Optimal Regulation of the Media Industry*

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November 2012

Abstract

This paper studies how a society should optimally organize and regulate its media industry. First, a political economy model of the media industry is developed. Second, a constitutional stage is considered and the optimal regulation of the industry is deduced. A simple but powerful normative message is derived from this analysis. The media should not be treated as a standard industry. Even if it operates under increasing returns to scale, this is not enough to conclude that the best solution is a media monopoly. Unless media productivity is extremely low, the optimal regulation is either to encourage entry with subsidies or to impose moderate entry limitations. It is worthwhile to pay the extra costs associated with several media companies obtaining and reporting the same news because competition avoids media capture and the corresponding dissipation of resources in the political system.

JEL Classification codes: D43, D61, D78

Keywords: Media, Capture, Principal-Agent, Optimal Regulation

1 Introduction

The media industry plays a crucial role in all modern societies, where the majority of citizens does not have direct access to relevant information about public policies, but rather obtains it by reading newspapers, listening to the radio and watching television. Many authors have acknowledged the importance of the media in modern politics and drawn attention to the effects of the media on political outcomes (see, e.g., MacChesney 2004 and Bagdikian 2004). However, to the best of my knowledge, there is no systematic work that studies how society should organize and regulate its media industry. The goal of this paper is to fill this gap.

The organization and regulation of the media industry varies greatly across countries and, sometimes, even within a country over time. In contrast to most of the autocratic regimes where the state tightly controls the media, in democracies, the state presence in media is more restricted and diverse. For example, Dejankov et al. (2002) document the contrast between autocratic regimes in which the state almost always controls television and has a strong presence in newspapers, with democratic countries, where the government does not own newspapers and has a limited presence in television (almost none

*I would specially like to thank Sebastian Galiani and David Levine for their permanent encouragement, insightful comments and suggestions, and infinite patience supervising this project. I also appreciate very helpful comments from Costas Azariadis, Juan Pantano, Itai Sened and Jorge Streb. As usual, any remaining mistakes are my own.

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in the United States and intermediate presence in Europe and other democracies). Moreover, there has been an increasing interest in the regulation of the media and regulatory reforms have been discussed and even introduced in some countries.[1] This paper seeks to develop a normative framework that can be used to evaluate current organizational diversity and potential future reforms to existing regulations in the media industry.

Information, the commodity provided by the media industry, has several characteristics. First, information can be seen as a public good since many agents can use the same piece of information at the same time (it is a non-rival good) and it is difficult to exclude the agents that do not pay for it (it is a non-excludable good). Second, there are important economies of scale in the process of gathering and disseminating information. While there are significant fixed costs of gathering information (e.g., journalists and distribution facilities), the marginal costs of an extra subscription are very low. Thus, information is a public good with decreasing average costs of production. This suggests that we should employ the standard literature on Public Economics and Regulation in order to deduce the optimal regulation of the media industry.

Unfortunately, the existing literature cannot be blindly applied to the media industry because a distinctive characteristic of the media is its vulnerability to political manipulation. Some groups might pay for receiving accurate information while others might pay to suppress or distort information. For example, politicians and bureaucrats could be tempted to censor or bribe the media to suppress information about corruption; or special interest groups could use their economic power to influence news about the effects of public policies. Obviously, this is not in the interest of the general public, which benefits from accurate and unbiased information.[2]

These two characteristics have created a tension on conventional views about the optimal organization and regulation of the media. On one hand, those who emphasize economies of scale and believe in a more benevolent government tend to recommend a state-owned monopoly or, at least, more government involvement. Indeed, a state-owned company or a regulated private monopoly would be the standard textbook solution to an industry with decreasing average costs. On the other hand, those who focus attention on information distortion and manipulation tend to favor a more competitive industry integrated by several privately owned companies. The starting point of this paper is to acknowledge that both features are present and then ask the normative question: How should society organize the media industry? Following Laffont (2000), the approach is to consider this question as a problem of constitutional design. In other words, the goal of this paper is to deduce optimal constitutional norms for the media industry.

Besides more fundamental issues, such as freedom of speech, and more practical issues, such as journalists' right to not reveal their sources, there are two key instruments to consider in a realistic constitutional design problem. First, should society encourage or restrict entry into the media industry? Note the normative trade off. While economies of scale call for entry restrictions, the dangers of

[1] For example, in 2009 the Argentine Congress enacted the controversial Law No. 26522, which introduced changes in the regulation of the media (see http://www.infoleg.gov.ar for the full text of the law). In 2011 the Brazilian Congress enacted Law No. 12485, which changed the norms for the provision of Pay TV services. In particular, the law eliminated previous restrictions to foreign investments in Pay TV services, and introduced restrictions on cross-ownership in telecommunications activities (see Beppu and Sampaio at http://www.latinlawyer.com for a summary of the law).

[2] An extreme case is Peru during the 1990's. As McMillan and Zoido (2003) document, Vladimiro Montesinos, president Fujimori's chief of the secret police, systematically bribed congressmen, judges and other political players. Moreover, he managed to avoid any public exposure for more than 10 years offering very generous bribes to the most important newspapers and television stations of the country.

information distortion and manipulation suggest a need for a more competition. Second, should society encourage or restrict the participation of some specific groups in the media? Note again the normative trade off. A highly conglomerated media industry probably helps special interest groups manipulate information about public policies, especially when they are required to inform the public about policies that affect business within the conglomerate. For example, if the same conglomerate owns a company that pollutes the environment and a newspaper, the newspaper may report distorted information about the impact of a new environmental regulation. Similarly, bureaucrats that control a public media may tend to suppress news that would negatively affect an incumbent politician. However, conglomerates can help special interest groups to limit the power of politicians and public media can help politicians to reduce the power of special interest groups. In other words, the constitution can use conglomerates and public media to erect an optimal web of checks and balances.

Modeling different groups that try to control several media companies is not an easy task. Hence, I begin by developing a baseline model with only one group capable of influencing the media. Then, I extend the analysis to two groups. The baseline model includes a politician, who is more informed than the general public about collective decisions (the cost of public projects) and a media industry that gathers information about these collective decisions (each media company receives an informative signal of the cost of public projects). The politician would like to keep the general public uninformed so he can extract informational rents, but in order to do so he must convince each media company to suppress the information about these collective decisions. Media companies which decide to suppress information collects bribes from the politician, but lose their audience. Since audience-related revenues are particularly high when no company is reporting news, in equilibrium, the politician captures the whole industry only if he is willing to bribe every media company with the amount that each company would receive if it was the only one in the industry. As a result competition in the media industry makes media capture more difficult.

The baseline model has some of the basic features of a model developed by Besley and Prat (2006). In particular, it assumes that the general public is informed even when only one media reports the news. This implies that if the politician wants to suppress information, he must bribe and capture the whole industry. However, there are important differences between this paper and Besley and Prat (2006). First, the main focus of the current work is normative, i.e., the goal is to deduce the optimal organization of the media. Second, while Besley and Prat (2006) consider an adverse selection model in which the general public must decide whether to reelect an incumbent who can be good (i.e., generates a surplus of 1 to the general public) or bad (i.e., generates no surplus to the general public), in my model the general public and the politician play a principal-agent game in which the general public is the uninformed principal and the politician is the informed agent. As a consequence, the rents of the politician and the surplus of the general public come from the principal-agent game, rather than being exogenous variables. Third, my model assumes that audience-related revenues are not exogenous, but proportional to the expected surplus the public can get if the media reports information. The intuition is that in the long run the public is willing to expend on media subscriptions an amount proportional to the surplus it gets with the information provided by the media.

Adding a constitutional stage to the baseline model I deduce the optimal regulation of the media industry. A simple but powerful normative message is derived from this analysis. The media should not be treated as a standard increasing-returns industry. Although there can be good reasons to believe that the media operates under increasing returns to scale, this is not enough to conclude that the best solution

is a media monopoly. In fact, if media productivity is higher than a threshold, the optimal regulation is either to encourage entry with subsidies or to impose a moderate entry limitation (Proposition 2). It is worthwhile to pay the extra costs associated with several media companies obtaining and reporting the same news because competition makes media capture more difficult, avoiding the dissipation of resources in the political system. In more technical terms, the general public is the principal, the politician is the agent and the media plays the role of a supervisor that can be captured by the agent. Indeed, there are multiple supervisors because there are several media companies and the optimal regulation encourages or restricts entry in order to induce the optimal number of supervisors.

A limitation of the baseline model is that only the politician is allowed to influence the media. However, special interest groups could also have incentives to manipulate information (Grossman and Helpman, 2001). In fact, Corneo (2005) and Petrova (2008) build models of media capture that stress the role of special interest groups. In Corneo's model, agents have different shares in a company that pollutes the environment, but they do not know the social cost of the pollution. The media gathers information about this cost and then approaches one agent to bargain over the report. In equilibrium, the media tends to form a conglomerate with a rich agent and to misreport the social cost of pollution. In Petrova's model, there are only two groups: the rich, who are informed about the cost of public goods, and the poor, who do not know the cost of public goods. As a consequence of this information asymmetry, the rich have an incentive to bribe the media to keep the poor median voter uninformed about the cost of public goods. In an extension, I introduce special interest groups to the baseline model.[3]

In the extended model there are two policy variables and two players who try to influence the media (the politician and the elite). One of the policy variables models the vertical dimension of social conflict (i.e., the conflict between citizens and the politician) while the other models the horizontal dimension of social conflict (i.e., the conflict between the elite and the general public). In equilibrium, the elite plays an ambiguous role in the media industry. On one hand, it tends to neutralize the politician by making media capture more difficult for him. On the other hand, the elite encourages the media to withhold information when it can be used to promote policies that negatively affect its interest. Two new messages emerge from the normative analysis of this extended model. First, restricting the involvement of the elite in the media industry tends to increase social welfare when the horizontal dimension of social conflict dominates, but tends to reduce it when the vertical dimension horizontal dominates (Propositions 6). Second, free entry is even more appealing when the elite has the ability to influence the media (Propositions 7).

The rest of the paper is organized as follows: Section 2 presents the baseline model. Section 3 defines and characterizes the equilibrium of the model (Proposition 1). Section 4 derives the optimal regulation of the media under the assumption that the media industry is a natural monopoly. This section contains the core message of the paper (Propositions 2-4). Section 5 confirms that analogous results apply if the media industry is a natural oligopoly (Proposition 5). Section 6 extends the baseline model and characterizes the optimal regulation in this extended setting (Proposition 6 and 7). Finally, section 7 presents the conclusions.

[3]The politician of the baseline model can be considered a special interest group. However, the really interesting environment is one in which a politician and a special interest group are two separate entities.

2 A model of the media industry

In this section I develop a principal-agent model augmented with a media industry. The general public is the principal, the politician is the agent and the media companies gather information about public policies and transmit it to the general public.

Consider a simple economy with one private good and one public good. The general public has an endowment of the private good y. The public good is produced with a simple linear technology, i.e., the total cost of producing g units of it is cg units of the private good. The unit cost of the public good c is a random variable that can adopt the values c_L or c_H ($c_L < c_H$) with probabilities $p \in (0,1)$ and $(1-p)$, respectively.

The general public gets utility from the consumption of both goods. The provision of the public good is financed with a tax T, which generates a deadweight loss of λT units of the private good, where $\lambda \geq 0$. The general public also expends E_M units of its endowment on media subscriptions. Thus, the utility function of the general public is given by:

$$u_{GP}(g, T, E_M) = u(g) + y - (1+\lambda)T - E_M, \tag{1}$$

where the sub-utility function u is strictly increasing, strictly concave, twice continuously differentiable and satisfies $\lim_{g\to 0} u'(g) = \infty$ and $\lim_{g\to\infty} u'(g) = 0$. $E_M = \sum_{i=1}^{n} E_{M,i}$, where $E_{M,i}$ is the general public expenditure on media subscriptions of company $i = 1, ..., n$.

The politician collects the taxes and provides the public good. He also expends B units of the private good on bribes to the media industry. Thus, the utility function of the politician is given by:

$$u_P(g, c, T, B) = T - cg - B, \tag{2}$$

where $B = \sum_{i=1}^{n} B_i$, and B_i is the bribe the politician gives to media company $i = 1, ..., n$.[4]

The information about the cost of the public good is asymmetrically distributed among the politician, the general public and the media. In particular, the politician knows the realization of c, the general public only knows the probability distribution of c, and the media industry receives an informative signal about c, which I denote s. Table 1 shows the probability distribution of the signal s. Note that when $c = c_L$, the media is perfectly informed ($s = c_L$) with probability δ and it does not have any information ($s = \varnothing$) with probability $(1-\delta)$, while when $c = c_H$, the media does not receive any information ($s = \varnothing$).

[4] In reality bribes can adopt several forms and they do not only represent direct payments to newspapers, radios and television channels as it was the case of Peru during the 1990's. Advertising can be a more subtle and indirect way of bribing the media. Indeed, DiTella and Franceschelli (2011) show that the extent to which the main newspapers in Argentina report government corruption is negatively correlated with the extent to which each newspaper receive government advertisement. Bribes can also be non-pecuniary in the form of favorable treatment or access. For example, McChesney (2004) suggests that presidents in the United States give exclusive interviews only to journalists who report a favorable view of their administration. Thus, although in the model bribes are direct payments, they should be interpreted as representing any direct or indirect way through which the politician buys media silence.

		Signal Value	
		$s = c_L$	$s = \varnothing$
Actual Value	$c = c_L$	δ	$1 - \delta$
	$c = c_H$	0	1

Table 1: Probability distribution of the signal s

The media cannot fabricate news. Thus, when $s = \varnothing$, every media company is forced to report $r_i = \varnothing$, while when $s = c_L$, each media company can choose to report the truth ($r_i = c_L$) or it can withhold the signal ($r_i = \varnothing$). Table 2 summarizes possible media reports for each signal value.

	Signal Value	
	$s = c_L$	$s = \varnothing$
Possible Report (r_i)	$\{c_L, \varnothing\}$	$\varnothing$

Table 2: Possible reports

The assumption that the media can withhold, but not fabricate information implies that information is verifiable. Although this seems a strong assumption, the key idea is that news are at least partially informative. In other words, news are not pure cheap talk, which implicitly requires that the signal s comes from an "independent" source of information.[5]

Media companies have two sources of revenue: news-related revenues (e.g., subscriptions and advertisement) and bribes.[6] In particular, media company i gets $E_{M,i}$ from news-related revenues (the general public expenditure on media i) and B_i from bribes paid by the politician. The cost of receiving the signal for an individual company is C_S (for example, the cost of journalists and facilities). Then, the payoff function of media company i is given by:

$$u_{M,i}\left(E_{M,i}, B_i, C_S\right) = E_{M,i} + B_i - C_S. \tag{3}$$

[5] For example, Bagdikian (2004) and McChesney (2004) discuss the role of the media during the Iraq war and they conclude that the media failed to inform the American public about crucial issues (such as the existence of weapons of mass destruction in Iraq). They argue that the critical problem was that media companies blindly relied on official sources of information. However, this is probably an extreme case, in which it is very costly to get an independent source of information. In terms of the model, this is a situation in which the politician controls the signal or the cost of an independent signal is prohibitive.

[6] Theoretically, it is easy to separate news-related revenues and bribes. The key distinction is that news-related revenues come from agents that demand information (e.g., subscribers and commercial advertisement), while bribes come from agents that want to suppress or manipulate information. However, in reality it is very difficult to disentangle them. For example, imagine that the government is advertising in the media a new vaccination program. This advertisement could be part of a real effort to inform the population about the advantages of the program and, hence, it should be treated as a news-related revenue. However, it is also possible that the advertisement, or part of it, is just a hidden bribe to media companies in order to suppress information about corruption in the vaccination program.

The expenditure on media subscriptions depends on the news. When there are no news ($r_i = \varnothing$ for all $i = 1, ..., n$) the general public does not expend anything on media subscriptions, while when there are some news the general public expends a positive amount. Thus, the expenditure on subscriptions as a function of the reports is given by:

$$E_M(r_1, ..., r_n) = \begin{cases} 0 & \text{if } r_i = \varnothing \text{ for all } i, \\ \bar{E}_M & \text{if } r_i = c_L \text{ for at least one } i, \end{cases} \tag{4}$$

where $\bar{E}_M > 0$. In the long run, it is reasonable to assume that the expenditure on media subscriptions bears some proportion to the value that information has for the general public. Thus,

$$\bar{E}_M = \gamma \left\{ \mathbf{E}\left[u_{GP}(r = c_L)\right] - \mathbf{E}\left[u_{GP}(r = \varnothing)\right] \right\}, \tag{5}$$

where $\mathbf{E}\left[u_{GP}(r = c_L)\right]$ is the expected utility of the general public when there is at least one media company i that reports $r_i = c_L$, $\mathbf{E}\left[u_{GP}(r = \varnothing)\right]$ is the expected utility of the general public when $r_i = \varnothing$ for all i, and $\gamma \in [0, 1]$. There are several ways of interpreting (5). One simple possibility is to consider that γ represents the fraction of the population that is interested in politics and, hence, they are willing to pay for media subscriptions in order to be informed about public policies. The intuition is that those who stay uninformed free ride those who pay for subscriptions. Another possibility is to assume that people demand information about public policies not because they are interested in making more informed collective decisions, but rather because they need this information to take better private decisions (Strömberg, 2004). If this is the case, the implicit assumption in (5) is that gains from these private decisions are proportional to the value that information has for public purposes. Regardless of the interpretation, the key issue is that $\bar{E}_M$ is not an exogenous constant, but rather a proportion of the value that information has for the general public. This is probably a reasonable assumption, particularly if we adopt a long run view.

The total expenditure on media subscriptions must be somehow distributed among media companies. Following Besley and Prat (2006), suppose that the total expenditure is evenly shared by all the active media companies, i.e., the companies that are reporting some news. Formally, the news-related revenue of media company i (bribes are the other source of revenue) is given by:

$$E_{M,i}(r_1, ..., r_n) = \begin{cases} 0 & \text{if } r_i = \varnothing, \\ \frac{\bar{E}_M}{m} & \text{if } r_i = c_L, \end{cases} \tag{6}$$

where $m = \#\{i : r_i = c_L\}$ is the number of companies reporting news.

The timing of events is as follows:

1. **Entry**: Companies simultaneously decide to enter into the media industry. If a company decides to enter it must pay C_S, regardless of the its future report.

2. **Signal**: Nature determines c. The politician observes the realization of c. A signal s about c is realized. All the media companies and the politician observe this signal.

3. **Bribes**:

a. The politician offers bribes to the media companies. Each bribe is a take it or leave it offer of the following form: the politician commits to pay a bribe $B_i(r_i)$ to media company i if and only if the media company i agrees to report r_i. Since the media cannot fabricate news, if $s = \varnothing$, then $r_i = \varnothing$, while if $s = c_L$, then $r_i \in \{c_L, \varnothing\}$.

b. The media companies simultaneously accept or reject the bribe offers and then report news.

4. **Contracts**:

a. The general public observes the news and then offers a contract or a menu of contracts to the politician. A contract specifies the level of the public good g and taxes T.

b. The politician selects a contract among the alternatives offered by the general public.

A key idea behind this timing is that the general public can use the information provided by the media to control the politician. Note that the general public offers a menu of contracts to the politician after observing media reports.[7]

This model can be represented as a game with incomplete information. A strategy for the politician is a schedule of bribes $(B_1, ..., B_n)$ (a bribe offer to each media company in the industry) and a public budget (T, g). Each B_i is of the following form: the politician commits to pay $B_i(r_i)$ to the media company i if and only if i agrees to report r_i. The politician also selects a public budget (T, g) for each menu of budgets offered by the general public. A strategy for media company i is a report r_i. A strategy for the general public is a menu of possible public budgets for each schedule of reports $(r_1, ...r_n)$. Formally, let M be the set of possible public budgets and let $\mathbf{P}(M)$ be the power set of M. Then, a strategy profile $(\alpha_P, \alpha_{M,1}, ..., \alpha_{M,n}, \alpha_{GP})$ is given by: (i) Politician: $\alpha_P = (B_1, ..., B_n, T, g)$, where $B_i : \{c_L, \varnothing\} \to \Re^2_+$ and $(T, g) : \mathbf{P}(M) \to M$; (ii) Media companies: $\alpha_{M,i} : B_i \to \{c_L, \varnothing\}$ for $i = 1, ..., n$; and (iii) General Public: $\alpha_{GP} : (r_1, ..., r_n) \to \mathbf{P}(M)$.

Definition 1: *An equilibrium with n media companies is a strategy profile* $(\alpha_P, \alpha_{M,1}, ..., \alpha_{M,n}, \alpha_{GP})$ *and a belief about the cost of the public good such that:*

1. **Belief**: *The general public form the following belief about the cost of the public good. If there exists at least one i that reports* $r_i = c_L$*, then the general public knows the cost is* c_L*, while if* $r_i = \varnothing$ *for all i, then the general public falls back to its priors, i.e., the general public believes that with probability p the cost is* c_L *and with probability* $(1 - p)$ *it is* c_H*.*

2. **Contracts**:

[7] There are several works that suggest that mass media play an important role monitoring politicians. Besley and Burgess (2001) use data from India to show that state governments react more to falls in food production and floods where newspaper circulation is higher (they expend more on public food distribution and calamity relief). Finan and Ferraz (2008) study the effects of disclosing information about corruption using data from an anti-corruption program implemented by the Brazilian federal government. They find that the release of information has a significant impact on incumbents's electoral performance, and that the effects are more pronounced in areas with more local radios. Querubin and Snyder (2011) employ data from the United States to estimate the rents obtained by congressmen between 1850-1880. They find significant rents during the Civil War period and they hypothesize that this is partly due to a decrease in control by the media, which was mainly focus on reporting news about the war. Snyder and Strömberg (2008) use modern data from the United States and they show that "congressmen who are less covered by local press work less for their constituencies". Moreover, they also document that "federal spending is lower in areas where there is less press coverage of the local members of congress".

a. Given its belief, the general public offers the menu of public budgets that maximizes its expected utility.

b. For each menu of budgets offered by the general public, the politician selects the budget that maximizes his utility.

3. **Bribes**: *The politician selects the bribe schedule that maximizes his expected utility.*

4. **Reports**: *Given the bribe schedule, each media company selects the report that maximizes its expected utility.*

It is useful to distinguish two different types of equilibria. When the politician uses bribes to keep the general public uninformed (formally, when in equilibrium $r_i = \varnothing$ for all i) we say that the media industry has been *captured* by the politician, while when the media truthfully reports the news (formally, when in equilibrium $r_i = s$ for at least one i), we say that the media industry is *free*.

Definition 1 assumes that there are n media companies in the market. It is not difficult to extend this definition to introduce endogenous entry.

Definition 2: *An equilibrium with endogenous entry is a strategy profile* $(\alpha_P, \alpha_{M,1}, ..., \alpha_{M,n}, \alpha_{GP})$*, a belief about the cost of the public good, and a number of media companies* n *such that:*

1. *The strategy profile and the belief is an equilibrium with* n *media companies.*

2. *The expected profit of each media company is nonnegative and it would be negative in any equilibrium with* $n + 1$ *companies.*

Definitions 1 and 2 apply for any specification of C_S. However, it is useful to impose some assumptions on C_S. In particular, since the total revenue of the industry is equally shared among the companies that report news, it is easy to induce several market structures just making C_S a function of the number of active companies. The simplest market structure is a natural monopoly.

Assumption 1: *The media industry is a natural monopoly. Formally, the cost of a media company is* $C_S(n) = \bar{C}_S > 0$ *for all* $n \geq 1$.

It is useful to clarify why assumption 1 implies that the media industry is a natural monopoly.[8] The cost of receiving the signal for an individual media company is $C_S(n) = \bar{C}_S$. This means that if there are n companies the total cost of the industry is $n\bar{C}_S$, which it is minimizes when $n = 1$. In other words, from a technological point of view, the only relevant feature of this industry is whether the signal is received or not by at least one company, which implies that one company can supply the market at a lower cost than two or more companies.

Assumption 2: *A media monopoly is always profitable. Formally,* $p\delta\bar{E}_M > \bar{C}_S$*, where* $\bar{E}_M = \gamma\{\mathbf{E}[u_{GP}(r = c_L)] - \mathbf{E}[u_{GP}(r = \varnothing)]\}$.

[8] I follow the standard definition of a natural monopoly due to Baumol (1977): "an industry in which multi-firm production is more costly than production by a monopoly".

Note that, if it were the case that $p\delta\bar{E}_M < \bar{C}_S$, then the expected revenue of the industry ($p\delta\bar{E}_M$) would be lower than its lowest possible cost ($\bar{C}_S$) and, hence, not even a single company would be willing to enter into the media market.

3 Equilibrium

In this section I characterize the equilibrium of the media industry employing backward induction. The menu of contracts that the general public offers to the politician depends on media reports. Subscriptions, bribes and the number of active companies determine media reports and, ultimately, the expected revenue obtained by each media company. Finally, companies optimally decide whether to enter into the media industry and, hence, the equilibrium number of media companies is determined. The key message of this section is that as media companies are more productive, there is more competition in the media market and capture is more difficult.

Proposition 1 below formally characterizes the equilibrium of the media industry; but first I need to introduce some notation. Let g_L and g_H be implicitly defined by the following expressions:

$$u'(g_L) = c_L(1+\lambda), \tag{7}$$

$$u'(g_H) = \left(\frac{c_H - pc_L}{1-p}\right)(1+\lambda), \tag{8}$$

where recall that $c \in \{c_L, c_H\}$ is the cost of the public good, $p = \Pr(c = c_L)$ and $\lambda \geq 0$ is the deadweight lose associated with a tax of one unit of the private good.[9] It is not difficult to prove that the utility gain of the politician when the media withholds $s = c_L$ (formally, when $s = c_L$ but $r_i = \varnothing$ for all i) is

$$\Delta_P = g_H(c_H - c_L), \tag{9}$$

while the expected utility gain of the general public when the media reports $s = c_L$ (formally, when $s = c_L$ and $r_i = c_L$ for at least one i) is

$$\Delta_{GP} = (1-p)[v(g_L) - v(g_H)], \tag{10}$$

where $v(g) = u(g) - u'(g)g$.[10]

Recall that $\gamma \in [0,1]$ is the proportion of the general public that buy media subscriptions. Let $int(x)$ indicates the integer part of x.

Proposition 1: *Let g_L, g_H, Δ_P, and Δ_{GP} be defined by expressions (7)-(10) and let n denotes the number of media companies. Then, the media industry is free if $n > \bar{n} = int\left(\frac{\Delta_P}{\gamma\Delta_{GP}}\right)$, while it is captured by the politician if $n \leq \bar{n}$. Moreover, suppose that Assumptions 1 and 2 hold. Then, free entry leads to a free media industry if and only if $\frac{\delta}{\bar{C}_S} \geq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$. Indeed, if $\frac{\delta}{\bar{C}_S} < \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$, the equilibrium number of media companies is $\bar{n}$, while if $\frac{\delta}{\bar{C}_S} \geq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$, it is $\hat{n} = int\left(\frac{p\delta\gamma\Delta_{GP}}{\bar{C}_S}\right)$.* **Proof**: See Appendix A.1.■

[9] It is easy to verify that g_L and g_H are unique and $g_L > g_H > 0$. $\lim_{g\to 0} u'(g) = \infty$, $\lim_{g\to\infty} u'(g) = 0$ and $u''(g) < 0$ imply that: (i) there is a unique $g_L > 0$ such that $u'(g_L) = c_L(1+\lambda)$; and (ii) there is a unique $g_H > 0$ such that $u'(g_H) = \left(\frac{c_H - pc_L}{1-p}\right)(1+\lambda)$. $c_L < \frac{c_H - pc_L}{1-p}$ and $u''(g) < 0$ imply that $g_L > g_H$.

[10] Note that $v'(g) = -u''(g)g > 0$ and $g_L > g_H$, which implies that $v(g_L) > v(g_H)$.

A few remarks about Proposition 1. First, I am interpreting γ as a parameter of the media demand, but it is also possible to consider γ as a combination of a demand parameter and the transaction costs of bribes. For example, in Besley and Prat (2006) B dollars of bribes paid by the politician becomes B/τ dollars received by the media, where $\tau > 0$ is a measure of the transactions costs involved in bribing. Then, we must replace γ by $\gamma' = \gamma\tau$. Second, technically speaking when $n\gamma\Delta_{GP} = \Delta_P$, the politician is indifferent between paying bribes of $n\gamma\Delta_{GP}$ and a captured media and do not paying bribes and a free media. I arbitrarily break this indifference assuming that the politician captures the media. Since the final goal is to find a constitutional rule for the media industry, I prefer to be in the safe side and have a free media industry only when this is strictly better for the politician. In the next section, the assumption is also convenient because it simplifies welfare comparisons.

The first part of Proposition 1 establishes that if there is enough competition in the media market, then the media will be free. The intuition behind this result is that if the politician wants to capture the media, he must pay to each company a bribe equal to the amount that a company would obtain if it was the only one that reports the truth. The second part of Proposition 1 establishes that free entry will lead to enough competition to avoid capture if the productivity of the media is higher than some threshold. Media productivity is measured as the ratio $\frac{\delta}{\bar{C}_S}$. The higher the ratio $\frac{\delta}{\bar{C}_S}$ the more productive the media industry is, in the sense that it is less costly to obtain the same signal (equivalently, it costs the same to obtain a more precise signal). The threshold is the inverse of the expected revenue of a media company when the number of companies is just enough to makes the industry free, i.e., $\bar{n}+1$. Alternatively, free entry leads to a free media industry if the expected profit of each media company when there are $\bar{n}+1$ companies is nonnegative, i.e., $\frac{p\delta\gamma\Delta_{GP}}{\bar{n}+1} - \bar{C}_S \geq 0$.

Figure 1 illustrates Proposition 1 for $u(g) = A\ln(g)$ with $A = 1$ million, $c_L = 1$, $c_H = 2.25$, $\bar{C}_S = 500, 1500$, $p = 0.25$, $\lambda = 0.35$, $\delta = 0.25$, and $\gamma = 0.10$. The dark curve indicates the expected revenue of a media company for each possible value of n (the number of companies that operates in the market). For $n \leq \bar{n} = 4$, the media is captured by the politician and, hence, the expected revenue of each company is $p\delta\gamma\Delta_{GP}$ (which is coming from bribes). For $n > \bar{n} = 4$, the media is free and, hence, the expected revenue of each company is $p\delta\gamma\Delta_{GP}/n$ (which is coming from subscriptions). The two thin horizontal lines indicate the cost of receiving the signal ($\bar{C}_S = 500, 1500$). The equilibrium number of firms is given by the intersection between the expected revenue curve and the cost line. For $\bar{C}_S = 500$, nine companies enter into the market and the media is free, while for $\bar{C}_S = 1500$ only four firms enter into the market and the media is captured by the politician.

< Please see Figure 1 >

Example: Let $u(g) = A\ln(g)$. Then, $\Delta_P = \frac{A(1-p)(\chi-1)}{(1+\lambda)(\chi-p)}$ and $\Delta_{GP} = (1-p)A\ln\left(\frac{\chi-p}{1-p}\right)$, where $\chi = \frac{c_H}{c_L}$. Hence, from Proposition 1, the media industry is free if and only if the following condition holds (recall that $int(x)$ indicates the integer part of x)

$$n > \bar{n} = int\left(\frac{\chi-1}{\gamma(1+\lambda)(\chi-p)\ln\left(\frac{\chi-p}{1-p}\right)}\right),$$

and free entry leads to a free media industry if and only if

$$\frac{\delta}{\bar{C}_S} \geq \frac{\bar{n}+1}{p\gamma\Delta_{GP}} = \frac{\bar{n}+1}{\gamma p\left(1-p\right)A\ln\left(\frac{\chi-p}{1-p}\right)}.$$

It is easy to check that as taxation is more costly (λ higher), the general public is more willing to expend in the media, or the transaction cost of bribing are higher (γ higher), a less productive media is enough to secure a free media. It is more tedious, but straightforward to prove that the RHS is decreasing in χ. Thus, as the agency problem becomes more serious (χ higher), a less productive media can avoid capture.

4 Optimal Regulation

In the previous section I have fully characterized the media industry when there is no public intervention. In this section I study the optimal regulation of the industry. After finding the first best allocation, I argue that it is very unlikely that any realistic regulation can implement it. Then, I consider a relatively unrestrictive constitutional environment in which entry can either be restricted or promoted to any degree. Finally, I study increasingly restrictive environments in which the constitution can only restrict or promote entry and, even more restrictively, it has a discrete choice: monopoly or free entry.

First Best Allocation. It is useful, as a benchmark, to begin deducing the first best allocation. If the general public does not know that $s = c_L$, society requires extra distortionary taxes just to induce the politician to provide g_L. Thus, a captured industry imposes a welfare loss. In order to avoid this loss it is better to have a free media industry. Since all media companies receive and transmit the same signal, an industry with more than one company is an unnecessary waste. In order to avoid this waste it is better to have a media monopoly. Therefore, the first best allocation is reached when a media monopoly always reports the truth to the general public.

The problem with this solution is that it is really hard to imagine any realistic environment in which it is possible to force a media monopoly to truthfully report the news. Note that the textbook solution, i.e., public ownership, does not seem to work in this case since the bureaucrat that runs the state-owned company will be easily captured by the politician.[11] A regulated privately owned monopoly does not seem to work either, unless there is an independent and incorruptible regulatory agency that somehow observes the signal. Summing up, it is very unlikely that any realistic regulation can implement the first best allocation.

A Constitutional Stage. Suppose that at the beginning of the game a stage 0 is added, which can be interpreted as a constitutional stage. The goal is to find a constitutional norm for the media industry

[11] An interesting example that illustrates the difficulties involved in regulating a state-owned media company is TVE and RTVE in Spain. After a terrorist attack in Madrid one week before a national election, TVE and RTVE were accused of manipulating the information about the perpetrators, favoring the official point of view of the event. As a consequence, a new procedure was established to design the CEOs and important managers of TVE and RTVE. According to the new system any designation requires 65% of the parliamentary votes, implicitly forcing an agreement between the two major parties (PP and PSOE). The goal was to avoid that the party that wins the election also captures TVE and RTVE. However, very recently, after a national election that gave a parliamentary majority to PP, a simple majority repealed the new law, allowing the government to designed new authorities for TVE and RTVE. Moreover, the PP justified the change, alleging that the previous authorities were strongly linked with PSOE.

that maximizes aggregate welfare. In order to so I explore constitutional norms that can only restrict or promote entry into the media industry. Moreover, I assume a simple, but realistic asymmetry. The constitution can always restrict entry at no cost, but it cannot completely shut down the industry (there must be at least one media company, i.e., $n \geq 1$.) However, to promote entry the constitution must subsidize media companies. The intuition behind this asymmetry is that in the long run it is relatively difficult to promote entry into an industry only employing threats and legal punishments.[12] However, it is easy to restrict entry employing non-pecuniary punishments such as legal licenses and fines. The key assumption is that through a constitutional norm or any other social mechanism society is able to impose and enforce restrictions and incentives to entry into the media industry.

The expected aggregate welfare that the constitution tries to maximize as a function of the number of companies is given by:[13]

$$W(n) = \mathbf{E}[u_{GP}] + \mathbf{E}[u_P] + \sum\nolimits_{i=1}^{n} \mathbf{E}[u_{M,i}].$$

In other words, the constitution tries to influence n in order to maximize $W(n)$ employing two policy instruments (entry restrictions and entry subsidies).[14] The crucial trade off depends on whether free entry leads to a free or a captured media industry. When, free entry leads to a captured media industry, the constitution can try to subsidize entry in order to obtain a free media or it can restrict entry to obtain a captured monopoly. When, free entry leads to a free media industry, the constitution can try a moderate entry limitation to avoid the costs of excessive entry, but keeping a free media or it can go all the way to a captured monopoly. Proposition 2 formally considers this trade off.

Proposition 2: *Natural Monopoly. Suppose that Assumptions 1 and 2 hold. Let* $\bar{n} = int\left(\frac{\Delta_P}{\gamma\Delta_{GP}}\right)$ *and* $\lambda \geq \bar{\lambda} = \frac{\bar{n}}{\frac{\Delta_P}{\gamma\Delta_{GP}}\bar{n}+\frac{\Delta_P}{\gamma\Delta_{GP}}}$. *Assume that the constitution can restrict and promote entry. Then:*

1. *Suppose that a media monopoly will be captured by the politician (formally,* $\bar{n} \geq 1$*). Then:*
   a. *If* $\frac{\delta}{\bar{C}_S} < \frac{(1+\lambda)\bar{n}+\lambda}{p\lambda(\Delta_P+\gamma\Delta_{GP})}$, *then the optimal media industry is a monopoly captured by the politician.*
   b. *If* $\frac{(1+\lambda)\bar{n}+\lambda}{p\lambda(\Delta_P+\gamma\Delta_{GP})} \leq \frac{\delta}{\bar{C}_S} \leq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$, *then the optimal media industry is free. Moreover, entry to the industry must be subsidized, with the optimal subsidy given by* $S = \bar{C}_S - \frac{p\delta\gamma\Delta_{GP}}{\bar{n}+1}$.
   c. *If* $\frac{\delta}{\bar{C}_S} > \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$, *then the optimal media industry is free. Moreover, entry to the industry must be restricted to* $\bar{n}+1$ *companies.*
2. *Suppose that a media monopoly cannot be captured by the politician (formally,* $\bar{n} < 1$*). Then, the optimal media industry is a monopoly.*

[12] Legal punishments to force entry into a market could also infringe fundamental rights, usually protected by liberal constitutions.

[13] I adopt a utilitarian welfare function, i.e., the aggregate welfare is the sum of the payoffs the agents involved. This is a standard approach in the literature on industrial organization and regulation of public utilities (see for example Laffont 2000). An analogous normative exercise can be repeated for other welfare functions.

[14] Later I also consider alternative constitutional environments in which the constitutional choices are even more restrictive.

Proof: See Appendix A.2.■

The message of Proposition 2 is simple, but powerful. The media should not be treated as a standard natural monopoly. Although there can be good reasons to believe that the media in an increasing-returns industry, this is not enough to conclude that the best we can do is to have one big media company. In fact, if media productivity is higher than a threshold ($\frac{\delta}{\bar{C}_S} \geq \frac{(1+\lambda)\bar{n}+\lambda}{p\lambda(\Delta_P+\gamma\Delta_{GP})}$), the optimal regulation is either to encourage entry with subsidies or to impose just a moderate entry limitation. The reason is that it is worthwhile to pay the extra costs associated with several media companies obtaining and reporting the same signal, if extra competition helps to avoid the dissipation of resources in the political system.

Proposition 2 can be seen as a formalization of the concerns informally discussed in Djankov et al (2001), who expose the limitations of a standard Pigouvian approach to the media industry. They argue that a standard Pigouvian approach would lead us to recommend that the media industry should be organized as one public owned company or, at least, as a regulated monopoly. However, they ask what would happen with the incentives to collect and report news if the media is monopolized and/or controlled by the state, a political economy issue not covered by the standard approach, but the central point of this paper.

Proposition 2 can also be contrasted with the literature on optimal entry. For example, Mankiw and Whinston (1986) and Zhao (2009) show that in a Cournot oligopoly free entry could lead to excessive entry, in the sense that the optimal number of firms is less than the equilibrium number of firms. The main reason is that when firms take their entry decisions they do not fully internalize economies of scale. A similar logic also applies to the model in this paper. However, in the media industry there could also exist a counterbalancing effect; namely, free entry may lead to too few companies and, therefore, to a captured media industry. Indeed, Proposition 2 balances these two opposite effects.

Proposition 2 is also related to the literature on principal-agent relationships with supervisors. The key idea in this literature is that the principal must design a contract in such a way that the agent does not have an incentive to collude with the supervisors (see for example Laffont 2000). Usually, more supervisors help the principal because they make collusion more complicated, but they also cost more resources. The trade off behind Proposition 2 is analogous, with the media companies playing the role of supervisors. However, there are two important differences between the principal-agent models with supervisors and the model in this paper. First, in the principal-agent literature the principal is allow to design a full contract subject to the incentive and participation constraints while here the constitution can only restrict or promote entry. Second, in the principal-agent literature more supervisors hinder collusion in several different ways (for example yardstick competition), while in the model of this paper more media companies make capture more difficult due to the way they compete for news-related revenues.

Example. Let $u(g) = A\ln(g)$. Then, from Proposition 1 (recall that $int(x)$ denotes the integer part of x):

$$\bar{n} = int\left(\frac{\Delta_P}{\gamma\Delta_{GP}}\right) = int\left(\frac{(\chi-1)}{(1+\lambda)(\chi-p)\gamma\ln\left(\frac{\chi-p}{1-p}\right)}\right),$$

$$\hat{n} = int\left(\frac{p\delta\gamma\Delta_{GP}}{\bar{C}_S}\right) = int\left(\frac{p\delta\gamma A\ln\left(\frac{\chi-p}{1-p}\right)}{\bar{C}_S}\right).$$

From Proposition 2 Part 1, the optimal regulation leads to a free media industry if and only if

$$\frac{\delta}{\bar{C}_S} \geq \frac{(1+\lambda)\,\bar{n}+\lambda}{\lambda p\,(1-p)\,A\left[\frac{(\chi-1)}{(1+\lambda)(\chi-p)}+\gamma\ln\left(\frac{\chi-p}{1-p}\right)\right]}.$$

The RHS of this expression is decreasing in γ and χ. Thus, as the general public is more willing to expend in the media (γ higher), and the agency problem becomes more serious (χ higher), the region for which the optimal media is free is bigger. When regulation requires an entry subsidy (Proposition 2 Part 1.b), the optimal subsidy is given by:

$$S = \bar{C}_S - \frac{p\delta\gamma\,(1-p)\,A\ln\left(\frac{\chi-p}{1-p}\right)}{\bar{n}+1},$$

which is decreasing in χ, γ and δ and increasing in $\bar{C}_S$. Thus, as the general public is more willing to expend in the media (γ higher), the agency problem becomes more serious (χ higher), and the media is more productive (δ higher or $\bar{C}_S$ lower), the subsidy we need to make the industry free is lower. When regulation requires an entry restriction (Proposition 2 Part 1.c), it is optimal to allow only $\bar{n}+1$ companies, while free entry would leave to $\hat{n}$ companies. The difference, i.e., $\Delta n = \hat{n} - (\bar{n}+1)$, is a measure of the magnitude of the restriction. Δn is increasing in χ, λ, γ, and $\frac{\delta}{\bar{C}_S}$. Thus, as the agency problem becomes more serious (χ higher), taxation more costly (λ higher), or the general public is more willing to expend in the media (γ higher), more firms would enter into the market under free entry ($\hat{n}$ higher) and fewer firms are enough to secure a free media ($\bar{n}+1$ lower). As a consequence, the magnitude of the entry restriction imposed by the optimal regulation increases. When the productivity of the media industry increases ($\frac{\delta}{\bar{C}_S}$ higher) more firms would enter under free entry and, hence, the entry restriction becomes more severe.

Alternative Constitutional Environment I. The welfare analysis behind Proposition 2 assumes that the constitution can promote and restrict entry. However, there could be situations in which the constitution can promote but not restrict entry or vice versa. Proposition 3 summarizes the optimal regulation in such constitutional environments.

Proposition 3: *Suppose that Assumptions 1 and 2 hold and* $\lambda \geq \bar{\lambda}$. *Let* $\bar{n} = int\left(\frac{\Delta_P}{\gamma\Delta_{GP}}\right) \geq 1$ *and* $\hat{n} = int\left(\frac{\delta p\gamma\Delta_{GP}}{\bar{C}_S}\right)$. *Then:*

1. *Assume that the constitution can promote, but not restrict entry. Then:*
   a. *If* $\frac{\delta}{\bar{C}_S} \geq \frac{\lambda\bar{n}+(1+\lambda)}{\lambda p(\Delta_P+\gamma\Delta_{GP})}$, *then the optimal media industry is free. Entry to the industry might be subsidized, with the optimal subsidy given by* $S = \max\left\{\bar{C}_S - \frac{p\delta\gamma\Delta_{GP}}{\bar{n}+1}, 0\right\}$. *Moreover, the optimal industry is an oligopoly with* $\max\{\bar{n}+1, \hat{n}\}$ *companies.*
   b. *If* $\frac{\delta}{\bar{C}_S} < \frac{\lambda\bar{n}+(1+\lambda)}{p\lambda(\Delta_P+\gamma\Delta_{GP})}$, *then the optimal media industry is an oligopoly with* $\bar{n}$ *companies captured by the politician.*
2. *Assume that the constitution can restrict, but not promote entry. Then:*

a. If $\frac{\delta}{C_S} \geq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$*, then the optimal media industry is free. Entry should be restricted to* $\bar{n}+1$ *companies.*

b. If $\frac{\delta}{C_S} < \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$*, then the optimal media industry is a captured monopoly. Entry should be restricted to only one company.*

Proof: See Appendix A.3.■

Comparing Proposition 2 Part 1 with Proposition 3 Part 1, if the constitution cannot employ entry restrictions, then the region for which the optimal media is free is bigger.[15] The reason is that when it is not possible to restrict entry the equilibrium number of companies will be at least $\bar{n}$. In other words, entry restrictions make a captured industry more attractive because a monopoly avoids the unnecessary duplication of C_S. Comparing Proposition 2 Part 1 with Proposition 3 Part 2 it is possible to prove that if the constitution cannot employ entry subsidies, then the region for which the optimal media is free is smaller.[16] The reason is again that entry restrictions make a captured industry a better alternative.

Alternative Constitutional Environment II. Consider an even more restrictive constitutional environment in which the constitution can only make a discrete choice: free entry or monopoly. Proposition 4 summarizes the optimal regulation in such environment.

Proposition 4: *Suppose that assumptions 1 and 2 hold. Let* $\bar{n} = int\left(\frac{\Delta_P}{\gamma\Delta_{GP}}\right) \geq 1$ *and* $\hat{n} = int\left(\frac{\delta p\gamma\Delta_{GP}}{C_S}\right)$*. Assume that the constitution can only select between free entry and a monopoly. Then, free entry dominates monopoly if and only if* $\frac{\delta}{C_S} \geq \max\left\{\frac{\bar{n}+1}{p\gamma\Delta_{GP}}, \frac{\hat{n}-1}{\lambda p\Delta_P}\right\}$. **Proof**: See Appendix A.4.■

Proposition 4 reaffirms the case against a media monopoly. Even when the media operates under increasing returns and the only available option to a media monopoly is free entry, monopoly is not automatically justified. In particular, note that if $\lambda \geq \frac{\gamma\Delta_{GP}}{\Delta_P}$, it is always the case that $\frac{\delta}{C_S} \geq \frac{\left\langle \frac{p\delta\gamma\Delta_{GP}}{C_S} \right\rangle - 1}{\lambda p\Delta_P}$ and, therefore, if free entry leads to a free media industry, it also dominates monopoly.

5 Extension I: Natural Oligopoly

The notion that the media industry is a natural monopoly might sound extreme. However, the main message of Proposition 2 remains unaltered if this assumption is relaxed. Consider the following generalization of Assumption 1.

Assumption 1bis: *The media industry is a natural oligopoly with* $n_{\min} \geq 1$ *companies. Formally, the cost function* $C_S(n)$ *is given by:*

$$C_S(n) = \begin{cases} \frac{G_S(n)}{n} & \text{if } n \leq n_{\min}, \\ \frac{C_S}{n_{\min}} & \text{if } n \geq n_{\min}, \end{cases}$$

[15] Formally, $\frac{(1+\lambda)\bar{n}+\lambda}{\lambda p(\Delta_P+\gamma\Delta_{GP})} \geq \frac{\lambda\bar{n}+(1+\lambda)}{\lambda p(\Delta_P+\gamma\Delta_{GP})}$ since $\Delta_P \geq \gamma\Delta_{GP}$.

[16] Note that $\frac{(1+\lambda)\bar{n}+\lambda}{p\lambda(\Delta_P+\gamma\Delta_{GP})} \geq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$.

where $G_S(n)$ is any decreasing function such that $G_S(n_{\min}) = \bar{C}_S$.

It is easy to see that if $n_{\min} = 1$, then Assumption 1bis is equivalent to Assumption 1. For $n_{\min} > 1$, Assumption 1bis generates a natural oligopoly of $n_{\min} > 1$ companies. In order to see this, note that $n_{\min} = \arg\min_n \{nC_S(n)\}$. In other words, $n_{\min}$ companies can supply the media market at the lowest possible cost. Several remarks about Assumption 1bis apply. First, note that the minimum cost of the industry is always $\bar{C}_S$, regardless of the value of $n_{\min}$. This implies that when $n_{\min}$ varies only the market structure of the media industry is changing, but the total minimum cost of the industry is fixed. Second, Assumption 1bis is compatible with a standard constant return to scale industry for which the number of companies is undetermined. Just define $G_S(n) = \bar{C}_S$ and $n_{\min} = \infty$, which means that $C_S(n) = \frac{\bar{C}_S}{n}$ for all $n \geq 1$ and, therefore, the total cost of the industry is $\bar{C}_S$ for all n.

The following assumption is a generalization of Assumption 2.

Assumption 2bis: *A media oligopoly of $n_{\min}$ companies is always profitable. Formally, $p\delta\gamma\Delta_{GP} > \bar{C}_S$.*

Proposition 5 summarizes the optimal regulation when the media industry is a natural oligopoly.

Proposition 5: *Natural Oligopoly. Suppose that Assumptions 1bis and 2bis hold. Let $\bar{n} = int\left(\frac{\Delta_P}{\gamma\Delta_{GP}}\right)$ and $\lambda > \tilde{\lambda} = \frac{\bar{n}+1-n_{\min}}{\frac{\Delta_P}{\gamma\Delta_{GP}}\bar{n}+\frac{\Delta_P}{\gamma\Delta_{GP}}}$. Assume that the constitution can restrict and promote entry. Then:*

1. *Suppose that an oligopoly with $n_{\min}$ companies will be captured by the politician (formally, $\bar{n} \geq n_{\min}$.) Then:*
   a. *If $\frac{\delta}{\bar{C}_S} \leq \frac{(1+\lambda)\bar{n}+1+\lambda-n_{\min}}{\lambda p(\Delta_P+\gamma\Delta_{GP})n_{\min}}$, then the optimal media industry is a captured oligopoly with $n_{\min}$ companies.*
   b. *If $\frac{(1+\lambda)\bar{n}+1+\lambda-n_{\min}}{\lambda p(\Delta_P+\gamma\Delta_{GP})n_{\min}} < \frac{\delta}{\bar{C}_S} \leq \frac{\bar{n}+1}{p\gamma\Delta_{GP}n_{\min}}$, then the optimal media industry is free. Moreover, entry to the industry must be subsidized with the optimal subsidy given by $S = \frac{\bar{C}_S}{n_{\min}} - \frac{p\delta\gamma\Delta_{GP}}{\bar{n}+1}$.*
   c. *If $\frac{\delta}{\bar{C}_S} > \frac{\bar{n}+1}{p\gamma\Delta_{GP}n_{\min}}$, then the optimal media industry is free. Moreover, entry to the industry must be restricted to $\bar{n}+1$ companies.*
2. *Suppose that an oligopoly with $n_{\min}$ cannot be captured by the politician (formally, $\bar{n} < n_{\min}$.) Then, the optimal media industry is an oligopoly with $n_{\min}$ companies.*

Proof: See Appendix A.5.■

Proposition 5 is a natural generalization of Proposition 2, with one important remark. Note that, as the media industry becomes more competitive, in the sense that $n_{\min}$ increases, it is more likely that the the constitution favors a free media. In order to see this formally, note that the threshold in Part 1 is decreasing in $n_{\min}$. The intuition is that when $n_{\min}$ increases, the difference between the number of companies necessary to make the industry free and $n_{\min}$ decreases.

Proposition 5 Part 1 implicitly assumes an upper bound on $n_{\min}$ (note that $\bar{n} \geq n_{\min}$, which implies that $n_{\min}$ must be finite). This eliminates the possibility of perfect competition in the media market. However, it is reasonable to ask what would happen if the industry becomes more and more competitive, eventually reaching a point for which $n_{\min} > \bar{n}$. Proposition 5 Part 2 answers this question. Once this happens, there is no more a trade off between excessive entry (due to duplication of the cost of the signal) and insufficient entry (due to capture). Therefore, the optimal constitution rule can restrict entry to $n_{\min}$, without any fear of inducing a captured industry.

6 Extension II: Politicians and Special Interests Groups (SIG)

Previous sections have stressed the role of politicians as the main source of media capture. This is a reasonable starting point because usually government officials are in a privileged position to bribe and extort the press and are those who can profit the most from information manipulation. Nevertheless, powerful constituencies (e.g., special interests groups) could be another important source of media capture and information manipulation. In other words, the baseline model emphasizes the vertical dimension of social conflict, i.e., the conflict between politicians that run the government and citizens with homogeneous policy preferences, but it overlooks the horizontal dimension, i.e., the conflict among groups of citizens with heterogeneous policy preferences. In this section, I extend the baseline model in order to introduce two groups of citizens, one of which has privileged access to the media. Then, I use the extended model to study the optimal regulation of the media industry.

6.1 A model of the media industry with politicians and SIG[17]

Consider a society composed by two homogeneous groups, indexed by $h = GP, E$, where GP indicates the general public and E indicates the elite. Each group has a proportion n_h of the citizens, with $n_{GP} > 1/2$, and each citizen in group h has income y_h (i.e., an endowment of the private good), with $y_E > y_{GP}$. Let y indicates the average income of the economy, i.e., $y = n_{GP} y_{GP} + n_E y_E$. Assume also that there are two public goods, g^1 and g^2. Each public good is produced with a simple linear technology, i.e., the total cost of producing g^j units of the public good $j = 1, 2$ is $c^j g^j$ units of the private good, where c^j is a random variable that can adopt the values c_L^j or c_H^j $(c_L^j < c_H^j)$ with probabilities $p^j \in (0, 1)$ and $\left(1 - p^j\right)$, respectively.

Citizens get utility from the consumption of the private good and the two public goods, whose provision is financed with a proportional income tax. Each unit of the private good taxed at the rate $\tau \geq 0$ generates a deadweight loss equal to $\lambda\tau$, where $\lambda \geq 0$. Citizens in group h also expends $E_M(h)$ on media subscriptions and/or advertisements.[18] The utility function of a citizen of group h is given by:

$$u_h\left(g^1, g^2, \tau, E_M(h)\right) = \beta u\left(g^1\right) + (1 - \beta)\, u\left(g^2\right) + \left[1 - (1 + \lambda)\,\tau\right] y_h - E_M(h), \tag{11}$$

[17] As I briefly mentioned in the introduction, Corneo (2005) and Petrova (2008) study media capture in environments populated by citizens with heterogeneous policy preferences. In both models, a group of citizens manage to bribe the media, distorting available information about public policies, and, hence, pushing public policies in the direction of their interests. In particular, Petrova (2005) develops a model in which the rich elite, who are informed about the cost of public goods, tries to influence the media in order to keep the poor median voter uninformed about the real cost of public goods. I adapt and incorporate this framework to the baseline model.

[18] The general public buys subscriptions and the elite pays advertisements.

where the sub-utility function u is strictly increasing, strictly concave, twice continuously differentiable and satisfies $\lim_{g\to 0} u'(g) = \infty$ and $\lim_{g\to\infty} u'(g) = 0$; and $\beta \in [0,1]$ is a measure of the importance of g^1.

The politician collects taxes and provides the public goods. He also expends B units of the private good on bribes to the media industry. Thus, the utility function of the politician is given by:

$$u_P\left(g^1, g^2, \tau, B\right) = \tau y - c^1 g^1 - c^2 g^2 - B \tag{12}$$

As in the baseline model, information about the cost of the public goods is asymmetrically distributed. In particular, the politician and the elite observe the realization of $\left(c^1, c^2\right)$, the general public only knows the probability distribution of $\left(c^1, c^2\right)$, and the media industry receives an informative signal $\left(s^1, s^2\right)$. When $c^j = c_L^j$, $s^j = c_L^j$ with probability δ^j and $s^j = \varnothing$ with probability $\left(1-\delta^j\right)$; when $c^j = c_H^j$, $s^j = \varnothing$. As before media companies cannot fabricate news, i.e., when $s^j = c_L^j$, $r_i^j \in \left\{c_L^j, \varnothing\right\}$, when $s^j = \varnothing$, $r_i^j = \varnothing$. Compared with the baseline model, the innovation is that the elite is informed about $\left(c^1, c^2\right)$.

Media companies have three rather than two sources of revenue. The general public still expends on subscriptions ($E_{M,i}$) and the politician pays bribes (B_i), but now the elite pays advertisements (A_i). Thus, the payoff function of media company i is given by:

$$u_{M,i}\left(E_{M,i}, A_i, B_i, C_S\right) = E_{M,i} + A_i + B_i - C_S, \tag{13}$$

where C_S is the cost of an individual company.

As in the baseline model the general public expenditure on subscriptions is proportional to the value that information has for the general public and the total expenditure on subscriptions is evenly shared among all the active media companies. In particular, let $m_j = \#\left\{i : r_i^j = c_L^j\right\}$ be the number of companies reporting news about c^j. Then, the subscription-related revenue of media company i is $E_{M,i} = E_{M,i}^1 + E_{M,i}^2$, where $E_{M,i}^j = \frac{\bar{E}_M^j}{m_j}$ if $r_i^j = c_L^j$, $E_{M,i}^j = 0$ if $r_i^j = \varnothing$, and $\bar{E}_M^j$ is given by:[19]

$$\bar{E}_M^j = \gamma_{GP}\left\{\mathbf{E}\left[u_{GP}\left(r^j = c_L^j\right)\right] - \mathbf{E}\left[u_{GP}\left(r^j = \varnothing\right)\right]\right\}, \tag{14}$$

where $\gamma_{GP} \in [0,1]$.

The timing of events is essentially the same as in the baseline model, except for the following modifications. *1.* **Entry**: In the entry stage now companies must also decide to specialize in gathering information about c^1, c^2 or both. *2.* **Signals**: In the signaling stage, not only the politician but also the elite observes $\left(c^1, c^2\right)$ and $\left(s^1, s^2\right)$. *3.* **Bribes**: In the bribing stage, now there are two groups (the politician and the elite) with the capacity of influencing news. Moreover, they move sequentially: first, the elite offers advertisements and, then, the politician offers bribes. *4.* **Contracts**: Now a contract specifies g^1, g^2 and a tax rate τ. g^2 must be the same in every contract of the menu and τ can be contingent on the realization of c^2, but not on the realization of c^1. The idea is that g^1 captures the

[19] Fortunately, $\bar{E}_M^1$ does not depend on r^2, neither $\bar{E}_M^2$ depends on r^1. The reason is that $u_{GP}\left(g^1, g^2, \tau, E_M\right)$ is separable.

conflict of interests between citizens and the politician, while g^2 captures the conflict between the elite and the general public.[20]

The extended model can be represented as a game with incomplete information.[21] Moreover, an equilibrium for this game is a natural extension of Definition 1.

Definition 3: *An equilibrium with n media companies ($n^j \geq 0$ that specialize in s^j and $n-n^1-n^2 \geq 0$ that receive both signals)*[22] *is a strategy profile $(\alpha_P, \alpha_E, \alpha_{M,1}, ..., \alpha_{M,n}, \alpha_{GP})$ and a belief about the cost of the public goods such that: 1.* ***Belief****: Definition 1 applies with $c = \left(c^1, c^2\right)$, $p = \left(p^1, p^2\right)$, $s = \left(s^1, s^2\right)$ and $r_i = \left(r_i^1, r_i^2\right)$. 2.* ***Contracts****: Definition 1 applies with a contract given by a public budget $\left(g^1, g^2, \tau y\right)$. 3.* ***Bribes****: (a) The elite selects the advertisement schedule that maximizes its expected utility; and (b) For each advertisement schedule the politician selects the schedule of bribes that maximizes his expected utility. 4.* ***Reports****: Definition 1 applies with $r_i = \left(r_i^1, r_i^2\right)$.*

When the politician uses bribes to keep the general public uninformed about c^1 (formally, when in equilibrium $r_i^1 = \varnothing$ for all i) we say that the media industry has been *captured by the politician* and when the elite uses advertisements to keep the general public uninformed about c^2 (formally, when in equilibrium $r_i^2 = \varnothing$ for all i) we say that the media industry has been *captured by the elite.*

Definition 3 takes (n^1, n^2, n) as given, but if companies can decide entry, these are endogenous variables.

Definition 4: *An equilibrium with endogenous entry is a strategy profile, a belief about the cost of the public goods, and a vector $\left(n^1, n^2, n\right)$, where $n^j \geq 0$ and $n \geq n^1 + n^2$, such that: 1. The strategy profile and the belief is an equilibrium with n media companies (n^j that specialize in s^j and $n - n^1 - n^2$ that receive both signals); and 2. $\left(n^1, n^2, n\right)$ is such that: (a) the expected profit of each company is nonnegative; (b) a company cannot increase its expected profit unilaterally changing its entry decision; and (c) the expected profit of a company that receives s^j would be negative in an equilibrium with one more firm that receives s^j.*

[20] The intuition is as follows. On the one hand, when the general public can offer a menu of contracts with different values of g^1, but with a tax rate that cannot be contingent on the realization of c^1, there is a principal-agent problem and, hence, the crucial issue is not the level of g^1 but the rents that the politician keeps due to his information advantage with respect to the general public. On the other hand, when the general public must select a level of g^2, but the tax rate can be contingent on c^2, the politician cannot capture any rents and the crucial issue is the level of g^2 (the elite prefers a lower g^2 than the general public).

[21] A strategy for the politician α_P is a schedule of bribes $\left(\left(B_1^1, B_2^2\right), ..., \left(B_n^1, B_n^2\right)\right)$ (a pair of bribe offers to each media company in the industry) and a public budget $\left(g^1, g^2, \tau y\right)$. Each B_i^j is of the following form: the politician commits to pay $B_i^j\left(r_i^j\right)$ to media company i if and only if the media company i commits to report r_i^j. The politician also selects a public budget $\left(g^1, g^2, \tau y\right)$ for each menu of budgets offered by the general public. A strategy for the elite α_E is schedule of advertisements $\left(\left(A_1^1, A_1^2\right), ..., \left(A_n^1, A_n^2\right)\right)$ (a pair of advertisement offers to each media company in the industry). Each A_i^j is of the following form: the elite commits to pay $A_i^j\left(r_i^j\right)$ to media company i if and only if media company i commits to report r_i^j. A strategy for media company i $\alpha_{M,i}$ is a pair of feasible reports $\left(r_i^1, r_i^2\right)$ for each schedule of bribes $\left(B_i^1, A_i^1, B_i^1, A_i^2\right)$. A strategy for the general public α_{GP} is a menu of possible public budgets for each schedule of reports.

[22] Note that it is always possible to relabel media companies in such a way that the companies that specialize in s^1 are $i = 1, ..., n_1$, the ones that specialize in s^2 are $i = n_1 + 1, ..., n_1 + n_2$, and the ones that recieve both signals are $i = n_1 + n_2 + 1, ..., n$. Thus, only the numbers n^1, n^2, and n matter.

Definitions 3 and 4 are consistent with any specification of the cost function of a media company C_S. However, it is useful to introduce some assumptions about the cost and market structure of the media industry.

Assumption 3: *The cost function of a media company is* $C_S = e^1\bar{C}_S^1 + e^2\bar{C}_S^2 - e^1e^2\alpha\left(\bar{C}_S^1 + \bar{C}_S^2\right)$, *where* $\bar{C}_S^j > 0$, $e^j = 1$ *if the company pays for signal for* s^j, $e^j = 0$ *if the company does not pay for* s^j, *and* α *is a measure of the degree of economies of scope.*

Assumption 3 implies that the media industry is either a natural monopoly or a natural duopoly with one company specialized in s^1 and another in s^2. In order to see this, note that the total cost of the media industry is given by

$$C_S\left(n^1, n^2, n\right) = \left(n - n^2\right)\bar{C}_S^1 + \left(n - n^1\right)\bar{C}_S^2 - \left(n - n^1 - n^2\right)\alpha\left(\bar{C}_S^1 + \bar{C}_S^2\right).$$

When there are economies of scope ($\alpha > 0$) $C_S\left(n^1, n^2, n\right)$ adopts its minimum for $\left(n^1 = 0, n^2 = 0, n = 1\right)$. Thus, the industry is a natural monopoly. When there are diseconomies of scope ($\alpha < 0$) $C_S\left(n^1, n^2, n\right)$ adopts its minimum for $\left(n^1 = 1, n^2 = 1, n = 0\right)$. Thus, the industry is a natural duopoly.

Assumption 4: *A natural duopoly with one company specialized in* s^1 *and another in* s^2 *is profitable for each company. Formally,* $p^j\delta^j\bar{E}_M^j > \bar{C}_S^j$ *for* $j = 1, 2$.

Assumption 4 simply states that at least one company will be willing to pay the cost of receiving s^j.

6.2 Equilibrium

In Appendix B.1[23] I fully characterize the equilibrium of the media industry for the extended model. In this section I briefly summarize the key features of the equilibrium and illustrate it employing a simple example. The critical result is that the elite uses advertisements to make media capture by the politician more difficult, but also to distort information about the cost of g^2.

Let Δ_P denotes the utility gain of the politician when the media withholds $s^1 = c_L^1$, Δ_{GP}^1 the expected utility gain of the general public when the media reports $r^1 = c_L^1$, and Δ_E^1 the utility gain of the elite when the media reports $r^1 = c_L^1$. Let $\gamma_{GP} \in [0, 1]$ be the fraction of the general public that buys media subscriptions and $\gamma_E \in [0, 1]$ the proportion of the elite that pays advertisements. Then, in equilibrium, the media is captured by the politician if and only if $n - n^2$, i.e., the number of companies that receive s^1, is less than $\bar{n}^1 + 1$, where $\bar{n}^1$ is given by: (recall the $int\,(x)$ indicates the integer part of x)

$$\bar{n}^1 = int\left(\frac{\Delta_P - \gamma_E\Delta_E^1}{\gamma_{GP}\Delta_{GP}^1}\right). \tag{15}$$

Compared with the baseline model, the innovation is $\gamma_E\Delta_E^1$, which is the amount that the elite uses to counter the politician's bribes. Note that if the elite cannot advertise, then the media will be captured by the politician whenever there are less than $\tilde{n}^1 + 1$ companies that receive s^1, where $\tilde{n}^1 = int\left(\frac{\Delta_P}{\gamma_{GP}\Delta_{GP}^1}\right) < \bar{n}^1$. In other words, the presence of the elite makes media capture by the politician more difficult.

[23] Appendix B can be found online at http://gustavotorrens.wordpress.com/.

Let Δ_E^2 denotes the utility gain of the elite when the media withholds $s^2 = c_L^2$, Δ_{GP}^2 the expected utility gain of the general public when the media reports $r^2 = c_L^2$. Then, in equilibrium, the media is captured by the elite if and only if $n - n^1$, i.e., the number of media companies that receive s^2, is less than $\bar{n}^2 + 1$, where $\bar{n}^2$ is given by:

$$\bar{n}^2 = int\left(\frac{\gamma_E \Delta_E^2}{\gamma_{GP} \Delta_{GP}^2}\right). \tag{16}$$

Compared with the baseline model, there are two innovations. First, concerning g^2, the source of media distortion is the elite, who is willing to pay up to $\gamma_E \Delta_E^2$ in advertisements if the media withholds $s^2 = c_L^2$. Second, the politician is neutral about g^2. The reason is that the tax rate can be contingent on c^2 and, hence, the politician cannot obtain any rents from g^2.

Figures 2.a and 2.b illustrate the equilibrium of the media industry under free entry when there are diseconomies of scope ($\alpha < 0$) for $u(g) = A\ln(g)$ with $A = 1$, $\beta = 0.50$, $\lambda = 0.35$, $\gamma_{GP} = 0.10$, $\gamma_E = 0.50$, $n_{GP} = 0.75$, $n_E = 0.25$, $y_E/y_{GP} = 4$, $p^1 = p^2 = 0.25$, $\delta^1 = \delta^2 = 0.25$, $c_H^1/c_L^1 = c_H^2/c_L^2 = 2.25$, $\bar{C}_S^1 = 250, 1500$, and $\bar{C}_S^2 = 500, 1500$. Note that media companies prefer to operate in only one market, i.e., no company pays both signals. In each figure, the dark curve indicates the expected revenue of a media company for each possible value of n^j (the number of companies that operates in market $j = 1, 2$), while the two thin horizontal lines indicate the cost of receiving the signal ($\bar{C}_S^j$). The equilibrium number of firms is given by the intersection between the expected revenue curve and the cost line. $\bar{n}^1 + 1$ and $\bar{n}^2 + 1$ are the thresholds for the number of companies that stop capture by the politician and the elite, respectively. Note, however, an important difference between both markets. While only the elite tries to influence r^2, the elite and the politician are willing to influence r^1. In fact, when $n^1 \in \left[\tilde{n}^1, \bar{n}^1 + 1\right]$, part of the revenue of the media is coming from advertisements paid by the elite.

< Please see Figures 2.a and 2.b >

Figure 3 illustrates the equilibrium of the media industry under free entry when economies of scope are high ($\alpha > \hat{\alpha} = \frac{\max\left\{\bar{C}_S^1, \bar{C}_S^2\right\}}{\bar{C}_S^1 + \bar{C}_S^2}$) for $u(g) = A\ln(g)$ with $A = 1$, $\beta = 0.50$, $\lambda = 0.35$, $\gamma_{GP} = 0.10$, $\gamma_E = 0.50$, $n_{GP} = 0.75$, $n_E = 0.25$, $y_E/y_{GP} = 4$, $p^1 = p^2 = 0.25$, $\delta^1 = \delta^2 = 0.25$, $c_H^1/c_L^1 = c_H^2/c_L^2 = 2.25$, $(1-\alpha)\left(\bar{C}_S^1 + \bar{C}_S^2\right) = 500, 1500$ (for example, $\bar{C}_S^1 = \bar{C}_S^2 = 500, 1500$ and $\alpha = 0.50$). Note that all media companies prefer to operate in both markets, i.e., no company pays only one signal. Again, the dark curve indicates the expected revenue of a media company for each possible value of n (the number of companies), while the two thin horizontal lines indicate the total cost of an integrated firm ($(1-\alpha)\left(\bar{C}_S^1 + \bar{C}_S^2\right)$). The equilibrium number of firms is given by the intersection between the expected revenue curve and the cost line. $\bar{n}^1 + 1$ and $\bar{n}^2 + 1$ are again the key thresholds. Indeed, if the expected profit of a media company when there are $\bar{n}^1 + 1$ companies in the market is nonnegative, at least $\bar{n}^1 + 1$ will enter into the market and, hence, the media will not be captured by the elite or the politician. If the expected profit of a company when there are $\bar{n}^1 + 1$ companies in the market is negative, but it is nonnegative when there are $\bar{n}^2 + 1$, at least $\bar{n}^2 + 1$, but less than $\bar{n}^1 + 1$ companies will enter into the market and, hence, media will be captured by the politician, but not by the elite. Finally, if the expected profit of a company when there are $\bar{n}^2 + 1$ companies in the market is negative, less than $\bar{n}^2 + 1$ companies will enter into the market and, hence, the media will be captured by the politician and the elite.

< *Please see Figure 3* >

6.3 Optimal Regulation

In the previous section I have characterized the equilibrium of the media industry when there is no public intervention. In this section I study the optimal regulation of the industry with a focus on how society should regulate the ability of the elite to influence the media. Following the approach of section 4, I begin finding the first best allocation. Then, I consider a relatively unrestrictive constitutional environment in which entry can either be restricted or promoted to any degree and the elite can be allowed or not to advertise. Finally, I study a more restrictive environment in which the constitution has a discrete choice, duopoly (monopoly) or free entry, and the elite's ability to influence the media through advertisements cannot be affected by the constitution.

First Best Allocation. It is useful, as a benchmark, to begin deducing the first best allocation. As in the baseline model a media industry captured by the politician imposes a welfare loss. The reason is that the general public must use extra distortionary taxes just to induce the politician to select the right level of g^1 when $c^1 = c_L^1$. It is easy to prove that this welfare loss is given by

$$\Delta^1 = [\lambda + (1+\lambda)(\mu - 1) s_{GP}] g_H^1 \left(c_H^1 - c_L^1\right), \tag{17}$$

where $\mu \geq 1$ is the weight that the constitution gives to the general public, s_{GP} is the income share of the general public and g_H^1 is the equilibrium level of g^1 when $c^1 = c_H^1$. In order to avoid this waste it is imperative to avoid media capture by the politician. In principle, a media captured by the elite has an ambiguous effect on aggregate welfare. The reason is that an increase in g^2 (from $g_\varnothing^2$, the equilibrium level of g^2 when $r^2 = \varnothing$, to g_L^2, the equilibrium level of g^2 when $r^2 = c_L^2$) financed with a rise in the income tax rate benefits the general public but hurts the elite. It is not difficult to prove that the net welfare change is given by

$$\Delta^2 = [1 + (\mu - 1) n_{GP}](1 - \beta)\left(u\left(g_L^2\right) - u\left(g_\varnothing^2\right)\right) - [1 + (\mu - 1) s_{GP}](1 + \lambda) c_L^2 \left(g_L^2 - g_\varnothing^2\right). \tag{18}$$

Assuming that $\Delta^2 > 0$, it is better to have a media industry that it is not captured by the elite. Therefore, in order to reach the first best allocation the media must always report the truth, i.e., $r^j = s^j$. Next, consider the total cost of the signals. When there are diseconomies of scope ($\alpha < 0$) the total cost adopts its minimum when the media industry is a duopoly; while when there are economies of scope ($\alpha > 0$), the total cost adopts its minimum when the media industry is a monopoly. Thus, when $\alpha < 0$, the first best allocation is reached with a duopoly (one company that reports $r^1 = s^2$ and another that reports $r^2 = s^2$); while when $\alpha > 0$, the first best allocation is reached with a monopoly that always reports $\left(r^1, r^2\right) = \left(s^1, s^2\right)$. For the same reasons discussed in section 4, it is very unlikely that any realistic regulation can reach the first best allocation.

A Constitutional Stage. Suppose that the constitution can impose entry restrictions, offer entry subsidies and allow or not the elite to advertise. Compared with the constitutional environment studied in section 4, the innovation is the regulation of advertisements. The intuition is that the constitution can

directly or indirectly restrict the involvement of the elite in the media industry, for example, imposing some limits on advertising or through explicit ownership restrictions.

Since in this extension there are two sources of conflict, it is useful to distinguish which source has a greater impact on aggregate welfare. When there are diseconomies (economies) of scope we say that the vertical dimension of social conflict (g^1) is more important than the horizontal dimension (g^2) if and only if the following condition holds

$$p^2\delta^2\Delta^2 \leq p^1\delta^1\Delta^1 - \begin{cases} \bar{n}^1\bar{C}_S^1 & \text{if } \alpha < 0, \\ \bar{n}^1(1-\alpha)\left(\bar{C}_S^1 + \bar{C}_S^2\right) & \text{if } \alpha > 0. \end{cases} \tag{19}$$

The interpretation of this condition is simply. Suppose that there are diseconomies (economies) of scope and take as a reference point a natural duopoly (monopoly) captured by the politician and the elite. If the constitution avoids a media industry captured by the politician, there is a welfare gain equal to Δ^1 whenever $s^1 = c_L^1$ (an event that occurs with probability $p^1\delta^1$), but it must be the case that at least $\bar{n}^1$ extra companies are induced to report s^1. Thus, $p^1\delta^1\Delta^1 - \bar{n}^1 C_S^1$ $\left(p^1\delta^1\Delta^1 - \bar{n}^1(1-\alpha)\left(\bar{C}_S^1 + \bar{C}_S^2\right)\right)$ is the maximum change in expected welfare that can be obtained avoiding a media industry captured by the politician, a measure of the social importance of the vertical dimension of social conflict. The constitution can always avoid a media industry captured by the elite just forbidding the elite to offer advertisements, which generates a welfare gain equal to Δ^2 whenever $s^2 = c_L^2$ (an event that occurs with probability $p^2\delta^2$). Thus, $p^2\delta^2\Delta^2$ is the maximum change in expected welfare that can be obtained avoiding a media industry captured by the elite, a measure of the importance of the horizontal dimension of social conflict.

Proposition 6 : *Suppose that Assumptions 3 and 4 hold and free entry leads to a media industry captured only by the elite when the elite can advertise, but it leads to a media industry captured only by the politician when the elite cannot to advertise. Assume that the constitution can impose entry restrictions, offer entry subsidies and allow or not the elite to advertise. Suppose that there are diseconomies of scope, i.e., $\alpha < 0$, and the cost of making the media industry free is lower when the elite can advertise (there are economies of scope, i.e., $\alpha > \hat{\alpha}$, and $\bar{n}^1 < \bar{n}^2 < \tilde{n}^1$). Then, if condition (19) holds, the optimal regulation allows the elite to advertise. Moreover, if the optimal regulation does not allow the elite to advertise, condition (19) does not hold.* **Proof**: See online Appendix B.2.[24]■

Proposition 6 shows that restricting the involvement of the elite in the media industry is more attractive when the horizontal dimension of social conflict is more important than the vertical one. The intuition behind this result is that a constitutional restriction that limits the ability of the elite to influence the media will reduce the checks on the politician, but it will increase the checks on the elite. Note, however, that when there are economies of scope it is easier that the horizontal dimension dominates the vertical dimension than when there are diseconomies of scope. The reason is that the extra cost of avoiding a media industry captured by the politician with respect to a situation with only one company that receives s^1 is $\bar{n}^1 C_S^1$ when there are diseconomies of scope, while it is $\bar{n}^1(1-\alpha)\left(\bar{C}_S^1 + \bar{C}_S^2\right)$ when there are economies of scope.

Proposition 6 can also be understood as a formalization of an old conservative/liberal debate. Those who emphasize the vertical dimension of conflict tend to welcome the involvement of elite in the media industry because they see it as a way of imposing a limit to politicians. On the other hand, those who

[24] Appendix B can be found online at http://gustavotorrens.wordpress.com/.

emphasize the horizontal dimension of conflict tend to favor restrictions to the involvement of the elite because they fear that a powerful elite that controls the media will manipulate the information about public policies. In terms of the model, when $\beta \to 1$ the horizontal dimension vanishes and the elite contributes to make the media free, while when $\beta \to 0$ the vertical dimension vanishes and the elite distorts information about policies.

Alternative Constitutional Environment. Suppose that the elite's ability to influence the media through advertisements is exogenous and cannot be affected by the constitution, which can only select between free entry and a natural duopoly when there are diseconomies of scope and between free entry and a natural monopoly when there are economies of scope.

Proposition 7: *Suppose that Assumptions 3 and 4 hold and there are diseconomies of scope, i.e., $\alpha < 0$ (economies of scope, i.e., $\alpha > \hat{\alpha}$). Assume that the constitution can only select between free entry and duopoly (monopoly) and the elite's ability to influence the media through advertisements is exogenous and cannot be affected by the constitution. Then, if free entry dominates a duopoly (monopoly) when the elite cannot advertise then free entry also dominates a duopoly (monopoly) when the elite can advertise.*
Proof: See online Appendix B.3.[25]■

Proposition 7 shows that free entry is more attractive when the elite can advertise. The intuition is that when the elite can advertise free entry is useful to avoid media capture by the politician and the elite, while when the elite cannot advertise, it cannot capture the media either and, hence, free entry is only useful to avoid media capture by the politician.

7 Conclusion

This paper develops a political economy model of the media industry and derives the optimal regulation of the media under several alternative constitutional settings. The fundamental message of the paper is that the media should not be treated as a standard industry and that economies of scale are not a sufficient condition for restricting entry or favoring a media monopoly. More competition inoculates the media from being captured by powerful politicians, avoiding the dissipation of resources in the political system. In other words, the standard argument in Industrial Organization about excessive entry in oligopolistic industries might not apply to the media industry because it neglects the effect that media competition has on political outcomes. In general, the optimal regulation favors free entry or, at least, the elimination of major entry barriers. Moreover, when free entry leads to a captured media, it might be optimal to actively promote entry rather than passively accept a captured industry.

Although my model stresses how competition contributes to stop media capture, competition in the media industry could be beneficial for other reasons. For example, Gentzkow and Shapiro (2006) show that competition tends to reduce the proclivity of media companies to confirm the public's views (prior beliefs) rather than inform objectively. Furthermore, my model ignores the standard deadweight loss due to imperfect competition. Nevertheless, introducing these or any other positive welfare effects caused by competition can only reinforce the main message of this paper.

[25] Appendix B can be found online at http://gustavotorrens.wordpress.com/.

The extended model developed in section 6 incorporates two sources of social conflict and two groups that try to capture the media (the politician and the elite). The elite plays an ambiguous role in the media industry. On one hand, it tends to neutralize the politician in the sense that it is more difficult for the politician to capture the media when the elite is also trying to influence news. From this point of view, the elite provides a public good. On the other hand, the elite encourages the media to withhold information when it can be used to promote policies that negatively its interest.

Two important results emerge from this extension. First, due to the ambiguous role of the elite, the relative importance of the vertical dimension of social conflict (i.e., the politician versus the general public and the elite) in comparison with the horizontal dimension (i.e., the general public versus the elite) is the key determinant of whether the involvement of the elite in the media industry is welfare enhancing. Second, free entry is even more appealing when the elite is involved in the media because if the elite can easily influence the media free entry helps to avoid media capture by the politician and the elite, while if the elite cannot influence the media, free entry is only useful to avoid media capture by the politician. The model also suggests that mergers and acquisitions in the media industry are complicated because they can dramatically change the equilibrium of the industry. For example, if integrated[26] companies merge and block entry, then media capture becomes more likely because there will be fewer media companies in the market. However, if there are economies of scope, allowing mergers between two non-integrated companies is a simple way of reducing entry barriers and, hence, decreasing the chances of capture.

This paper is far from answering all the relevant questions about the optimal organization of the media industry. Indeed, there are several interesting open questions. First, in my model there is no explicit distinction between private and public media companies. Can public media enhance aggregate welfare? It is easy to see that in the baseline model the answer is "no" because ultimately, public media will be controlled by the politician. Thus, it will only reduce the cost of capture, most likely decreasing aggregate welfare. When the horizontal dimension of conflict is present, public media might be useful. In the extended model this is not the case: the politician only cares about the vertical dimension of conflict and he is neutral regarding the horizontal dimension. As a result, a public media controlled by the politician has little incentive to report the true signal about c^2. However, if the game is repeated and the general public can reelect the politician, it is possible that he strictly prefers to use public media to report about c^2. Moreover, the general public will be more willing to reelect a politician that reports the true signal about c^2. Nevertheless, public media will have an ambiguous effect on aggregate welfare, making media capture by the politician easier at the cost of making media capture by the elite more complicated.

There are at least three more specific open issues with respect media industry organization: the distribution of official government advertising; exclusive interviews versus general press conferences; and, the extension of the right of journalists to protect their sources. With respect to the first issue, politicians might be tempted to use government paid advertising to influence the media. A simple way of alleviating this problem could be a regulation that allocates government advertising to media companies according their fraction of readership and/or viewers.[27] Second, sometimes politicians give exclusive interviews only

[26] "Integrated" is defined as a company that gathers information about both policy dimensions. A "non-integrated" company is one that only reports about one policy dimension.

[27] To implement this policy, might not be as simple as it looks. It is not easy to find objectives ways of measuring readership or audience (apparently this is a less pressing problem for television than for newspapers). Self-report measures lack credibility. For example, the Argentine newspaper 'Ambito Financiero' claims that the most important national newspapers (Clarin and LaNacion) over-report their readership when the key issue is government advertising, but they sub-report their

to journalists who favor their agenda, thereby distorting the information received by the public. A simple way to solve this problem is to promote general press conferences in which media companies with diverse ideological leanings can participate and ask questions.[28] Third, journalists tend to protect the anonymity of their sources, while government agencies always find a good reason to ask journalists to disclose them. An optimal regulation should define the extension of the journalists' right to protect the anonymity of their sources by balancing between the potential value of the information for the government against the value of journalists' reputation.

Finally, in future works, it would be really interesting to integrate these specific and more focus regulations with the broader regulations considered in this paper.

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readership when the issue is anti-trust laws.

[28] Allegedly a complete ban on exclusive interviews would violate freedom of speech. However, it seems possible to have an informal norm that promotes general press conferences as there is an informal norm that supports candidates' debates in the United States.

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Appendix A: Baseline model

In this Appendix I present the proofs of the lemmas and propositions for the baseline model (sections 3, 4 and 5).

A.1 Proof of Proposition 1

Lemma 1: *Let g_L, g_H, Δ_P, and Δ_{GP} be defined by the following expressions:*

$$\begin{aligned} u'(g_L) &= c_L(1+\lambda), \\ u'(g_H) &= \left(\frac{c_H - pc_L}{1-p}\right)(1+\lambda), \\ \Delta_P &= g_H(c_H - c_L), \\ \Delta_{GP} &= (1-p)[v(g_L) - v(g_H)], \end{aligned}$$

where $v(g) = u(g) - u'(g)g$ and let $\gamma \in [0,1]$ be the proportion of the general public that buy media subscriptions. Assume that n companies have entered into the media market. Then, the media industry is free (indeed $r_i = s$ for all i) if $n\gamma\Delta_{GP} > \Delta_P$, while it is captured by the politician ($r_i = \varnothing$ for all i) if $n\gamma\Delta_{GP} \leq \Delta_P$.

Proof: The proof uses backward induction.

Step 1: Equilibrium Contracts. Consider the problem of the general public for each possible report.

1. Suppose that the media report is $r = c_L$ (formally when $r_i = c_L$ for at least one i). Then, the problem of the general public is

$$\max_{g_L, T} \{u(g_L) - (1+\lambda)T\},$$

subject to $T = c_L g_L$. The solution is given by:

$$u'(g_L) = (1+\lambda)c_L,\ T = c_L g_L.$$

Thus, the utility of the politician and the general public are $u_P(r = c_L) = 0$, and $u_{GP}(r = c_L) = v(g_L)$, respectively, where $v(g) = u(g) - u'(g)g$.

2. Suppose that the media report is $r = \varnothing$ (formally, when $r_i = \varnothing$ for all i). Then, the general public falls back to its priors and, from the revelation principle, solves the following problem:

$$\max_{\{g_L, T_L, g_H, T_H\}} \{p[u(g_L) - (1+\lambda)T_L] + (1-p)[u(g_H) - (1+\lambda)T_H]\},$$

subject to participation constraints $T_L - c_L g_L \geq 0$ and $T_H - c_H g_H \geq 0$, and the incentive compatibility constraints $T_L - c_L g_L \geq T_H - c_L g_H$, and $T_H - c_H g_H \geq T_L - c_H g_L$. Note that the media expenditure does not appear in the objective function. The reason is that at this point it is just a constant since the media reports has already been decided. Note also that the bribes paid by the politician do not appear in the constraints because at this time there have already been paid and, hence, there are just a sunk cost. Besides these two caveats, this is an standard principle-agent problem (see Laffont 2000), whose

unique solution is given by:

$$\begin{aligned} u'(g_L) &= (1+\lambda)\, c_L,\ u'(g_H) = (1+\lambda)\left(\frac{c_H - p c_L}{1-p}\right) \\ T_L &= g_H(c_H - c_L) + c_L g_L,\ T_H = c_H g_H. \end{aligned}$$

Thus, the utility of the politician is $u_P(r=\varnothing) = g_H(c_H - c_L)$ if $c = c_L$ and $u_P(r=\varnothing) = 0$ if $c = c_H$ and the utility of the general public is $u_{GP}(r=\varnothing) = u(g_L) - (1+\lambda) T_L$ if $c = c_L$ and $u_{GP}(r=\varnothing) = u(g_H) - (1+\lambda) T_H$ if $c = c_H$. Therefore, the expected utility of the general public is $\mathbf{E}[u_{GP}(r=\varnothing)] = pv(g_L) + (1-p)\, v(g_H)$.

Deduction of Δ_P and Δ_{GP}. From step 1, the utility gain of the politician when the media withholds $s = c_L$ is given by:

$$\Delta_P = u_P(r=\varnothing) - u_P(r=c_L) = g_H(c_H - c_L).$$

From step 1, the expected utility gain of the general public when the media reports $r = c_L$ is given by:

$$\Delta_{GP} = \mathbf{E}[u_{GP}(r=\varnothing)] - u_{GP}(r=c_L) = (1-p)[v(g_L) - v(g_H)].$$

Step 2: Equilibrium Bribes and Reports.[29] From (5) $\bar{E}_M = \gamma\{\mathbf{E}[u_{GP}(r=c_L)] - \mathbf{E}[u_{GP}(r=\varnothing)]\}$. Therefore, $\bar{E}_M = \gamma\Delta_{GP}$. Suppose that $s = c_L$ and $n\gamma\Delta_{GP} > \Delta_P$. Δ_P is the maximum that the politician is willing to offer in order to change the report from $r = c_L$ to $r = \varnothing$, while $n\gamma\Delta_{GP}$ is the total amount that the politician must pay in bribes if he wants to induce such change in r . In order to see this, suppose that all media companies are reporting $r_i = \varnothing$. Then, if only one company decides to deviate it gets $\gamma\Delta_{GP}$ and the report changes from $r = \varnothing$ to $r = c_L$. Thus, if the politicians wants $r = \varnothing$, he must offer $\gamma\Delta_{GP}$ to each company. Since there are n companies, he must offer $n\gamma\Delta_{GP}$. But if $n\gamma\Delta_{GP} > \Delta_P$, the amount that he must pay is higher than the maximum that he is willing to offer. Hence, the best strategy for the politician is to offer zero bribes to all media companies. Then, the media will be free and all companies will report $r_i = c_L$. Conversely, if $n\gamma\Delta_{GP} \leq \Delta_P$, the politician will offer $B_i(\varnothing) = \gamma\Delta_{GP}$ to each media company and the media will be captured by the politician. Note that $B_i(\varnothing) \geq \gamma\Delta_{GP}$ for all i also induces $r^i = c_L$ for all i, but a bribe in excess of $\gamma\Delta_{GP}$ is a total waste from the point of view of the politician. This completes the proof of Lemma 1.■

Lemma 2: *Suppose that assumptions 1 and 2 hold. Then, free entry leads to a free media industry if and only if* $\frac{\delta}{C_S} \geq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$, *where* $\bar{n} = int\left(\frac{\Delta_P}{\gamma\Delta_{GP}}\right)$ *Moreover, if* $\frac{\delta}{C_S} < \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$, *the equilibrium number of media companies is* $\bar{n}$, *while if* $\frac{\delta}{C_S} \geq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$, *it is* $\hat{n} = int\left(\frac{p\delta\gamma\Delta_{GP}}{C_S}\right)$.

[29] Making $\gamma\Delta_{GP} = a$ and $\Delta_P = r$, the proof of Step 2 is identical to the proof of Proposition 1 in Besley and Prat (2006). The reason is the following. In Besley and Prat (2006) a and r are both exogenous variables, while in the present model $\gamma\Delta_{GP}$ and Δ_P are endogenously determined by the solution to principal-agent problem faced by the general public. However, $\gamma\Delta_{GP}$ and Δ_P are not affected neither by the politician's bribing decision nor by the media companies news policies.

Proof:[30] From Lemma 1, if $n \leq \bar{n}$, the politician captures the media, while if $n \geq \bar{n}+1$, the politician cannot capture the media. Thus, the expected profit of a company is given by:

$$\mathbf{E}[u_M] = \begin{cases} p\delta\gamma\Delta_{GP} - C_S & \text{if } n \leq \bar{n}, \\ \frac{p\delta\gamma\Delta_{GP}}{n} - C_S & \text{if } n \geq \bar{n}+1. \end{cases}$$

Note that $\mathbf{E}[u_M]$ is a decreasing function of n. Under free entry a company will enter into the market whenever $\mathbf{E}[u_M] \geq 0$. Therefore, if $\frac{p\delta\gamma\Delta_{GP}}{\bar{n}+1} \geq C_S$ then at least $\bar{n}+1$ companies will enter and, hence, the politician will not capture the media. Indeed, the equilibrium number of companies will be $\hat{n}$. In order to prove this note that $\frac{p\delta\gamma\Delta_{GP}}{\hat{n}} \geq C_S$, but $\frac{p\delta\gamma\Delta_{GP}}{\hat{n}+1} < C_S$. On the other hand, if $\frac{p\delta\gamma\Delta_{GP}}{\bar{n}+1} < C_S^1$, at most $\bar{n}$ companies will enter and, hence, the politician will capture the media. Indeed the equilibrium number of firms will be $\bar{n}$. In order to prove this note that when there are $\bar{n}$ companies each gets $p\delta\gamma\Delta_{GP} - C_S \geq 0$, while when there are more than $\bar{n}$, each company gets a negative expected profit.■

The proof of Proposition 1 is immediate from Lemmas 1 and 2.

A.2 Proof of Proposition 2

Assume that $\Delta_P \geq \gamma\Delta_{GP}$. Then, from Lemma 1, for $n = 1$ the media industry is captured by the politician. Suppose that $\frac{\delta}{\bar{C}_S} \leq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$. Then, from Lemma 2, free entry leads to a captured media industry. There are two alternative constitutional rules. First, the constitution can try to restrict entry. Since free entry is not enough to induce a free media industry, any restriction to entry will also induce a captured industry. Thus, the best possible restriction is to allow only one firm. Under such rule, the expected aggregate welfare is given by

$$W(1) = p\delta\left[u(g_L) - (1+\lambda)c_L g_L - \lambda g_H(c_H - c_L)\right] - \bar{C}_S.$$

Second, the constitution can try to induce more entry. Any extra entry on top of the number of firms under free entry that is not enough to make the media industry free is useless. The reason is that, any new firm increases the cost of the industry in $\bar{C}_S$, but it does not make any difference in the voter's behavior. Thus, any subsidy to entry must be generous enough to transform the media industry into a free one. Moreover, there is no good reason to induce more entry that the strictly necessary to make the industry free. Thus, the best possible option is to set a subsidy to entry S such that the number of firms that enter the market is just enough to have a free media industry. Formally, the optimal S is given by

$$\frac{p\delta\gamma\Delta_{GP}}{\bar{C}_S - S} = \bar{n} + 1,$$

which induces $\bar{n}+1$ media companies. Therefore, expected welfare is given by

$$\begin{aligned} W(\bar{n}+1) &= p\delta\left[u(g_L) - (1+\lambda)c_L g_L\right] - (\bar{n}+1)\left(\bar{C}_S + \lambda S\right) \\ &= p\delta\left[u(g_L) - (1+\lambda)c_L g_L\right] - (1+\lambda)(\bar{n}+1)\bar{C}_S + \lambda p\delta\gamma\Delta_{GP}. \end{aligned}$$

$$W(\bar{n}+1) - W(1) = \lambda p\delta\left[\gamma\Delta_{GP} + \Delta_P\right] + \bar{C}_S - (1+\lambda)(\bar{n}+1)\bar{C}_S$$

[30] Making $\gamma\Delta_{GP} = a$, $\Delta_P = r$, and $\delta = q$, the proof of Lemma 2 is identical to the proof of Proposition 4 in Besley and Prat (2006).

Comparing $W(1)$ with $W(\bar{n}+1)$ it is easy to prove that $W(1) > W(\bar{n}+1)$ if $\frac{\delta}{\bar{C}_S} < \frac{(1+\lambda)\bar{n}+\lambda}{p\lambda(\Delta_P+\gamma\Delta_{GP})}$ and $W(1) \leq W(\bar{n}+1)$ if $\frac{(1+\lambda)\bar{n}+\lambda}{p\lambda(\Delta_P+\gamma\Delta_{GP})} \leq \frac{\delta}{\bar{C}_S} \leq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$, which completes the proof of Parts 1.a and 1.b of the proposition. Note that $\lambda > \bar{\lambda}$ assures that these two regions are not empty.

Suppose that $\frac{\delta}{\bar{C}_S} > \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$. Then, from Lemma 2, free entry leads to a free media industry. And again, there are two alternative constitutional rules. First, the constitution can try to avoid the excessive number of firms without changing the nature of the industry. That is, the constitution can promote a moderate entry limitation that just keeps the media industry free. Formally, the constitution only allows $\bar{n}+1$ media companies, which implies that the expected aggregate welfare is given by

$$W(\bar{n}+1) = p\delta\left[u(g_L) - (1+\lambda)c_L g_L\right] - (\bar{n}+1)\bar{C}_S.$$

Note that subsidies are not necessary in this case because under free entry there are more media companies than $\bar{n}+1$, the number necessary to have a free media industry. Second, the constitution can try a more radical approach and extend the limitation below $\bar{n}+1$. In such a case, the media will be captured by the politician, which implies that it is better to go all the way down till the industry becomes a monopoly. Formally, the constitution only allows one firm and the expected aggregate welfare is given by

$$W(1) = p\delta\left[u(g_L) - (1+\lambda)c_L g_L - \lambda g_H(c_H - c_L)\right] - \bar{C}_S.$$

Comparing $W(\bar{n}+1)$ and $W(1)$, it is easy to prove that $\lambda \geq \bar{\lambda}$ implies that it is always the case that $W(\bar{n}+1) \geq W(1)$, which completes the proof of Part 1.c of the proposition.

Suppose that $\Delta_P < \gamma\Delta_{GP}$. Then, from Lemma 1, for $n = 1$ the media industry is free. Then, the optimal media industry is a monopoly.■

A.3 Proof of Propositions 3

Let's begin studying a constitutional environment in which entry restrictions are not allowed. From Lemma 2, we know that, if $\frac{\delta}{\bar{C}_S} \geq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$, then free entry will lead to a free industry with $\hat{n} = int\left(\frac{\delta p\gamma\Delta_{GP}}{\bar{C}_S}\right)$ companies, while if $\frac{\delta}{\bar{C}_S} < \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$, then free entry will lead to a captured media industry with $\bar{n}$ companies. Since entry restriction is not an option, when $\frac{\delta}{\bar{C}_S} \geq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$, there will be free press. On the other hand, when $\frac{\delta}{\bar{C}_S} \leq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$, the constitution might consider a subsidy to entry that makes the media free. Thus, the welfare comparison at the constitutional stage is as follows. Under no subsidy, the expected aggregate welfare is (as in previous proofs we only write the relevant terms of $W(n)$):

$$W(\bar{n}) = p\delta\left\{u(g_L) - (1+\lambda)c_L g_L - \lambda g_H(c_H - c_L)\right\} - \bar{n}\bar{C}_S + ...$$

while under a subsidy S, the expected aggregate welfare is:

$$W(n) = p\delta\left\{u(g_L) - (1+\lambda)c_L g_L - \lambda g_H(c_H - c_L)\right\} - n\left(\bar{C}_S + \lambda S\right) + ...$$

Note that the optimal subsidy is lowest possible S that induces $\bar{n}+1$ companies to enter into the market. That is, $S = \bar{C}_S - \frac{\delta p\gamma\Delta_{GP}}{\bar{n}+1}$, which implies that

$$W(\bar{n}+1) = p\delta\left\{u(g_L) - (1+\lambda)c_L g_L\right\} - (\bar{n}+1)(1+\lambda)\bar{C}_S + \lambda\delta p\gamma\Delta_{GP} + ...$$

Comparing $W(\bar{n}+1)$ and $W(\bar{n})$ we get:

$$W(\bar{n}+1) \geq W(\bar{n}) \Leftrightarrow \frac{\delta}{\bar{C}_S} \geq \frac{\lambda\bar{n}+(1+\lambda)}{\lambda p(\Delta_P+\gamma\Delta_{GP})}.$$

This completes the proof of the first part of the proposition.

Next, consider the opposite constitutional environment, in which entry promoting is not allowed. Then, the constitution has two possible alternatives: either to restrict entry to only one firm and induce the best possible captured media structure, or to restrict entry to $\bar{n}+1$ and try to induce the best possible free media structure. However, the last option would be effective only if free entry would lead to the entry of at least $\bar{n}+1$ firms, i.e., when $\frac{\delta}{\bar{C}_S} \geq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$. When only one company is allowed to operate, expected aggregate welfare is given by:

$$W(1) = p\delta\{u(g_L) - (1+\lambda)c_L g_L - \lambda g_H(c_H - c_L)\} - \bar{C}_S + ...$$

When $\frac{\delta}{\bar{C}_S} \geq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$ and entry is restricted to $\bar{n}+1$, expected aggregate welfare is given by:

$$W(\bar{n}+1) = p\delta\{u(g_L) - (1+\lambda)c_L g_L\} - (\bar{n}+1)\bar{C}_S + ...$$

Comparing the last two expression we have:

$$W(\bar{n}+1) \geq W(1) \Leftrightarrow \frac{\delta}{\bar{C}_S} \geq \frac{\bar{n}}{\lambda p\Delta_P}.$$

Note that $\frac{\bar{n}+1}{p\gamma\Delta_{GP}} \geq \frac{\bar{n}}{\lambda p\Delta_P}$ since $\lambda \geq \bar{\lambda}$, which completes the proof of the second part of the proposition.■

A.4 Proof of Proposition 4

Since a monopoly is always captured by the politician, the expected aggregate welfare under monopoly is given by (as in previous proofs we only write the relevant terms of $W(n)$):

$$W(1) = p\delta\{u(g_L) - (1+\lambda)c_L g_L - \lambda g_H(c_H - c_L)\} - \bar{C}_S + ...$$

From Lemma 2, free entry leads to a free media industry if and only if $\frac{\delta}{\bar{C}_S} \geq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$. Moreover, when $\frac{\delta}{\bar{C}_S} \geq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$, the equilibrium number of firms $\hat{n} = int\left(\frac{p\delta\gamma\Delta_{GP}}{\bar{C}_S}\right)$, while when $\frac{\delta}{\bar{C}_S} < \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$, the equilibrium number of firms is $\bar{n}$. Thus, the expected aggregate welfare under free entry is given by:

$$W(\hat{n}) = p\delta\{u(g_L) - (1+\lambda)c_L g_L\} - \hat{n}\bar{C}_S + ...$$

when free entry leads to a free media industry and it is given by:

$$W(\bar{n}) = p\delta\{u(g_L) - (1+\lambda)c_L g_L - \lambda g_H(c_H - c_L)\} - \bar{n}\bar{C}_S + ...,$$

when free entry leads to a captured media industry.

From simple inspection $W(1) > W(\bar{n})$. Thus, when $\frac{\delta}{\bar{C}_S} < \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$, monopoly dominates free entry. When $\frac{\delta}{\bar{C}_S} \geq \frac{\bar{n}+1}{p\gamma\Delta_{GP}}$ we have that $W(1) > W(\hat{n})$ if and only if $\frac{\delta}{\bar{C}_S} < \frac{\hat{n}-1}{p\lambda\Delta_P}$. Therefore, monopoly dominates free entry if and only if $\frac{\delta}{\bar{C}_S} < \max\left\{\frac{\bar{n}+1}{p\gamma\Delta_{GP}}, \frac{\hat{n}-1}{p\lambda\Delta_P}\right\}$.■

A.5 Proof of Proposition 5

From Lemma 1 (which does not depend on Assumptions 1-2), it is always the case that the media industry is free if $n\gamma\Delta_{GP} > \Delta_P$, while it is captured by the politician if $n\gamma\Delta_{GP} \leq \Delta_P$. Next, a simple variation of Lemma 2 implies that under free entry the media industry is free if and only if $\frac{\delta}{\bar{C}_S} > \frac{\bar{n}+1}{n_{\min}p\gamma\Delta_{GP}}$. In order to prove this, note that under free entry the equilibrium number of firms is implicitly given by

$$\begin{aligned} p\delta\gamma\Delta_{GP} &\geq nC_S(n), \\ p\delta\gamma\Delta_{GP} &< (n+1)C_S(n+1). \end{aligned}$$

Due to assumption 1bis $nC_S(n)$ is decreasing in n for $n \leq n_{\min}$ and increasing for $n \geq n_{\min}$. Due to assumption 2bis $p\delta\gamma\Delta_{GP} \geq n_{\min}C_S(n_{\min}) = \bar{C}_S$ and $n_{\min}$ is finite. Thus, the number of media firms under free entry must be greater than $n_{\min}$. Specifically, the number of media firms under free entry is $\tilde{n} = int\left(\frac{n_{\min}p\delta\gamma\Delta_{GP}}{\bar{C}_S}\right)$, which implies, due to Lemma 1, that the media industry is free if and only if $\tilde{n} > \bar{n}$ or, which is equivalent, if and only if $\frac{\delta}{\bar{C}_S} > \frac{\bar{n}+1}{n_{\min}p\gamma\Delta_{GP}}$. The rest of the proof follows analogous steps to the proof of Proposition 2.

Assume that $\bar{n} \geq n_{\min}$. Then, a natural oligopoly with $n \leq n_{\min}$ companies is always captured by the politicians. Suppose that $\frac{\delta}{\bar{C}_S} \leq \frac{\bar{n}+1}{n_{\min}p\gamma\Delta_{GP}}$. Then, free entry leads to a captured media industry. There are two alternative constitutional rules. First, the constitution can try to restrict entry. Since free entry is not enough to induce a free media industry, any restriction to entry will also induce a captured industry. Thus, the best possible restriction is to allow $n_{\min}$ firms. Under such rule, the expected aggregate welfare is given by

$$W(n_{\min}) = p\delta\left[u(g_L) - (1+\lambda)c_L g_L - \lambda g_H(c_H - c_L)\right] - \bar{C}_S.$$

Second, the constitution can try to induce more entry. Any extra entry on top of the number of firms under free entry that is not enough to make the media industry free is useless. The reason is that, any new firm increases the cost of the industry in $\frac{\bar{C}_S}{n_{\min}}$, but it does not make any difference in the voter's behavior. Thus, any subsidy to entry must be generous enough to transform the media industry into a free one. Moreover, there is no good reason to induce more entry that the strictly necessary to make the industry free. Thus, the best possible option is to set a subsidy to entry S such that the number of firms that enter the market is just enough to have a free media industry. Formally, the optimal S is given by

$$\frac{p\delta\gamma\Delta_{GP}}{\frac{\bar{C}_S}{n_{\min}} - S} = \bar{n} + 1,$$

which induces $\bar{n}+1$ media companies. Therefore, expected welfare is given by $S = \frac{\bar{C}_S}{n_{\min}} - \frac{p\delta\gamma\Delta_{GP}}{\bar{n}+1}$

$$\begin{aligned} W(\bar{n}+1) &= p\delta\left[u(g_L) - (1+\lambda)c_L g_L\right] - (\bar{n}+1)\left(\frac{\bar{C}_S}{n_{\min}} + \lambda S\right) \\ &= p\delta\left[u(g_L) - (1+\lambda)c_L g_L\right] - (1+\lambda)(\bar{n}+1)\frac{\bar{C}_S}{n_{\min}} + \lambda p\delta\gamma\Delta_{GP}. \end{aligned}$$

Comparing $W(1)$ with $W(\bar{n}+1)$ it is easy to prove that $W(1) \geq W(\bar{n}+1)$ if $\frac{\delta}{\bar{C}_S} \leq \frac{(1+\lambda)\bar{n}+1+\lambda-n_{\min}}{\lambda p(\Delta_P+\gamma\Delta_{GP})n_{\min}}$ and $W(1) < W(\bar{n}+1)$ if $\frac{(1+\lambda)\bar{n}+1+\lambda-n_{\min}}{\lambda p(\Delta_P+\gamma\Delta_{GP})n_{\min}} < \frac{\delta}{\bar{C}_S} \leq \frac{\bar{n}+1}{n_{\min}p\gamma\Delta_{GP}}$, which completes the proof of Parts 1.a and 1.b of the proposition. Note that $\lambda > \tilde{\lambda}$ assures that these two regions are not empty.

Suppose that $\frac{\delta}{\bar{C}_S} > \frac{\bar{n}+1}{n_{\min} p \gamma \Delta_{GP}}$. Then, free entry leads to a free media industry. And again, there are two alternative constitutional rules. First, the constitution can try to avoid the excessive number of firms without changing the nature of the industry. That is, the constitution can promote a moderate entry limitation that just keeps the media industry free. Formally, the constitution only allows $\bar{n}+1$ media companies, which implies that the expected aggregate welfare is given by

$$W(\bar{n}+1) = p\delta\left[u(g_L) - (1+\lambda)\, c_L g_L\right] - (\bar{n}+1)\,\frac{\bar{C}_S}{n_{\min}}.$$

Second, the constitution can try a more radical approach and extend the limitation below $\bar{n}+1$. In such a case, the media will be captured by the politician, which implies that it is better to go all the way down till $n_{\min}$ (Assumption 2bis assures that with $n_{\min}$ the industry is captured). Formally, the constitution only allows $n_{\min}$ firms and the expected aggregate welfare is given by

$$W(n_{\min}) = p\delta\left[u(g_L) - (1+\lambda)\, c_L g_L - \lambda g_H\,(c_H - c_L)\right] - \bar{C}_S.$$

Comparing $W(\bar{n}+1)$ and $W(n_{\min})$, it is easy to prove that $\lambda > \tilde{\lambda}$ implies that it is always the case that $W(\bar{n}+1) > W(n_{\min})$, which completes the proof of part 1.c of the proposition.

Assume that $\bar{n} < n_{\min}$. Then an oligopoly with $n \leq n_{\min}$ induces a free media industry. Therefore, the optimal media industry is an oligopoly with $n_{\min}$ companies.■

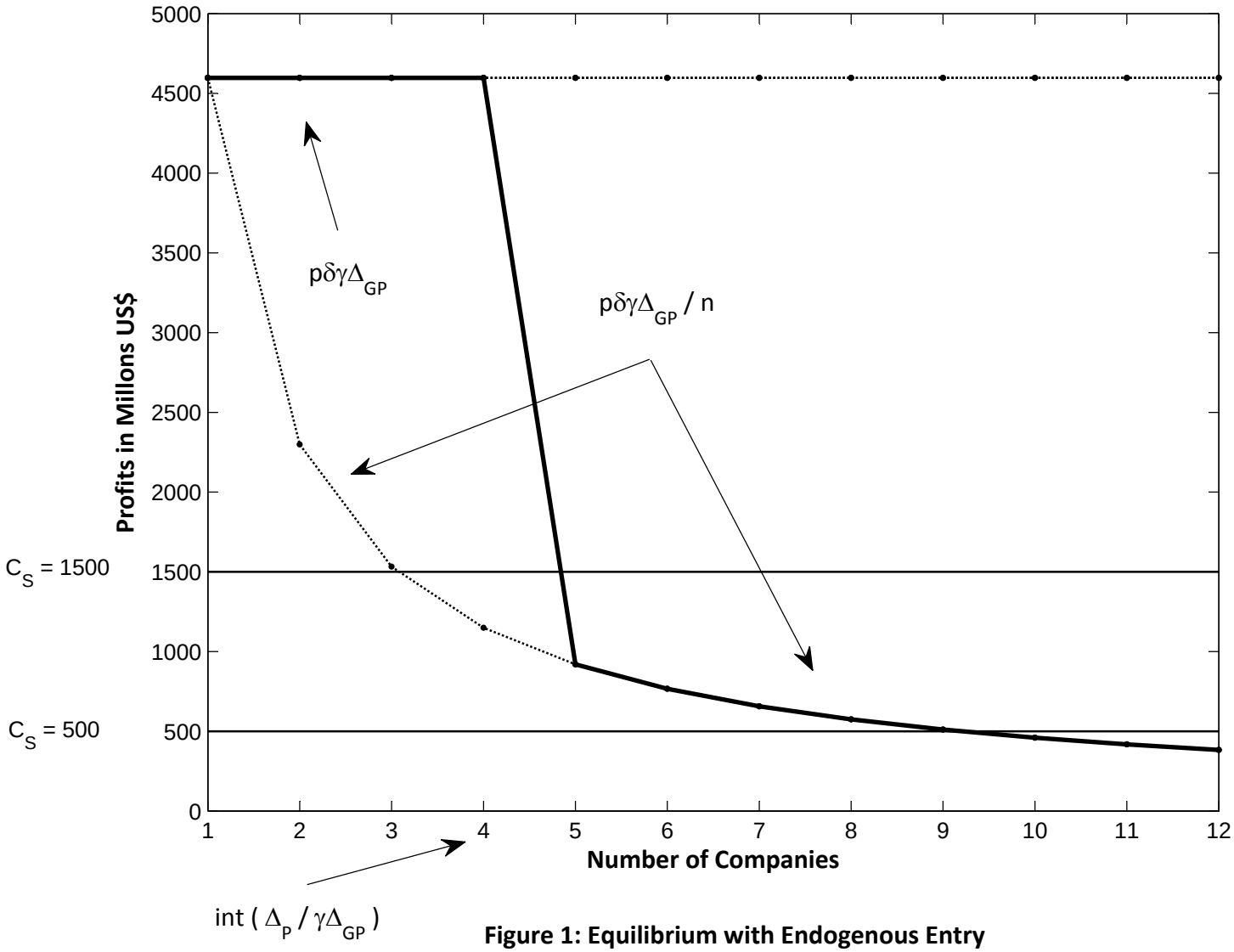

Figure 1: Equilibrium with Endogenous Entry

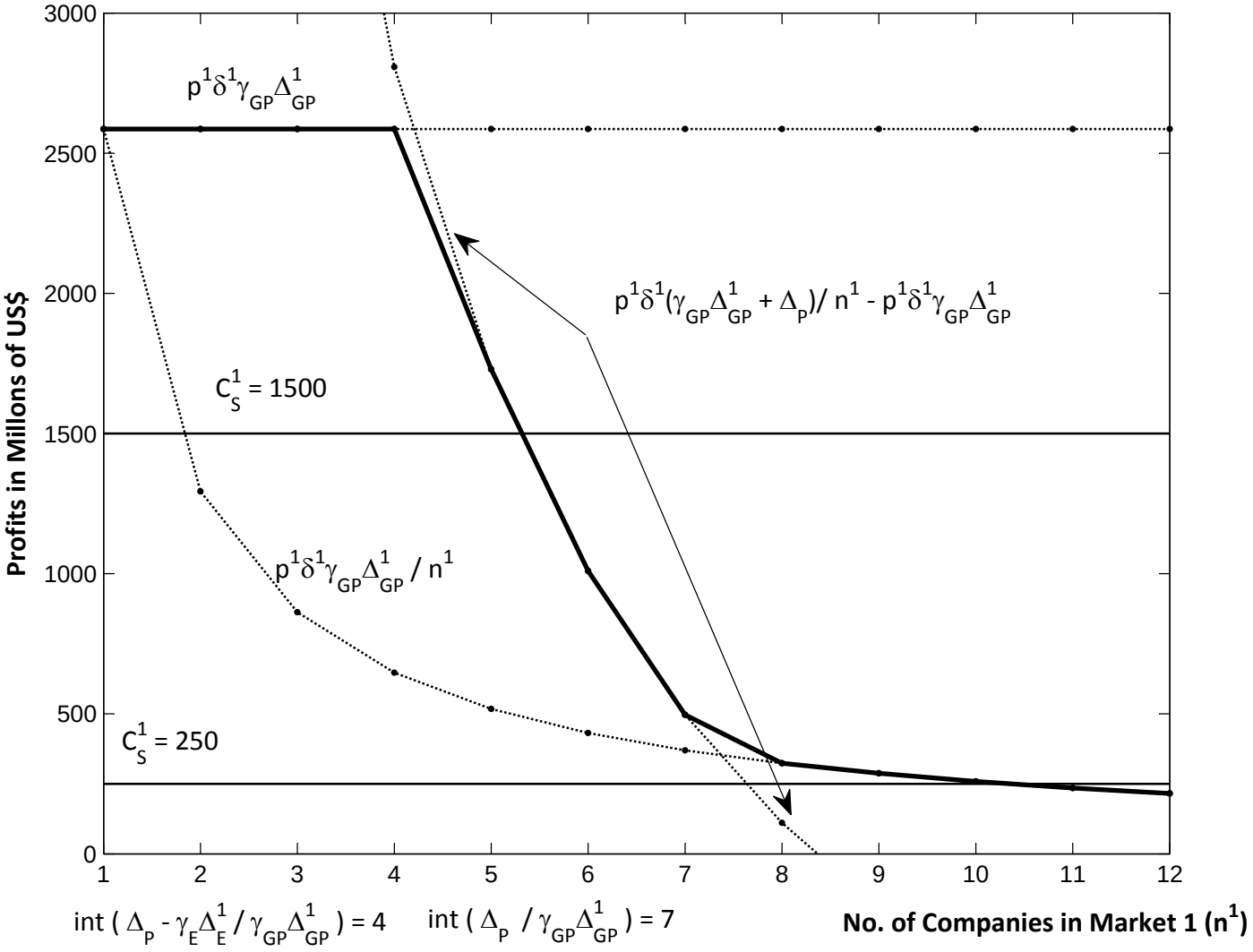

Figure 2.a: Equilibrium in Market 1 with Endogenous Entry (Diseconomies of Scope)

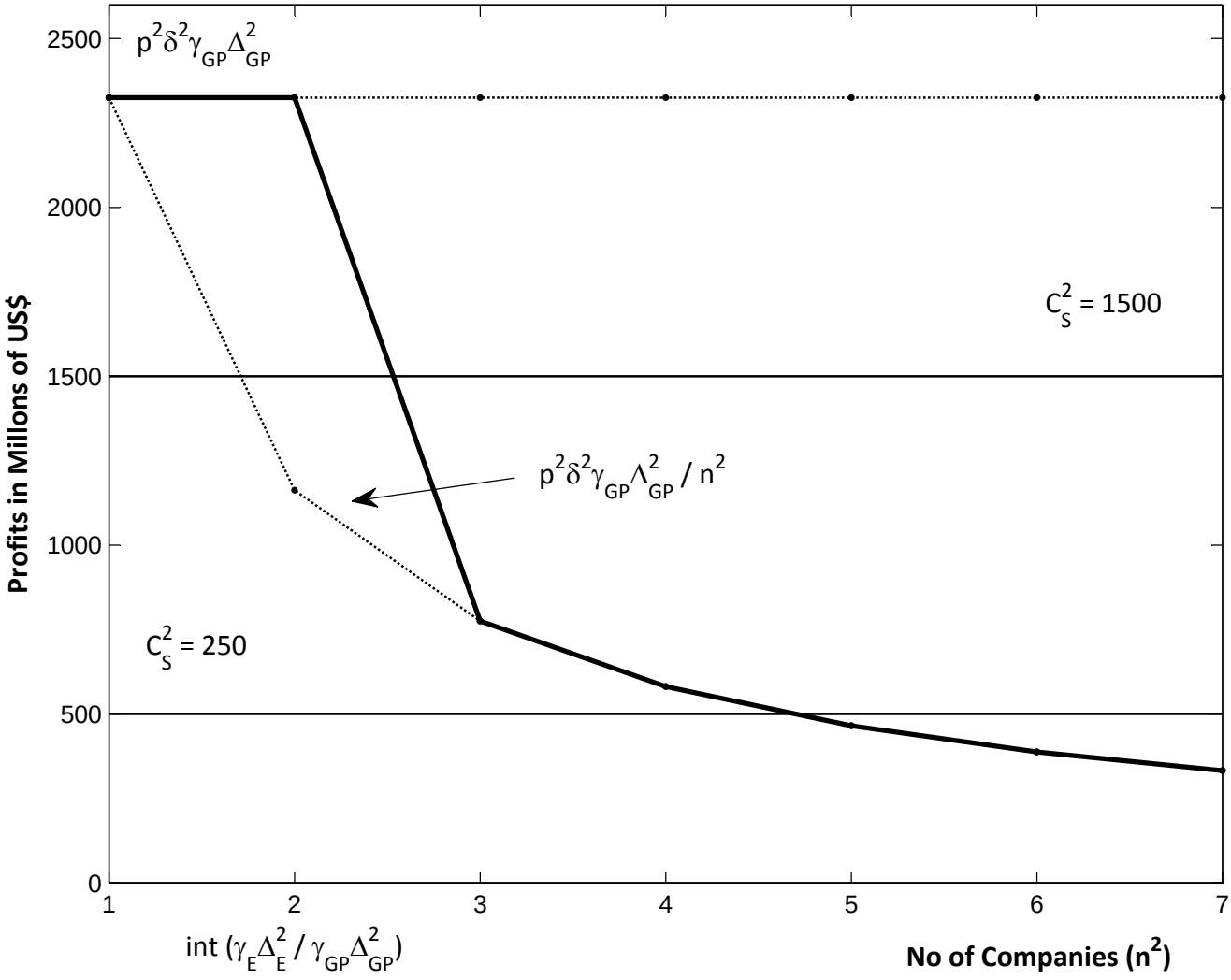

Figure 2.b: Equilibrium in Market 2 with Endogenous Entry (Diseconomies of Scope)

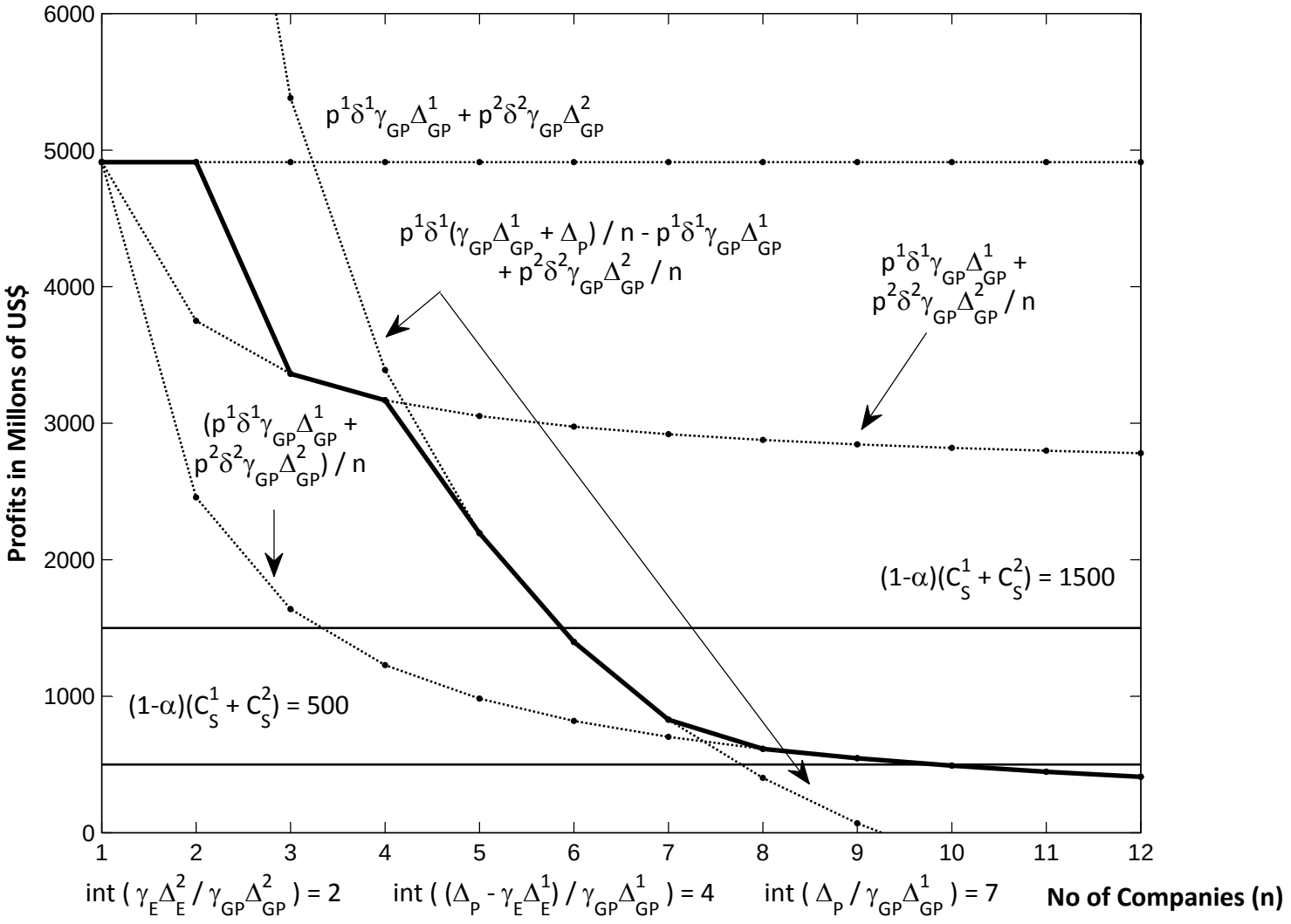

Figure 3: Equilibrium with Endogenous Entry (Economies of Scope)