical findings of Cowgill et al. [2023]. They find that merging firms in the US do spend considerable lobbying money but mostly in the Congress. They also do not find anticipatory effects before the

[18] See Motta [2004] for a discussion about antitrust authorities' mandates and, in particular, for an introduction to the debate around the consumer welfare standard. Currently, both in the US and in the EU, competition authorities follow, albeit with some differences, a consumer welfare standard.

approval date of a merger.[19]

Let us define two thresholds for μ, corresponding to the different levels of efficiencies required for prices to decrease after a merger, and as a function of the policy a:

$$\begin{aligned} &\overline{\mu}(0) : \mu \leq \overline{\mu}(0) \Rightarrow p^{m=1}(0) < p^{m=0}(0) \\ &\overline{\mu}(\eta) : \mu \leq \overline{\mu}(\eta) \Rightarrow p^{m=1}(\eta) < p^{m=0}(\eta) . \end{aligned} \tag{4.1}$$

A *traditional* competition authority, assuming that P behaves well and considering only price effects, would approve the merger if and only if $\mu \leq \overline{\mu}(0)$. We refer to this approach as the consumer welfare standard.

We start by writing down the authority's payoff across the different equilibria. We suppose that the authority does not observe θ. Thus, they do not know what type of P will be at play, but they know what kind of equilibrium will occur and, therefore, how different types of P would behave. Let $W(m)$ denote the authority's payoff as a function of market structure. Let also $d^*(p^m(p_3))$ be the vector of demands. In a Pooling equilibrium,

$$W_{Pool}(m) = u\left(d^*\left(p^m(0)\right)\right) + (1-q)\left(-\phi\right) \ . \tag{4.2}$$

In a Pooling equilibrium , the consumer always enjoys lower prices, but the voter always re-elects P. Then, with probability $1-q$, the voter re-elects a *Bad* P.

In a Separating equilibrium,

$$\begin{aligned} &W_{Sep}(m) = q\left[u\left(d^*\left(p^m(0)\right)\right)\right] + \\ &(1-q)\left[u\left(d^*\left(p^m(\eta)\right)\right) + (1-x)\left(-\phi\right) + x(1-q)\left(-\phi\right)\right] \ . \end{aligned} \tag{4.3}$$

With probability q, P is *Good*, and the consumer enjoys lower prices. It does not matter if the voter observes a or not, in either case $r^* = 1$ and $v(r^*) = 0$. With probability $1-q$, P is *Bad*, and the reform is not implemented. In this case, with probability x, the voter observes $a^* = 0$, and the *Bad* P is defeated. The newly elected politician is *Bad* with probability $1-q$. With probability $1-x$, the action is not observed, and the *Bad* P is re-elected. We show the expressions of (4.2) and (4.3) in Appendix A.3.

Lobbying comes at the cost of corruption and high prices *today*, but it increases the probability that *Bad* politicians are defeated *tomorrow*. In particular,

[19]This is possibly due to the fact that most mergers fall below screening thresholds for merger notification and, therefore, are not vetted by the antitrust enforcers.

in a Pooling equilibrium, the voter appoints a *Bad* politician with probability $1-q$. In a Separating equilibrium, a *Bad* P is appointed with probability

$$(1-q)\left[(1-x)+x(1-q)\right] < 1-q\,. \tag{4.4}$$

Therefore, the voter always prefers a Separating equilibrium over a Pooling equilibrium. The opposite is true for the consumer. The authority needs to trade-off these two effects as well as to anticipate the effect of their decision on the likelihood that lobbying will occur in equilibrium.

We distinguish among three cases, corresponding to the different regions in Figure 3.1.

(a) $t \in \left[0, \frac{Vx}{2}\right)$ or $t > \Delta\pi(1)$. For any m, the equilibrium is always Pooling. Political effects do not matter. For all m, the *Bad* P is always re-elected with probability $1-q$. All P types approve the reform: $a^* = 1$. Thus, the authority approves the merger if and only if $\mu \leq \overline{\mu}(0)$. In this case, the consumer welfare standard is optimal.

(b) $t \in \left[\frac{Vx}{2}, \Delta\pi(0)\right]$. For any m, the equilibrium is always Separating. As in the previous case, the probability of election of a *Bad* politician does not depend on m. The authority approves the merger if and only if μ is low enough for prices to decrease. However, with probability $1-q$, a *Bad* P is in office, and the reform is not implemented ($a^* = 0$). The optimal standard to be adopted would be $\overline{\mu}(\eta)$. Therefore, the authority's optimal merger policy is stricter than a consumer welfare standard that ignores lobbying that does happen. The critical threshold, $\hat{\mu}$, is such that $\hat{\mu} \in [\overline{\mu}(\eta), \overline{\mu}(0)]$.[20] Clearly, $\hat{\mu} \to \overline{\mu}(\eta)$ if $q \to 0$ and $\hat{\mu} \to \overline{\mu}(0)$ if $q \to 1$.

(c) $t \in (\Delta\pi(0), \Delta\pi(1)]$. In this case, there is a Separating equilibrium if the merger is approved ($m = 1$) and a Pooling equilibrium if the merger is not approved ($m = 0$). If $m = 0$, the consumer enjoys lower prices (the reform is always implemented), but the voter does not learn about P's type. If $m = 1$, with probability $1-q$, the consumer faces higher prices in the market, but the voter learns P's type (with probability x), thereby defeating the corrupt politician. The authority faces a trade-off between

[20] To see this, suppose $\hat{\mu} > \overline{\mu}(0)$. Then, if $\mu \in (\overline{\mu}(0), \hat{\mu})$, the merger increases prices with probability 1 but it is accepted, which cannot be optimal for the authority. Analogously, say $\hat{\mu} < \overline{\mu}(0)$. Then, if $\mu \in (\hat{\mu}, \overline{\mu}(0))$, the merger decreases prices with probability 1, but it is rejected, which cannot be optimal for the authority.

having the *Good* reform *today* and being able to screen Ps' types *tomorrow*. This *new* trade-off augments the problem of the authority, otherwise only trying to balance market power and efficiencies. The authority approves the merger if and only if $\mu \leq \tilde{\mu}$, but potentially $\tilde{\mu} < \overline{\mu}(0)$ or $\tilde{\mu} > \overline{\mu}(0)$. In particular, $\tilde{\mu} > \overline{\mu}(0)$ when ϕ is high enough; and $\tilde{\mu} < \overline{\mu}(0)$ when ϕ is low enough.[21] In this case, the consumer welfare standard can be either too strict or too weak, depending on the benefits of separation ϕ.

When ϕ is high, the authority can allow mergers that increase prices ($\tilde{\mu} > \overline{\mu}(0)$) because the merger allows the voter to defeat (with some probability) the corrupt politician. The increase in the voter's payoff offsets the decrease in the consumer's utility, as the value of separation (ϕ) is high enough.

When ϕ is low, the merger must be very efficient ($\tilde{\mu} < \overline{\mu}(0)$) to be approved. The intuition is simple. Suppose that the authority commits to approve the merger whenever $\mu \leq \overline{\mu}(0)$, for example, because they think that P is *Good*. However, with probability $1 - q$, P is *Bad*, and the merger gives firms enough power to influence P's behavior. As a result, if $\mu \in (\tilde{\mu}, \overline{\mu}(0))$, prices increase (in expectations) after the merger because of firms' political power rather than market power. If ϕ is low, it can also be the case that $\tilde{\mu} < \overline{\mu}(\eta)$.[22] Efficiencies must be high enough not only to decrease prices, but also to compensate for the fact that, if the merger were not allowed, the consumer would always enjoy the pro-competitive reform, no matter the type of P.

The following Proposition summarizes the results of this Section.

Proposition 2. *The authority allows the merger ($m^* = 1$) if and only if $\mu \leq \mu^*$, where*

$$\mu^* = \begin{cases} \overline{\mu}(\eta) & \text{if } t \in \left[0, \frac{Vx}{2}\right) \text{ or } t > \Delta\pi(1) \\ \hat{\mu} & \text{if } t \in \left[\frac{Vx}{2}, \Delta\pi(0)\right] \\ \tilde{\mu} & \text{if } t \in (\Delta\pi(0), \Delta\pi(1)], \end{cases}$$

$\hat{\mu} \in [\overline{\mu}(\eta), \overline{\mu}(0)]$, *and* $\tilde{\mu} \gtreqless \overline{\mu}(0)$ *depending on* ϕ.

Proposition 2 captures the key insights of our model.[23] We summarize the

[21] We show this formally in Appendix A.3 and A.4.
[22] See Appendix A.3 and A.4.
[23] The expressions for the different thresholds in Proposition 2 are reported in Appendix A.3.

Figure 4.1: Merger policy when ϕ is high

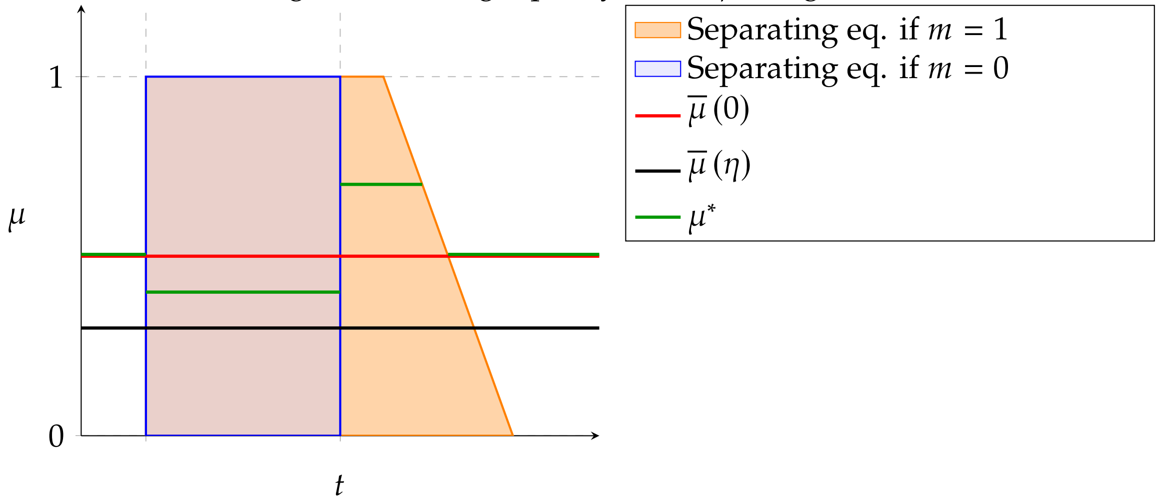
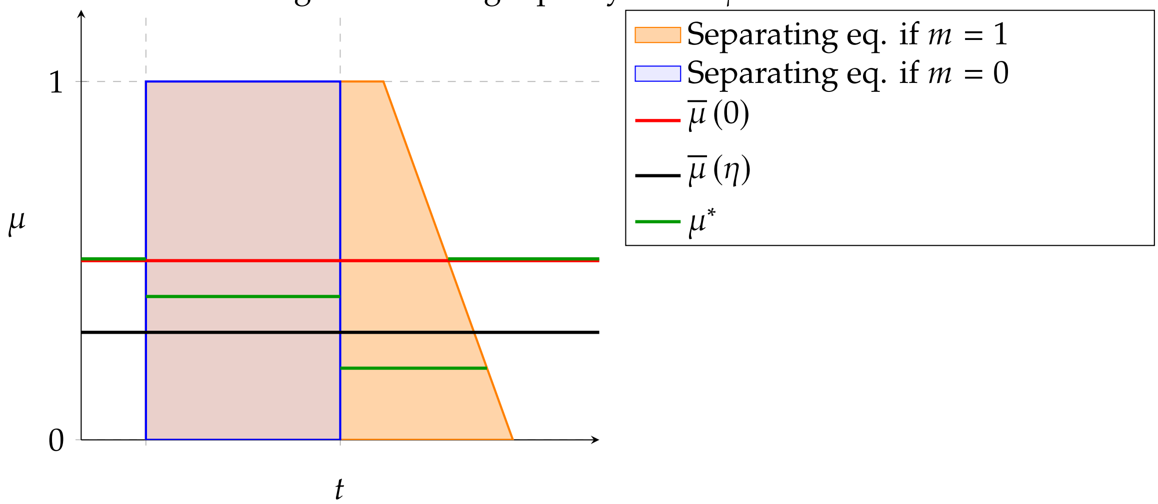


Figure 4.2: Merger policy when ϕ is low



results with the help of Figures 4.1 and 4.2. Figure 4.1 corresponds to the case of high ϕ. Figure 4.2 corresponds to low ϕ. The optimal merger policy coincides with the consumer welfare standard when the equilibrium does not exhibit lobbying, that is, when the equilibrium is Pooling for all m (white regions in Figures 4.2, 4.1).

The optimal merger policy is stricter than the consumer welfare standard when the equilibrium exhibits lobbying, but the merger does not induce the voter's learning, that is, when the equilibrium is Separating for all m (blue region in Figures 4.2, 4.1). In the same way, the optimal policy is stricter than the consumer welfare standard when the merger induces a Separating equilibrium, but the benefits from the voter's learning do not offset the increase in prices (orange region in Figure 4.2).

When, instead, the merger can induce learning, and benefits from the voter's learning are high enough (orange region in Figure 4.1), the optimal merger policy can be more lenient than what the consumer welfare standard would suggest. This can happen in equilibrium if and only if t is high enough. Therefore, our model shows substitutability between the stringency of the lobbying legislation and the stringency of the merger policy. The merger policy can be more lenient than the consumer welfare standard only when lobbying costs are high (the lobbying legislation is strict). In particular, when lobbying costs are high enough that lobbying can only occur if the merger is approved, the authority may want to approve a merger that increases prices to let the voter learn the type and defeat a corrupt politician.

Discussion We have shown that the traditional consumer welfare standard can be sub-optimal when political effects enter the picture. Should then antitrust antitrust authorities consider these dimensions too in their analysis? We do not think this is feasible in practice. However, policy has several dimensions of uncertainty that are not captured by our model but are very relevant in reality. Two dimensions, in particular, are related to the burden of proof and the standard of proof.

The standard of proof is the degree to which a party must prove its case to succeed. The burden of proof, or the onus, is the requirement to satisfy that standard. Our results can then be re-interpreted from this perspective. Antitrust authorities can retain a consumer-centric mandate, even in a world with political dimensions. The current system is one where the burden of proof for efficiencies falls on to the firms, as they have far better information than the enforcer about technology. This is very reasonable. It is when it comes to the standard of proof that our considerations kick in. A strict optimal merger policy can be interpreted as a situation where the standard of proof required for efficiencies is very high. The strictest case arises when there is a structural presumption that a merger is bad, and this cannot be rebutted by any efficiency claim.

5 Extensions

In the previous sections, we presented a simple model highlighting the political effects of mergers and how these effects interplay with market power considerations in a merger's assessment. We now extend the model to discuss the robustness of our findings. In particular, we first consider an alternative bargaining structure where firms offer a mechanism to P. Then, we consider an alternative model setup with two periods and endogenous t, ϕ, and V.

5.1 Firms Offer the Mechanism

Let us consider a modified version of the timing introduced in Section 2. In Stage 2, both firms submit a TIOLI offer to P: $l_i(a) \in \{0, 1\}$. If $m = 1$, the two (merged) firms coordinate their offers. If $m = 0$, the two firms submit their offers simultaneously and independently. In Stage 3, P observes both offers and decides on the implementation of the reform.

How does this alternative bargaining structure affect the nature of the lobbying equilibrium? Suppose $m = 1$. Suppose further that

$$(1 - x)V + t \geq V \Rightarrow t \geq Vx \,. \tag{5.1}$$

Condition (5.1) implies that a single bribe of value t is sufficient to make $a = 0$ IC for P. In the baseline model, even if (5.1) holds, P requires the payment of two bribes for a total amount of $2t$ to set $a = 0$ because they have the power to commit to that, and of course, $2t > t$. Then, the optimal mechanism for the merged firms is:

$$\begin{cases} l_i^*(0) = 1 \\ l_j^*(0) = 0 \,. \end{cases} \tag{5.2}$$

Since the merged firms know that P is willing to set $a = 0$ in exchange for t, there is no incentive to offer more and pay $2t$. In this case, only one firm lobbies, and P does not implement the policy. This equilibrium exists if and only if $t \in [Vx, \Delta\pi(1)]$. If $t \in \left[\frac{Vx}{2}, Vx\right)$, the merged firms know that they need to pay a total of $2t$ in order to make $a = 0$ IC for P, as in the baseline model.

Now, suppose that $m = 0$. As in the previous case, if $t \in \left[\frac{Vx}{2}, Vx\right)$, both firms lobby in equilibrium. When $t \in [Vx, \Delta\pi(0)]$, there exist two equilibria in pure strategies. In the first equilibrium, firm i commits to the offer $l_i^*(0) = 1$ and firm j commits to $l_i^*(0) = 0$, and P chooses $a^* = 0$. In the second equilibrium, firm j

lobbies, and firm i does not.[24]

The multiplicity of equilibria generates a coordination problem between the two firms. To illustrate this, let us consider the following profile of mixed strategies. Suppose that firm 1 makes the offer $l_1(0) = 1$ with probability $k \in (0,1)$ and commits not to lobby with probability $1-k$. Let $\tilde{l}_1$ denote this mixed strategy. If firm 2 makes the offer $l_2(0) = 1$, its expected payoff is:

$$\mathbb{E}\left[l_2(0) = 1, \tilde{l}_1\right] = \pi_2\left(p^{m=0}(\eta)\right) - t\ . \tag{5.3}$$

If firm 2 commits to $l_2 = 0$, its expected payoff is:

$$\mathbb{E}\left[l_2 = 0, \tilde{l}_1\right] = k\left(\pi_2\left(p^{m=0}(\eta)\right)\right) + (1-k)\,\pi_2\left(p^{m=0}(0)\right)\ . \tag{5.4}$$

It follows that if $k = \frac{\Delta\pi(0)-t}{\Delta\pi(0)} := k^*$, there exists an equilibrium in mixed strategies where both firms lobby with probability k^*. In this equilibrium, with probability $(1-k^*)^2$, neither firm lobbies and P does not implement the policy. This coordination failure arises from the incentive to free-ride on the competitor's lobbying effort.

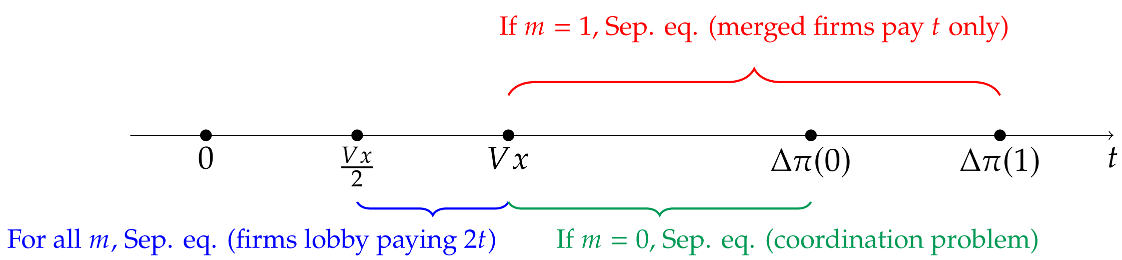
There are two main takeaways from this robustness check. First, for all m, when firms have the power of commitment on the offer to P, there exist equilibria where only one bribe worth t is paid. Firms can extract more surplus from P, as they can get protection ($a = 0$) at a lower price (t rather than $2t$). However, if the two firms do not merge ($m = 0$), the potential multiplicity of equilibria generates a coordination problem. The merger solves the coordination problem. Second, we have shown that our main results are robust to this alternative bargaining structure. Figure 5.1 summarizes the results of this Section. By comparing Figures 5.1 and 3.1, we can see that this alternative bargaining structure does not affect the likelihood that lobbying emerges in equilibrium, but only the extent of lobbying. The welfare analysis of the merger is also analogous to the baseline model.

5.2 Endogenous t, ϕ, V in a Two-Period Model

This Section introduces two key novelties. First, the political game is repeated twice, as in most political agency models. This allows us to endogenize the cost for consumers to re-elect a *Bad* P and the value of the office for a *Bad* P. Second,

[24] There is no equilibrium where both firms lobby because, given that firm i is lobbying, firm j does not want to lobby.

Figure 5.1: Existence of Separating Equilibrium when firms have commitment power



we allow P to specify t as part of the contract. We show that the main results of the baseline model extend to this more general setup. For the sake of simplicity, we assume perfect monitoring ($x = 1$). Then, we can think of the consumer and the voter as the same player.

The timing is as follows. With a slight abuse of notation, we refer to the time between Stage 1′ and Stage 5′ as the *First Period*, and to the time between Stage 6′ and Stage 8′ as the *Second Period*.

Stage 1′ Nature draws θ, θ' and m. Firms 1, 2 merge if $m = 1$, and do not merge if $m = 0$.

Stage 2′ P commits to a mechanism $a(l_1, l_2, t)$.

Stage 3′ Firms observe the mechanism and choose whether to lobby ($l_i = 1$) or not ($l_i = 0$). The reform a realizes.

Stage 4′ Firms observe $p_3(a)$ and simultaneously set prices p_1, p_2. The consumer observes prices and chooses a consumption plan d_1, d_2, d_3. First-period payoffs realize.

Stage 5′ The consumer chooses whether to re-elect P ($r = 1$) or not ($r = 0$).

Stage 6′ The elected P (with type θ^*) commits to a mechanism $a'\left(l'_1, l'_2, t'\right)$.

Stage 7′ Firms observe the mechanism and choose whether to lobby ($l'_i = 1$) or not ($l'_i = 0$). The reform a' realizes.

Stage 8′ Firms observe $p_3(a')$ and simultaneously set prices p'_1, p'_2. The consumer observes prices and chooses a consumption plan d'_1, d'_2, d'_3. Second-period payoffs realize.

During the first period, players discount the future at a common discount factor $\delta \in (0, 1)$. The parameter δ can be interpreted as the exogenous probability that the game ends before the second period.

The consumer's *lifetime* utility is then:

$$u(d_1, d_2, d_3) + \delta \left[u\left(d_1', d_2', d_3'\right) - s \right] , \tag{5.5}$$

where $u(d_1, d_2, d_3)$ is defined as in (2.1) and

$$s = \begin{cases} \phi' & \text{if } \theta^* = Bad \\ 0 & \text{otherwise} , \end{cases} \tag{5.6}$$

for some $\phi' \geq 0$. The parameter ϕ' captures the consumer's anticipated cost from appointing a *Bad* P, in addition to the market's partial equilibrium effects. If $\phi' = 0$, the consumer only cares about their utility within the market. If $\phi' > 0$, re-electing a *Bad* PM has a negative effect beyond the market. The *lifetime* payoff for a *Bad* P is:

$$V' + t(l_1 + l_2) + r\delta \left(V' + t' \left(l_1' + l_2' \right) \right) . \tag{5.7}$$

In this case, $V' \geq 0$ may be seen as the value of re-election, on top of bribes. For instance, V' may be the politician's salary.[25] Firms' *lifetime* payoffs are:

$$\pi_i(p_i, d_i, l_i) + \delta \left(\pi_i \left(p_i', d_i', l_i' \right) \right) , \tag{5.8}$$

where $\pi_i(p_i, d_i, l_i)$ is defined as in (2.4). To characterize the equilibrium, we proceed by Backward Induction.

Second Period Let us start from Stage 8′. This stage is analogous to the baseline model. The consumer's consumption plan is as in (3.2). Equilibrium prices are as in Appendix A.1. Let us now consider the lobbying equilibrium (Stage 6′, Stage 7′). Suppose that a *Good* P is in office. Then, they always implement the policy. Suppose that a *Bad* P is in office. Their optimal contract is:

$$a'^* \left(l_1' = l_2' = 1, t'^* = \Delta\pi(m) \right) = 0 . \tag{5.9}$$

[25]In the baseline model, we assume that V is already expressed in present-value terms. As in the baseline model, the *Good* P has a behavioral type and always implements the policy.

A *Bad* P commits not to implement the policy $a' = 0$ if and only if both firms lobby. It is optimal for them to set the price of lobbying so as to extract all the surplus from the two firms: $t'^{*} = \Delta\pi(m)$. Since the game ends at the end of the period, a *Bad* P has no re-election incentives, and they never implement the pro-competitive reform. Firms are indifferent between lobbying or not, and, as in the baseline model, we assume that the tie is broken in favor of lobbying.[26]

First Period Let us start from the voting stage (Stage 5′). If the consumer appoints a *Bad* P, the reform is never implemented, and they also bear a penalty ϕ'. If the consumer appoints a *Good* P, the reform is always implemented. Hence, the re-election rule described in Section 3.1 is optimal. The consumer re-elects the incumbent P if and only if $\hat{q} \geq q$, where $\hat{q}$ is the posterior belief that $\theta = Good$.

In Stage 4′, the equilibrium is analogous to the second period, and to the baseline model. We now turn our attention to the first-period lobbying equilibrium (Stage 2′-Stage 3′). A *Good* P always implements the pro-competitive reform. A *Bad* P faces a trade-off between accepting bribes *today* or ensuring re-election and bribes *tomorrow*. The solution of this trade-off depends on the discount factor δ.

The optimal contract is analogous to (5.9). This contract is IC for the two firms. In particular, as $\delta < 1$, firms have no incentives to give up protection *today* ($a = 0$) to induce the re-election of the *Bad* P and gain protection *tomorrow* ($a' = 0$). However, for this to be IR for P, it must be that:

$$2\Delta\pi(m) \geq \delta\left(2\Delta\pi(m) + V'\right) . \tag{5.10}$$

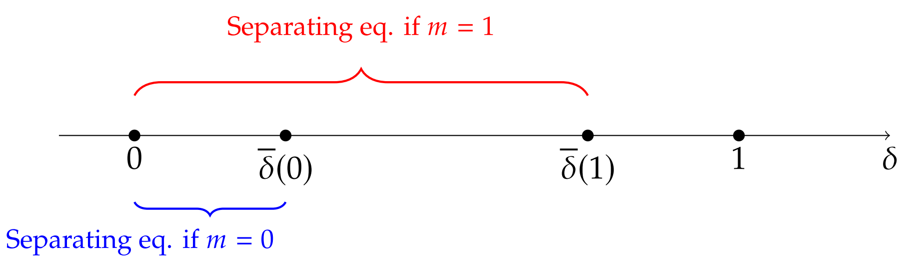
Accepting bribes *today* must be better than winning the office and getting bribes *tomorrow*. Unsurprisingly, this is optimal for P if and only if they are impatient enough. The IR constraint (5.10) implies:

$$\delta \leq \frac{2\Delta\pi(m)}{2\Delta\pi(m) + V'} := \bar{\delta}(m). \tag{5.11}$$

As in the baseline model, if (5.10) is not satisfied, the equilibrium is Pooling: both Ps types implement the policy and firms do not lobby. If instead (5.10) holds, the equilibrium is Separating. This more general model produces a

[26] If that was not the case, the optimal contract for P would be such that $t'^{*} = \Delta\pi(m) - \epsilon$, with $\epsilon \to 0_{+}$.

Figure 5.2: Existence of Separating Equilibrium with endogenous t, ϕ, V.



result equivalent to Proposition 1. The merger increases the likelihood that lobbying emerges in equilibrium as $\overline{\delta}(1) > \overline{\delta}(0)$. If $m = 1$, firms have more incentives to lobby, and a *Bad* P can ask for higher bribes. Since bribes *today* are more valuable than bribes *tomorrow*, the merger increases lobbying in the first period. Figure 5.2 illustrates this finding.

Merger Assessment We now briefly discuss the welfare analysis of the merger. In particular, we show that if, there are no benefits from separation other than those coming from the market ($\phi' = 0$), the optimal merger policy from the consumer's perspective is *always stricter* than the consumer welfare standard ($\mu^* \leq \overline{\mu}(0)$).

To see this, assume $\phi' = 0$ and $\delta \in \left(\overline{\delta}(0), \overline{\delta}(1)\right]$. In this case, there is a Separating equilibrium if and only if the merger is approved ($m = 1$). A separating equilibrium reduces the consumer's first-period payoff by providing a *Bad* P incentives to protect firms. However, it mitigates adverse selection of Ps, thereby potentially increasing their second-period payoff. Let $\Delta u(m) = u\left(d^*\left(p^m\left(0\right)\right)\right) - u\left(d^*\left(p^m\left(\eta\right)\right)\right) \geq 0$ be the loss in the consumer's utility stemming from the non-approval of the pro-competitive reform.

Let us consider the second period. In a Separating equilibrium, the consumer pays the penalty $\Delta u(1)$ with probability $(1-q)^2$, that is, if nature draws a *Bad* P *and* a *Bad* challenger. In a Pooling equilibrium, the consumer pays the penalty $\Delta u(0)$ with probability $1-q$, that is, if nature draws a *Bad* P. If $\Delta u(0)(1-q) < \Delta u(1)(1-q)^2$, the consumer's second-period payoff is higher in a Separating equilibrium. For this to be optimal in *lifetime* terms, it must be optimal for the consumer to pay the penalty $\Delta u(1)$ with probability $(1-q)$ in the first period (which would never happen in a Pooling equilibrium). However, since $\delta < 1$, paying the penalty *tomorrow* is always better than paying it *today*. Therefore, there are no potential political benefits that outweigh a price increase, and the merger must decrease prices to be approved ($\mu^* \leq \overline{\mu}(0)$).

On the contrary, if $\phi' > 0$, it can be the case that $\mu^* \geq \overline{\mu}(0)$ when ϕ' is high enough. The intuition is analogous to the baseline model. Let ϕ' be the cost for the consumer of detrimental policies that a corrupt P may implement in *other* sectors during the last period of office. For example, a corrupt P may extract public resources for themselves. As ϕ' increases, a first-period Separating equilibrium becomes more efficient for the consumer as it allows them to defeat a corrupted P with a higher probability. Then, if ϕ' is high enough, the consumer may want to sustain a price increase *today* in this sector to get benefits *tomorrow* in the other sectors. Hence, if and only if $\phi' > 0$, committing to the consumer welfare standard can still result in both type I and type II errors.

There are three main takeaways from this extension. First, a two-period model with endogenous ϕ, V, and t displays the same intuitions of the simple baseline model presented in Section 2: the merger increases lobbying. Second, when P is allowed to specify t as part of the mechanism, the optimal contract is such that all the surplus from trade is extracted from the two firms. P chooses the highest possible t so that firms are indifferent between lobbying or not. Third, the optimal merger policy may be less strict than the consumer welfare standard if and only if there are benefits from screening other than those coming from the narrowly defined market, for example, if corruptible politicians can implement regulations detrimental to consumers/voters in other parts of the economy.

6 Concluding Remarks

Zingales [2017] calls our attention to the risk of a "Medici vicious circle", in which economic and political power reinforce each other. Large firms can influence the rules of the game they play in the market. Society designs institutions and empowers them with legal tools: how should they account for the linkage between economic and political power?

In this paper, we consider how antitrust enforcement should react to the presence of political power, by joining a simple model of mergers from industrial organization with a political economy model of firms lobbying for regulation. Our model highlights a new trade-off associated with mergers. Mergers increase firms' political influence. On the one hand, this additional political power is bad for consumers as it reduces the level of competition politicians implement in the market. On the other hand, political power allows voters to screen politicians' types and punish corrupt ones. We also investigate how this trade-off interacts with traditional competition considerations in a merger's assessment. This allows us to contribute to the debate on the appropriateness of the *Consumer Welfare* in antitrust.

In our simple model, incumbent firms are aligned with respect to the action they want the politician to take, namely to reduce the threat of a competitive fringe. An important extension of our model would be to consider settings, still involving firms with market power, but when they are in disagreement over the action that the politician should take. Exploring this connection will provide further insights for a deeper understanding of the relationship between economic and political power.

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Appendix

The solution of the model can be replicated by downloading the Mathematica Annex.

A Proofs and Derivations

A.1 Equilibrium Prices

Suppose the two firms have not merged ($m = 0$). Profits are as follows:

$$\pi_i \left(p_i, p_j, p_3\right) = \frac{(p_i - c)(1 - \gamma - p_i(\gamma + 1) + (\gamma(p_j + p_3)))}{(1 - \gamma)(2\gamma + 1)} \,. \tag{A.1}$$

The FOCs imply:

$$\begin{aligned} \frac{\partial \pi_i \left(p_i, p_j, p_3\right)}{\partial p_i} &= \frac{1 + c - 2p_i + \gamma(c - 2p_i + p_j + p_3 - 1)}{1 - 2\gamma^2 + \gamma} = 0 \Rightarrow \\ p_i \left(p_j, p_3\right) &= \frac{\gamma(c + p_j + p_3 - 1) + c + 1}{2(\gamma + 1)} \,. \end{aligned} \tag{A.2}$$

Intersecting firms' best response functions, we get:

$$p_i^{m=0}\left(p_3\right) = \frac{\gamma\left(c + p_3 - 1\right) + c + 1}{\gamma + 2} \,. \tag{A.3}$$

It is easy to see that (A.3) is increasing in $p_3\,(a)$. Substituting (A.3) into demand functions and profits, we get:

$$\begin{aligned} d_i \left(p_i^{m=0}\left(p_3\right), p_j^{m=0}\left(p_3\right), p_3\right) &= \frac{(\gamma + 1)(1 - c - \gamma + \gamma p_3)}{(1 - \gamma)(\gamma + 2)(2\gamma + 1)} \\ \pi_i \left(p_i^{m=0}\left(p_3\right), p_j^{m=0}\left(p_3\right), p_3\right) &= \frac{(\gamma + 1)(1 - c - \gamma + \gamma p_3)^2}{(1 - \gamma)(\gamma + 2)^2(2\gamma + 1)} \,, \end{aligned} \tag{A.4}$$

with

$$\begin{aligned} &\frac{\partial d_i \left(p_i^{m=0}\left(p_3\right), p_j^{m=0}\left(p_3\right), p_3\right)}{\partial p_3} < 0 \,, \\ &\frac{\partial \pi_i \left(p_i^{m=0}\left(p_3\right), p_j^{m=0}\left(p_3\right), p_3\right)}{\partial p_3} < 0 \,. \end{aligned} \tag{A.5}$$

Therefore, profits of firm i increase in p_3 via two channels. First, an increase in the price of good 3 increases the demand of good i. Second, the higher the price of good 3, the milder the competition, and the higher the price that firm i can set.

If the merger is approved ($m = 1$), the merged firm solves:

$$\max_{p_1, p_2 \geq 0} \pi_1 (p_1, p_2, p_3) + \pi_2 (p_2, p_1, p_3) \ . \tag{A.6}$$

By FOCs, optimal prices are:

$$p_i^{m=1} (p_3) = \frac{1}{2}(c\mu + \gamma(p_3 - 1) + 1) \ , \tag{A.7}$$

with

$$\begin{aligned} &x_i \left(p_i^{m=1} (p_3), p_j^{m=1} (p_3), p_3\right) = \frac{c\mu + \gamma - \gamma p_3 - 1}{4\gamma^2 - 2\gamma - 2} \ , \\ &\pi_1 \left(p_1^{m=1} (p_3), p_2^{m=1} (p_3), p_3\right) + \pi_2 \left(p_2^{m=1} (p_3), p_1^{m=1} (p_3), p_3\right) = \\ &\frac{(c\mu + \gamma + \gamma(-p_3) - 1)^2}{2(1-\gamma)(2\gamma + 1)} \ . \end{aligned} \tag{A.8}$$

The comparative statics of (A.8) is analogous to (A.5).

We now compare prices (A.3), (A.7). The merger decreases prices if and only efficiencies are high enough:

$$p_i^{m=1} (p_3) < p_i^{m=0} (p_3) \Leftrightarrow \mu < \frac{2c(\gamma + 1) - \gamma(1 - \gamma + \gamma p_3)}{c(\gamma + 2)} := \overline{\mu} (p_3) \ . \tag{A.9}$$

A.2 Returns from Protection

If $m = 0$, firms' return from protection is:

$$\begin{aligned} &\Delta\pi_i (0) = \\ &\pi_i \left(p_i^{m=0} (\eta), p_j^{m=0} (\eta), \eta\right) - \pi_i \left(p_i^{m=0} (0), p_j^{m=0} (0), 0\right) = \\ &\frac{\gamma(\gamma + 1)\eta(2(c-1) - \gamma(\eta - 2))}{(1-\gamma)(\gamma + 2)^2(2\gamma + 1)} \ . \end{aligned} \tag{A.10}$$

If $m = 1$, firms' return from protection is:

$$\begin{aligned} &\Delta\pi_i(1) = \\ &\pi_i\left(p_i^{m=1}(\eta), p_j^{m=1}(\eta), \eta\right) - \pi_i\left(p_i^{m=1}(0), p_j^{m=1}(0), 0\right) = \\ &\frac{\gamma\eta(\gamma(\eta-2) - 2c\mu + 2)}{4(1-2\gamma^2+\gamma)} . \end{aligned} \tag{A.11}$$

It is easy to see that $\Delta\pi(1) > \Delta\pi(0) \geq 0$ always.

A.3 Merger Policy

We start by writing down the authority's payoff across the different equilibria. Let $m = 0$. In a Pooling equilibrium :

$$\begin{aligned} &W_{Pool}(0) = \\ &\frac{1}{4}\left(c^2 - 2c - 4(1-q)\phi + 3\right) + \\ &+ \frac{\gamma\left(6\gamma^3 + c^2\left(2\gamma^2 + 7\gamma + 7\right)\gamma + 7\gamma^2 + c\left(-4\gamma^3 - 6\gamma^2 + 2\gamma + 8\right) - 5\gamma - 8\right)}{4(1-\gamma)(\gamma+2)^2(2\gamma+1)} . \end{aligned} \tag{A.12}$$

Let $m = 1$. In a Pooling equilibrium :

$$\begin{aligned} &W_{Pool}(1) = \\ &\frac{1}{4}\left(c^2\mu^2 - 2c\mu + 4(q-1)\phi + 3\right) - \frac{\gamma\left(\gamma\left(-2c^2\mu^2 + 4c\mu - 3\right) + c^2\mu^2 - 4c\mu + 3\right)}{4(1-\gamma)(2\gamma+1)} . \end{aligned} \tag{A.13}$$

Let $m = 0$. In a Separating equilibrium :

$$\begin{aligned} &W_{Sep}(0) = \\ &A\eta^2 + B\eta + C \ , \end{aligned} \tag{A.14}$$

where

$$
\begin{aligned}
&C = \\
&\frac{2c^2(\gamma+1)^2 + 4c(\gamma-1)(\gamma+1)^2 + (\gamma-1)\left(-7\gamma^2 - 14\gamma + (\gamma+2)^2(2\gamma+1)q - 6\right)}{2(1-\gamma)(\gamma+2)^2(2\gamma+1)} + \\
&+ \frac{q}{2} - (q-1)\phi(qx-1)\;; \\
&A = \\
&\frac{\left(4-\gamma\left(3\gamma^2+\gamma-8\right)\right)(1-q)}{2(1-\gamma)(\gamma+2)^2(2\gamma+1)}\;; \\
&B = \\
&\frac{\eta\left(4c\gamma(\gamma+1)^2(q-1) - 2(\gamma-1)(5\gamma(\gamma+2)+4)(q-1)\right)}{2(1-\gamma)(\gamma+2)^2(2\gamma+1)}\;.
\end{aligned}
\tag{A.15}
$$

Let $m = 1$. In a Separating equilibrium :

$$
\begin{aligned}
&W_{Sep}(1) = \\
&D\mu^2 + E\mu + F\;,
\end{aligned}
\tag{A.16}
$$

where

$$
\begin{aligned}
&F = \\
&\frac{\gamma(\gamma(q+2)-2q-1)}{4(1-\gamma)(2\gamma+1)} + \frac{(1-\eta)(1-q)\left(3\gamma^2(\eta-1) - 2\gamma\eta - 2\eta + 2\right)}{4(1-\gamma)(2\gamma+1)} + \\
&+ \frac{1}{4}\left(\mu^2 - 2\mu - 4(1-q)\phi(1-qx) + 2q + 1\right)\;; \\
&D = \\
&\frac{\left(2\gamma^2 - \gamma - (1-c)(1+c)\right)}{4(1-\gamma)(2\gamma+1)}; \\
&E = \\
&-\frac{\left(4\gamma^2 + 2c\gamma\eta - 2(c+1)\gamma - 2c\gamma\eta q - 2(1-c)\right)}{4(1-\gamma)(2\gamma+1)}\;.
\end{aligned}
\tag{A.17}
$$

We now obtain the critical thresholds $\tilde{\mu}, \overline{\mu}(0), \hat{\mu}, \overline{\mu}(\eta)$. These thresholds are obtained from finding the admissable roots of a quadratic equation in μ. Specifically, for all $h, l \in \{Sep, Pool\}$, we solve

$$
W_k(1) - W_l(0) = W\mu^2 + S\mu + T\;,
\tag{A.18}
$$

where W, S, T are constant in μ and $W > 0$ always. Findings are reported next.

$$\begin{aligned}
&\mu \leq \hat{\mu} \Rightarrow W_{Sep}(1) \geq W_{Sep}(0) \text{ , where} \\
&\hat{\mu} = \\
&\frac{(\gamma+2)(1-\gamma+\gamma\eta(1-q)) - \sqrt{G\eta^2 + H\eta + I}}{c(\gamma+2)} \text{ and} \\
&G = \gamma^2(1-q)\left(4(\gamma+1)^2 - (\gamma+2)^2 q\right) \\
&H = 8\gamma(\gamma+1)^2(1-q)(1-c-\gamma) \\
&I = 4(\gamma+1)^2(c+\gamma-1)^2 \text{ ;}
\end{aligned} \tag{A.19}$$

$$\begin{aligned}
&\mu \leq \tilde{\mu} \Rightarrow W_{Sep}(1) \geq W_{Pool}(0) \text{ , where} \\
&\tilde{\mu} = \\
&\frac{(\gamma+2)(1-\gamma+\gamma\eta(1-q)) - \sqrt{L\gamma^4 + M\gamma^3 + N\gamma^2 + Q\gamma + R}}{c(\gamma+2)} \text{ and} \\
&L = (1-q)(8qx\phi - \eta(8-\eta(q-4))) + 4 \\
&M = 8c - 2(1-q)\left(\eta(\eta(2q-7)+14) - 14qx\phi\right) \\
&N = 4c(c+2) - 2(1-q)\left(\eta(\eta(2q-3)+6) - 6qx\phi\right) - 8 \\
&Q = 8((c-1)c - 2(1-q)((\eta-2)\eta + 2qx\phi)) \\
&R = 4(c-2)c - 8(1-q)((\eta-2)\eta + 2qx\phi) + 4 \text{ ;}
\end{aligned} \tag{A.20}$$

$$\begin{aligned}
&\mu \leq \overline{\mu}(0) \Rightarrow W_{Pool}(1) \geq W_{Pool}(0) \text{ , where} \\
&\overline{\mu}(0) = \frac{2c(\gamma+1) + (\gamma-1)\gamma}{c(\gamma+2)} \text{ .}
\end{aligned} \tag{A.21}$$

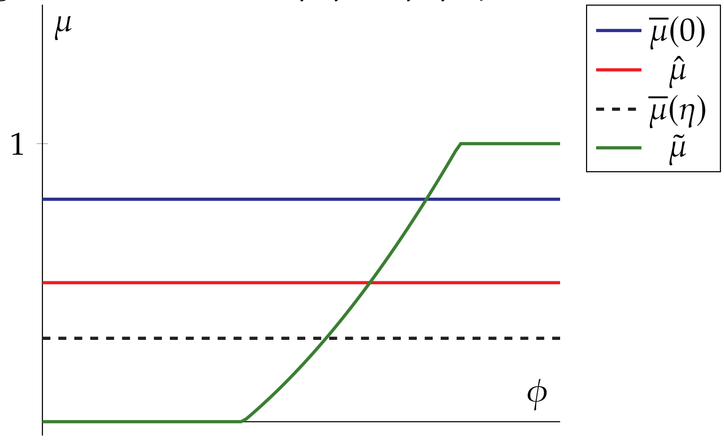
Additional details are available in the Mathematica Annex. In Figure A.1, we plot the different thresholds as a function of ϕ.

A.4 Proof that $\tilde{\mu} \gtreqless \overline{\mu}(0)$

The authority approves the merger if and only if:

$$\begin{aligned}
&W_{Sep}(1) - W_{Pool}(0) \geq 0 = \\
&q\left[u\left(d^*\left(p^{m=1}(0)\right)\right)\right] + \\
&(1-q)\left[u\left(d^*\left(p^{m=1}(\eta)\right)\right) + (1-x)(-\phi) + x(1-q)(-\phi)\right] + \\
&-u\left(d^*\left(p^{m=0}(0)\right)\right) - (1-q)(-\phi) \geq 0 \text{ .}
\end{aligned} \tag{A.22}$$

Figure A.1: Thresholds $\tilde{\mu}, \overline{\mu}(0), \hat{\mu}, \overline{\mu}(\eta)$ as a function of ϕ



Let us define $s(\phi)$ as the expected benefit for the voter in the Separating equilibrium :

$$s(\phi) = -\phi \Delta P(\theta^* = Bad) \ , \tag{A.23}$$

where

$$\begin{aligned} &\Delta P(\theta^* = Bad) = \\ &[(1-q)(x(1-q)+(1-x))] - (1-q) = \\ &-(1-q)qx \leq 0 \end{aligned} \tag{A.24}$$

is the difference in the probability of election of a *Bad* P between the two equilibria. Since $s(\phi) \geq 0$ always, the voter prefers the Separating equilibrium. Moreover, $s' > 0$ and $s(0) = 0$.

Now, we rewrite (A.22) as follows:

$$\begin{aligned} &W_{Sep}(1) - W_{Pool}(0) \geq 0 = \\ &\left[qu\left(d^*\left(p^{m=1}(0)\right)\right) + (1-q)\,u\left(d^*\left(p^{m=1}(\eta)\right)\right) - u\left(d^*\left(p^{m=0}(0)\right)\right)\right] + s(\phi) \geq 0 \end{aligned} \tag{A.25}$$

(A.25) allows us to isolate the effects of the merger on the consumer's and the voter's payoffs.

Let us assume $\phi = 0$ and consider the consumer's perspective. If the merger is approved, the reform is implemented with probability q, while if the merger is not approved, the reform is implemented with probability 1. Therefore, a very high level of efficiencies (lower μ) is needed for the merger to be pro-competitive. In particular, if $\phi = 0$, $\tilde{\mu} < \overline{\mu}(0)$ necessarily.

We can see this by contradiction. Assume $\phi = 0$ and $\tilde{\mu} \geq \overline{\mu}(0)$. For the merger to be pro-competitive, it must decrease prices. Then,

$$\begin{aligned} &\mu \in [\overline{\mu}(0), \tilde{\mu}) \Rightarrow \\ &q p_i^{m=1}(0) + (1-q) p_i^{m=1}(\eta) \leq p_i^{m=0}(0) \Rightarrow \\ &p_i^{m=1}(0) < p_i^{m=0}(0). \end{aligned} \tag{A.26}$$

which contradicts (4.1). In words, if $\mu \in (\overline{\mu}(0), \tilde{\mu})$ and the merger is pro-competitive when the reform is implemented with probability < 1, then it must also be pro-competitive when the reform is implemented with probability 1, which we know it is not the case. Finally, since (A.25) is increasing in ϕ, then also $\tilde{\mu}$ increases in ϕ.[27]

By the same logic, one can see that $\tilde{\mu}$ can be lower than $\overline{\mu}(\eta)$. To see this with an example, consider the extreme case than $q = 0$ (all politicians are *Bad*) and $\phi = 0$. The authority approves the merger if and only if

$$\begin{aligned} &u\left(d^*\left(p^{m=1}(\eta)\right)\right) > u\left(d^*\left(p^{m=0}(0)\right)\right) \Rightarrow \\ &p^{m=1}(\eta) < p^{m=0}(0) \ . \end{aligned} \tag{A.27}$$

Recall that

$$\mu \leq \overline{\mu}(\eta) \Rightarrow p^{m=1}(\eta) < p^{m=0}(\eta) \ . \tag{A.28}$$

Since

$$p^{m=0}(0) < p^{m=0}(\eta) \ , \tag{A.29}$$

a higher level of efficiencies is required for (A.27) to hold:

$$\tilde{\mu} < \overline{\mu}(\eta) \ . \tag{A.30}$$

We show next some numerical examples of the relationship between $\tilde{\mu}$, $\overline{\mu}(\eta)$ $\overline{\mu}(0)$, $\hat{\mu}$, and we comment on some limiting cases.

Table A.1 shows that as we increase ϕ, $\tilde{\mu}$ becomes larger than $\overline{\mu}(0)$.

Table A.2 shows that when $q = 1$ (all politicians are *Good*), the optimal merger policy always coincides with the consumer welfare standard $\overline{\mu}(0)$.

Table A.3 shows that when $q = 0$ (all politicians are *Bad*), $\hat{\mu} = \overline{\mu}(\eta)$. In this case, $\tilde{\mu} = 0$. No merger is approved when allowing the merger creates a

[27] Suppose $\phi \to \infty$, then even if the merger does not bring efficiencies ($\mu = 1$), it is implemented. By monotonicity, it exists some $\tilde{\phi} < \infty$ such that $\tilde{\mu} = \overline{\mu}(0)$.

Separating equilibrium, as this Separating equilibrium is very inefficient from the voter's perspective.

ϕ	$\tilde{\mu}$	$\overline{\mu}(0)$	$\hat{\mu}$	$\overline{\mu}(\eta)$
0.3	0	0.366667	0.222818	0.116667
0.5	0	0.366667	0.222818	0.116667
0.8	0.134601	0.366667	0.222818	0.116667
1	0.951899	0.366667	0.222818	0.116667

Table A.1: Optimal merger policy when $\eta = 0.3; \gamma = 0.5; x = 0.5; q = 0.5; c = 0.12$

ϕ	$\tilde{\mu}$	$\overline{\mu}(0)$	$\hat{\mu}$	$\overline{\mu}(\eta)$
0.3	0.366667	0.366667	0.366667	0.116667
0.5	0.366667	0.366667	0.366667	0.116667
0.8	0.366667	0.366667	0.366667	0.116667
1	0.366667	0.366667	0.366667	0.116667

Table A.2: Optimal merger policy when $\eta = 0.3; \gamma = 0.5; x = 0.5; q = 1; c = 0.12$

ϕ	$\tilde{\mu}$	$\overline{\mu}(0)$	$\hat{\mu}$	$\overline{\mu}(\eta)$
0.3	0	0.366667	0.116667	0.116667
0.5	0	0.366667	0.116667	0.116667
0.8	0	0.366667	0.116667	0.116667
1	0	0.366667	0.116667	0.116667

Table A.3: Optimal merger policy when $\eta = 0.3; \gamma = 0.5; x = 0.5; q = 0; c = 0.12$

B Generalization of Proposition 1 to Supermodular Games

In this Section, we show that Proposition 1 follows from the supermodularity of the Bertrand game, and so it easily extends to any supermodular game. The concepts used in this Section are standard and come from Milgrom and Shannon [1994], Topkis [1998], and Levin [2003].

Let us define the following game. Let $i \in \{1, 2\}$ index the two firms. Each firm's action is $a_i \in A_i$, where A_i is the action space, which we assume to be a compact set. Let $\pi_i(a_i, a_j, a)$ be the payoff of firm i, where $a \in \{0, 1\}$ is the politician's action, which we interpret as in the baseline model, so that $\pi_i(a_i, a_j, a)$ is decreasing in a. Assume P chooses a before firms choose their actions. Then, we can interpret a as a parameter. We assume that $\pi_i\left(a_i, a_j, a\right)$ is continuous.

If $m = 1$, firms' choose a_i, a_j cooperatively. If $m = 0$, they choose a_i, a_j simultaneously and independently. Our aim is to show that each firm's marginal benefit from reducing a increases after a merger ($m = 1$).

Before introducing the notion of supermodularity, we define two additional elements. First, for expositional convenience, let us introduce the following notation: $\bar{a} = -a$, so that $\pi_i\left(a_i, a_j, \bar{a}\right)$ increases in $\bar{a}$. Second, we introduce the property of *increasing differences* (ID). A function $f(x, t)$ satisfies ID in (x, t) if and only if, for all $x \in X, t \in T$, where X, T are two (partially) ordered sets, such that $x' \geq x, t' \geq t$, the following property holds:

$$f(x', t') - f(x, t') \geq f(x', t) - f(x, t) \ . \tag{B.1}$$

Condition (B.1) implies that the marginal value from increasing x is higher when t is higher.

We assume that the game described above is a supermodular game with positive spillovers indexed in $\bar{a}$ (Levin [2003]), that is,

(a) For all i, j, the function $\pi_i\left(a_i, a_j, \bar{a}\right)$ satisfies ID in $\left(a_i, a_j\right)$;

(b) For all i, the function $\pi_i\left(a_i, a_j, \bar{a}\right)$ satisfies ID in $(a_i, \bar{a})$;

(c) For all i, j, the function $\pi_i\left(a_i, a_j, \bar{a}\right)$ increases in a_j.

Let us define $\left(a_i^{m=1}, a_j^{m=1}\right)$ as the optimal actions for the two firms if $m = 1$.[28] If $m = 0$, by the supermodularity of the game, there is at least one Nash Equilibrium in pure strategies. Let $\left(a_i^{m=0}, a_j^{m=0}\right)$ be the Nash Equilibrium actions of the game if $m = 0$.[29]

By (c):

$$\left(a_i^{m=1}, a_j^{m=1}\right) \geq \left(a_i^{m=0}, a_j^{m=0}\right) \ , \tag{B.2}$$

which implies:

$$\forall \bar{a}, \pi_i\left(a_i^{m=1}, a_j^{m=1}, \bar{a} = 0\right) - \pi_i\left(a_i^{m=0}, a_j^{m=0}, \bar{a} = 0\right) \geq 0. \tag{B.3}$$

[28]These maximizers exist by the continuity of payoff functions and the compactness of action spaces.

[29]In case of a multiplicity of equilibria, we select, without loss of generality, the Pareto undominated equilibrium, which exists by (c) (Levin [2003]).

Because of *pair-wise* ID between any pair of its arguments, the function π_i is supermodular.[30] Therefore, increasing both actions a_i, a_j has an higher marginal return when $\bar{a}$ is higher:

$$\begin{aligned} &\pi_i\left(a_i^{m=1}, a_j^{m=1}, \bar{a}=0\right) - \pi_i\left(a_i^{m=0}, a_j^{m=0}, \bar{a}=0\right) \geq \\ &\pi_i\left(a_i^{m=1}, a_j^{m=1}, \bar{a}=-1\right) - \pi_i\left(a_i^{m=0}, a_j^{m=0}, \bar{a}=-1\right) \end{aligned} \tag{B.4}$$

and by the symmetry of ID:

$$\begin{aligned} &\pi_i\left(a_i^{m=1}, a_j^{m=1}, \bar{a}=0\right) - \pi_i\left(a_i^{m=1}, a_j^{m=1}, \bar{a}=-1\right) \geq \\ &\pi_i\left(a_i^{m=0}, a_j^{m=0}, \bar{a}=0\right) - \pi_i\left(a_i^{m=0}, a_j^{m=0}, \bar{a}=-1\right) \geq 0 \end{aligned} . \tag{B.5}$$

Intuitively, because of a merger, firms set actions cooperatively and take positive spillovers into account. Then, they choose higher actions. If the marginal value of increasing actions a_i, a_j increases as a $\bar{a}$ increases (a decreases), then, by symmetry, the marginal value of increasing $\bar{a}$ (decreasing a) increases when actions are higher.

Note that the Bertrand game is a supermodular game. The Cournot duopoly is a supermodular game if one player's strategy set is given the reverse of its usual order (Levin [2003]). For more examples, see Levin [2003]. Note also that this proof does not require any assumption on the degree, concavity, or differentiability of profit functions. If a_i, a_j are interpreted as prices, then (B.5) implies

$$\forall i\ , a_i^{m=1}(\overline{a}=0) - a_i^{m=0}(\overline{a}=0) > a_i^{m=1}(\overline{a}=-1) - a_i^{m=0}(\overline{a}=-1)\ , \tag{B.6}$$

which confirms that the welfare analysis performed in Section 4 would easily extend to this more general model.

If the sign of (B.5) is inverted, then a merger decreases firms' incentives to lobby. We have shown that this can never be the case if the market interaction is a game with spillovers and supermodular payoffs.

[30] To apply the properties of supermodular functions, we need to impose the assumption that the set $A_i \times A_j \times \{0, 1\}$ is a lattice.