

Product Diversity and Ethnic Fragmentation: Is Heterogeneity Good or Bad for Media Capture?

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Abstract

Under some circumstances a power seeking politician tries to exert control over the media in order to gain political support. He has two ways to reach this goal; one is to formally acquire media's ownership, the other is to pay the media in exchange for favourable information or silence. In this paper, as in Besley and Prat (2005), media are captured whenever the government bribes them for hiding news which potentially damage his reputation and threaten his reelection. My aim is to study how heterogeneity in consumers' preferences for media outlets can shape the structure of the media market, in turn affecting the extent to which media can be captured by politicians. I distinguish between "hard" ethno-linguistic differences and "soft" hedonic differences among consumers. My model shows that the first type of heterogeneity tends to foster media capture while the second type of heterogeneity tends to reduce it. The intuition behind this result is that when consumers are separated by strong linguistic or cultural barriers, they cannot obtain information from each others' news outlet. As a result, by bribing only a subset of few newspapers, politicians are able to gain political support. By contrast, when consumers' heterogeneity is hedonic, a large number of media outlets is supplied in equilibrium. However, since under this second type of heterogeneity consumers can freely acquire information from any outlet, a

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politician will need to bribe a very large number of outlets to gain political support, rendering the enterprise more difficult. This result implies that standard indexes of market structure such as the number of outlets supplied and their concentration may say little about the extent of media freedom since different sources of media pluralism may have opposite implications for the ability of politicians to influence citizens' information. Overall this analysis can shed light on the possibility for the media sector to foster the quality of politics especially in developing countries, where cultural and ethnic polarization play a key role.

Keywords: Media, Corruption, Ethnolinguistic Fragmentation

JEL: D72, D73, L82

1 Introduction

Nowadays the media represent a very important instrument through which citizens can monitor politicians' behavior and the functioning of other institutions, such as the judicial or the financial system. Viewing the one between voters and their representatives as a principal agent relation, the availability of unbiased information gives to the agents the incentive to well behave. On the contrary if the agents are able to manipulate the news about their own conduct, the asymmetry of information increases the scope for moral hazard practices. Therefore the media providing hard news plays a crucial role in fostering the quality of the politics. There is a large debate on which features of the media market can guarantee freedom and independence of the information; the ones most emphasized by antitrust agencies and economic literature have been ownership structure and pluralism. My study links to this debate pointing out that standard indexes of market structure such as the number of outlets supplied and their concentration may say little about the extent of media freedom since different sources of media pluralism may have opposite implications for the ability of politicians to influence citizens' information.

In my analysis, as in Besley and Prat (2005), media are captured when the politician bribes them in exchange for favorable information or silence. My goal is to analyze how heterogeneity in consumers' preferences for media outlets can shape the structure of the media market, in turn affecting the extent to which media can be captured by politicians. I distinguish between "hard" ethno-linguistic differences and "soft" hedonic differences among consumers.

The first type of heterogeneity is due to strong cultural and linguistic barriers which separate

consumers in a way that each outlet has to specialize choosing to target a specific ethno linguistic group. This leads to a segmented market such that readers buy only from a restricted sample of the outlets.

The second type of heterogeneity is hedonic and regards the main issue covered by a newspaper; within the same language group, some consumers may prefer to read about sport, others about politics or fashion and so on. This feature of consumers preferences generates an horizontal differentiated market; the more heterogeneous and distant are individuals' preferences along this dimension, the higher the number of outlets willing to enter that market. In a segmented market characterized by many linguistic groups, a high hedonic heterogeneity among consumers would translate in having more outlets targeting each group. The argument developed here relies on two critical assumptions: (i) consumers can read only newspapers targeting their own ethnic group and (ii) apart from their hedonic and ethnic tastes, they all prefer "hard" news, that is they all give the same value to unbiased information. From these conditions it follows the consumers behavior to get access to information; in a model of horizontal differentiation a la Salop, I assume that every consumer continues to read his preferred newspaper even if uninformative, being still interested in the main issue it covers, but he tries to get trustworthy news buying also from other outlets. Thus if ethno linguistic segmentation is perfect, in order to become informed, citizens can freely move among hedonically differentiated media but not among ethno linguistic diverse papers so that if all the outlets targeting his own group are bias, he remains completely uninformed.

The main result of my analysis is that ethno linguistic fragmentation tends to foster media capture, while hedonic heterogeneity tends to reduce it. The intuition behind this result is that when consumers are separated by linguistic or cultural barriers, they cannot obtain information from each others' news outlet. Thus by bribing only a subset of few newspapers, politicians are able to gain political support. By contrast, when consumers' heterogeneity is hedonic, a large number of media outlets is supplied in equilibrium. However, since under this second type of heterogeneity consumers can freely acquire information from any outlet, a politician will need to bribe a very large number of outlets to gain political support, rendering the enterprise more difficult. I will start my analysis assuming perfect segmentation such that consumers cannot overcome linguistic barriers at all, reading other groups' papers. I later generalize the model allowing a fraction of readers to move across groups and buy also newspapers in another language. I will show that imperfectly separated markets mitigate the results but will not modify the main implications of the model. In my study I stress two sources of pluralism for the media market demonstrating their opposite

effects on media freedom but I want to highlight an alternative interpretation one can give to my model; in particular every element that, on one hand, leads more outlets to enter but on the other hand generates a “hard” segmentation of the market, is potentially harmful for the independence of the press, while any source of a “softer” pluralism deters media capture. So you might think at geographical distance instead of ethno linguistic heterogeneity and at outlets differentiated along an ideological dimension instead of along the issue covered.

This paper relates to the growing body of literature on media which on one hand focuses on the effects of media on social and political outcomes, on the other analyzes the determinants of media bias. In the first strand one can mention Besley and Burgess (2002) and Stromberg (2004) which focus on the role of media in taking the politician accountable. The former study uses a panel data from India, showing that the government increases public food distribution and relief funds in states where newspaper’s circulation is higher; instead Stromberg finds that in 1930’s the US countries with more radio listeners have been the ones that received more New Deal Funds. Regarding the effects of mass media on voters’ political decisions and attitudes, Della Vigna and Kaplan (2006) analyze the impact of entry of Fox news in cable markets on voting behavior; using a data set on voting for US towns they find that Republicans gained from 0,4 to 0,7 percentage points in towns which broadcast Fox News; Gerber et al. (2006) conduct a randomized control trial just prior to the November 2005 gubernatorial election in Virginia in which the control group was represented by individuals that received a free subscription to the Washington Post, while individuals in the treatment group received a free subscription to the Washington Times. They find that individuals assigned to the Washington Post were eight percentage points more likely to vote for the Democrat in the 2005 election, while individuals assigned to the New York Times, were only four percentage points more likely to vote for the Democrat. Others studies stressed the social outcomes of mass media; Gentzkow and Shapiro (2006) analyzed the effect on children’s school performance, Olken (2006) on adult participation in social activities and trust, La Ferrara et al (2008) found in Brazil that women exposed to soap operas decreased their fertility rate. Finally, Jensen and Oster (2007) estimate the impact of cable TV on female autonomy, school enrollment and fertility. This work is closely related to the literature on media bias that can be divided in two streams ; the first focusing on a demand driven bias, the second on a supply driven media bias. Gentzkow and Shapiro (2007) measured media bias looking at similarities between the language used by media outlets and congressmen and find that the bias of newspapers depends mainly on consumers ideological position and less on the identity of owners. Also Mullainathan and

Shleifer (2005) identify the origin of bias in the demand side, arguing that it is driven by consumers prior beliefs. Others stressing a supply driven bias are Larcinese et al. (2007) who investigate the correlation between the endorsement policy of newspapers, and the differential coverage of bad/good economic news as a function of the president’s political affiliation. They find suggestive evidence that outlets with pro-Democratic endorsement give more coverage to high unemployment when the incumbent president is a Republican than when the president is Democratic, compared to newspapers with pro-Republican endorsement pattern, furthermore this result is not driven by the partisanship of readers. Also Besley and Pratt (2005) belong to the second stream; they build a model of media ownership and political capture, where media capture arises endogenously. Their main findings are that media pluralism and independent ownership reduce capture and that media capture negatively affects some political outcomes such as political turnover. My paper can be considered lying in between these two lines of research; on one hand I consider a supply driven bias, since it originates from the politician action, on the other hand the likelihood of media capture turns out to depend on two features of consumers preferences, i.e. on the demand side.

The novelty of my paper is that I derive the equilibrium outcomes of the media market making assumptions on consumers preferences and population characteristics, while Besley and Prat take as exogenous the market profit of the media. Moreover my analysis sheds light on the positive role of heterogeneous consumers preferences. As I said, since hedonic heterogeneity can be referred not only to preferences over issues (sports, nature, culture) but also to consumers’ ideological positions, my model would predict a higher media freedom if the population has highly heterogeneous political preferences. Then it is interesting to ask ourselves what is the origin of hedonic heterogeneity. I believe that education plays an important role helping to create a critical thinking and to develop consciousness of personal needs and tastes. I believe that income too is an important source of “soft” diversity in preferences; wealthier persons can take more care of their passions, cultivate their interests and increase their needs. As a consequence the demand for travel, design or cooking magazines and newspapers will certainly increase with income.

The following analysis offers important empirical predictions on the relationship between total number of outlets and media capture.

Consistent with the conclusion of Besley and Prat, it is widely accepted the view according to which having more media outlets can guarantee media freedom. My analysis implies that this is not always the case; in particular, different sources of pluralism might have opposite effects for the freedom of the press. To understand why, imagine two similar countries unless for a different degree

of ethno linguistic fragmentation; the common view would predict for both countries the same level of media freedom while my theory would predict a higher media freedom in the less fragmented country.

The paper will continue as follows; in the first section I will describe the political setup through a simple model of moral hazard. In the second section I will study the media sector and I will determine the equilibrium media capture. Third section provides an extension of the model introducing the possibility of imperfect segmentation of the market. In the fourth section I will conclude discussing the main results and describing my future research on this topic.

2 The Model

My analysis is divided in two parts; in the political setup, through a simple model of moral hazard, I describe the politician incentives to misbehave and to capture the media. In the second part I will analyze more closely the media sector using a standard horizontal differentiation model a la Salop; first, I determine how heterogeneous consumers' preferences for media outlets shape the market structure, then I derive the reservation utility of the outlets, or stating it differently the amount they have to be offered to accept to hide the news. This helps me to pin down the conditions under which we can expect to observe media capture. I start with a framework where markets are perfectly segmented, next I will generalize the results relaxing this assumption.

2.1 Political Setup: A Moral Hazard Problem

In this economy there is a population normalized to one which is divided into N separated ethno linguistic groups. Each of them has different culture, religion and above all a different language. The population of each group is uniformly distributed around a unitary perimeter circle city with density $\mu \in (0, 1)$. Each city is targeted by a certain number of media outlets which are the only source of information available to consumers. All the outlets share the same information so that no outlet has a privileged access to news. Moreover, for simplicity, information cannot be bias such that no newspaper can misrepresent or falsify it. The hypothesis of perfect segmentation implies that consumers in a group are not able to overcome the linguistic barriers therefore they read only newspapers in their own language. Moreover since consumers are rational and like truthful news,

they are willing to move around the city in order to get informed, regardless of the distance they have to travel.

I introduce a model of electoral accountability in which citizens can discipline the politician through a backward-looking voting behavior.

The incumbent politician has an amount Δ of the government budget which he can use as private rents and as targeted transfers to the population. Neglecting other components of the public spending, the government budget constraint can be written as: $\Delta = T + r$ with $T = \sum_i \bar{t}_i$, where \bar{t}_i is the exogenously given transfer to group i . The voters monitor the politician by reading newspapers and decide whether to keep him in office. There is a proportional electoral system, therefore the politician is reelected if he gets the votes of at least half of the population. Everyone is risk neutral.

2.1.1 Timing

The timing of the events is as follows:

1. In the first period (t_0) the incumbent can decide to steal or not to steal an amount S of money.
If he steals, the judiciary catches him and puts him in prison with probability $(1 - p)$;
2. In the second period (t_1) the incumbent decides whether to hide the news bribing the media;
3. In the third period (t_2) voters buy newspapers and learn what they read; as I already pointed out, there is no biased or partisan information, so either they get a report on the politician's behavior or they do not get anything.
4. In the fourth period (t_3) elections are held in which the voters choose between the incumbent and an identical opponent. Notice that citizens will punish ex post the official, voting for the opponent, only in case they learn he did misbehave during his mandate.

2.1.2 The Political Equilibrium

The politician has to decide whether to affect voters' decision by capturing the media. In this way he could hide his bad conduct and steal without being punished by the voters. Let C, NC indicate corrupted and not corrupted media, while S, NS stand for to steal and not to steal.

Solving this simple game by backward induction one can immediately see that in t_0 the incumbent, anticipating population's voting behavior, decides to steal or not. This decision is closely

related to the one about capturing or not media outlets which directly determines the voters' response to the incumbent conduct.

The politician expected payoffs in the first period are:

- i) $E(NC|S) = p \times S$
- ii) $E(NC|NS) = R + r$
- iii) $E(C|S) = p(S + R + r) - f(C)$
- iv) $E(C|NS) = R + r - f(C)$

where R are the rents for staying in office, r are the private rents he extracts from Δ and $f(C)$ is the cost of bribing the media.

It is important to remark that in taking his decisions the incumbent has to consider at least half of the population. The groups are perfectly separated but within group everyone has access to the same information. Indeed, as I will better explain in the next section, if there is at least one informative outlet in a group every member of that group will learn the truth. Therefore if the politician decides to capture the media in order to be reelected, he has to keep uninformed groups representing at least half the population and moreover he will distribute to them the transfers which in my setup are completely exogenous. Thus the incumbent gives \bar{t} to a subset $N^* \subset N$ such that: $\sum_{i \in N^*} \mu_i \geq 1/2$. Substituting in the government budget constraint $r = \Delta - T$ where T are the total transfers.

In order to determine the optimal politician decision in t_0 , we first have to compare i) with iii) and ii) with iv).

Proposition 1 *If $S < \frac{R+r}{p}$, the politician will decide to steal and capture the media whenever:*

$$f(C) < pS - (1 - p)(R + r) \quad (1)$$

Proposition 2 *If $S > \frac{R+r}{p}$, the politician will decide to steal and capture the media whenever:*

$$f(C) < p(R + r) \quad (2)$$

Notice that both the thresholds are increasing in p ; if the probability to be imprisoned is low, the politician is more likely to choose to bribe and to run the risk of stealing. The incumbent decision will depend on the relative gain of stealing (S) to the one of holding office ($R + r$); in particular if

it is low, then any increase in $(R + r)$ will make the politician less likely to bribe the media. On the other hand if it is high, an increase in the value of office will push him to capture the media.

In the next section I will determine the cost function $f(C)$, analyzing the features of the media industry that affect it. The following analysis helps us to find out when the incumbent is successful in bribing the media and as a consequence when media capture will take place in equilibrium

3 The Media Sector

In this section I determine the amount demanded by each media outlet to the politician in exchange for hiding information which corresponds to the opportunity cost for a certain outlet of not being informative.

Remember that media in a group share the same information, consumers value information *per se* and the market is perfectly segmented. It follows that the politician is effective in hiding information for group j only if every outlet in j is silenced. Indeed in the bargaining game with the incumbent every outlet takes as granted that all other newspapers have been successfully bribed.

Therefore each outlet will ask the official, what it could earn if it were the only one to be informative, that is the monopoly profit in information. As a result, once the politician has decided which groups to keep uninformed, the total cost of bribing (i.e. $f(C)$) will be the monopoly profit in information times the number of active outlets targeting those groups.

Following the standard analysis of spatial differentiation "on the circle" due to Salop ('79) but including segmented markets due to ethno linguistic fragmentation, I pin down the number of active outlets in a certain group and the monopoly profit in information.

In this setup consumers are located around the circle city at different places. This can be interpreted as consumers having heterogeneous (hedonic) preferences which lie on a continuum. This model studies entry and location when there are no barriers to entry other than fixed costs.

The n goods are produced in the media sector (one can think at newspapers but also at tv channels). Each outlet produces only one good. There is free entry and each potential commodity requires a fixed set-up cost f and a constant marginal cost c .

Let me restate how the information diffusion works; the outlets differentiate themselves with respect to the main issue they cover (sport, economics, fashion, gossip) but they all provide truthful information about the politician conduct. Newsprints share the same information, i.e. they have

the same technology and the same sources to get the news, so at the beginning of the period they all know the actual behaviour of the politician. Consumers get an utility of B from information.

The outlets perfectly compete among themselves for the provision of information. Since the cost of producing it is normalized to zero, firms charge a price equal to zero for the news and make consumers paying only for the differentiated component of the good.

Given the previous characteristics of consumers' preferences, the technology of the media outlets and of the population, it is possible to compute the equilibrium outcome in the media sector in terms of prices and number of entrants. There is a large number of identical potential firms. As I said, consumers distribute themselves among the N groups.

This situation can be described as having N circular cities with unitary perimeter each. The firms also are located around each circle and no location is a priori better than another. Consumers wish to buy one unit of the good and have a unit transportation cost s . In the preferences interpretation they incur in a utility loss from not consuming their preferred commodity.

They are willing to buy as long as the generalized cost does not exceed the utility they obtain from the good $\bar{u} + B$.

Each firm can locate in only one location.

The firm profit is: $\bar{\pi} = (p_i - c)D_i - f$ if it enters and $\bar{\pi} = 0$ otherwise.

This is a two stage game; in the first stage, potential entrants simultaneously choose whether or not to enter. Let n be the number of entering firms. They are located equidistant from one another. Maximal differentiation is exogenously imposed. In the second stage they compete in prices. Given the assumption of free entry, the equilibrium profit of entering firms is zero. To solve the problem we should; 1) determine the Nash equilibrium in prices for any number of firms and calculate the profit functions and 2) determine the Nash equilibrium in the entry game.

Let me solve the problem for a firm located in the representative city j .

Equilibrium in price

Assume that n firms entered the market. They are located symmetrically so it is reasonable to look at an equilibrium in which all charge the same price p . Firm i have only two competitors, the two surrounding it. Suppose it chooses price p_i . A consumer located at the distance $x_i \in (0, \frac{1}{n})$ from firm i is willing to purchase from firm i rather than from i 's closest neighbor if:

$$p_i + sx \leq p + s(\frac{1}{n} - x) \quad (3)$$

Calling $x^* \equiv \frac{p + \frac{s}{n} - p_i}{2s}$ and remembering that the density of consumers in circle j is μ_j we can determine the demand function solving:

$$D_i(p_i, p) = 2 \int_0^{x^*} f(x) dx = \frac{p + \frac{s}{n} - p_i}{s} \mu_j \quad (4)$$

Firm i faces demand: $D_i(p_i, p) = 2x = \frac{p + \frac{s}{n} - p_i}{s} \times \mu_j$, thus, firm i will solve:

$$\underset{p_i}{Max} \left[(p_i - c) \left(\frac{p + \frac{s}{n} - p_i}{s} \times \mu_j \right) - f \right] \quad (5)$$

Differentiating with respect to p_i and then setting $p_i = p$ gives: $p = c + \frac{s}{n}$

Equilibrium in the number of entrants

From the zero profit condition for the existing firms we can obtain the number of firms in equilibrium:

$$(p - c) \frac{1}{n} \times \mu_j - f = \frac{s}{n^2} \times \mu_j - f = 0 \quad (6)$$

The equilibrium prices and number of firms for each group in equilibrium are:

$$p_j^* = c + \sqrt{\frac{sf}{\mu_j}} \quad (7)$$

and

$$n_j^* = \sqrt{\frac{\mu_j}{f}} \times s \quad (8)$$

Firms' entry decision turns out to depend on the scope for both economies of scale ($\frac{\mu_j}{f}$) and differentiation (s); as the fixed costs increase relative to market size (μ_j), the number of equilibrium entrants decreases while, at the same time a lower substitutability rate between the outlets, *ceteris paribus*, leads to an increase in the number of entrants since the firms have more opportunity to differentiate and so face less competition. It is important to notice that in equilibrium must be:

$$n_j^* \geq 1 \quad (9)$$

Or using (8):

$$\mu_j \geq \frac{f}{s} \equiv \bar{\mu} \quad (10)$$

If this expression is not satisfied it means that no outlet will enter to target a certain group; in other words this implies that a group could remain "naturally" uninformed. The elements that render this situation more likely are: i) high substitutability rate between outlets, that is a lower hedonic heterogeneity of consumers, ii) high fix set up costs and iii) small market size. As before, this is due to the presence of economies of scale; since there are fix set up costs an increase in market size increases the market share available for each firm entering the group. Therefore holding constant the total population, the higher the fragmentation of the market (higher number of groups), the smaller the number of active firms within each group. In highly fragmented population this implies a higher probability of observing completely uninformed groups, especially the smaller ones. Notice also that in equilibrium it must hold the following condition:

$$p^* + \frac{s}{2n^*} < \bar{u} + B \quad (11)$$

i.e. the consumer furthest from a store, having to travel a distance of $\frac{1}{2n^*}$, receives a positive net surplus consuming the good.

3.1 The Equilibrium Media Capture I

As in Besley and Pratt [7] I focus the attention on pure strategy perfect Bayesian equilibrium in which voters use undominated strategy, that is they always vote for their preferred candidate¹. To get the intuition behind this solution suppose that only one outlet is informative. One can think at a political scandal covered only by a newspaper or a detailed reportage on the incumbent misconduct.

In this case consumers will continue to read their preferred newspaper but, valuing information *per se*, they will buy also the informative newsprint even if they are not interested in the main issue it covers, that is they are located very distant from it. In this setup the uninformative outlets continue to compete in prices with the others. Thus the differentiated component of the newspaper has the same cost as before (i.e. p^*). The main difference is that now the monopolist will

¹ All proofs are in the Appendix.

set a higher price charging consumers for the benefit they extract from information. Therefore the monopolist price will be: $p^m = p^* + B$, where p^* is the price charged by the uninformative newspapers.

The implicit hypothesis here is that the monopolist does not price discriminate among consumers and this in turn comes from the assumption on consumers' preferences; consumers perceive the transportation cost only with respect to the main issue covered by newspapers while they have homogeneous preferences over information. They value hard information so much that they are willing to buy the only informative newspaper regardless of the travel distance from it. As I will state below, the only binding constraint is that they cannot pay more than their utility benefit. Therefore the monopolist cannot do more than fixing a price higher than before by an amount exactly equal to the utility gained by consumers in reading truthful pieces of facts. Let me explain this scenario by an example; imagine a city with many newspapers, each of them having a different ideological position. Suppose that the incumbent politician stole money from public funds and every newspaper got aware of this misbehavior. Since the citizens value information irrespectively of their ideological position, all the papers will report it. The monopoly scenario I described above, refers to the situation in which for some reasons, only one outlet provides a detailed reportage on the scandal. Then every consumer continues to buy the usual newspaper but will not miss the only source of information available whatever her distance from it. The active (i.e. informative) outlet will increase the price of the newspaper, taking into account how much the consumers benefit from information. Indeed, as I already explained, consumers value distance only along the "issues" dimension, the differentiated component of the journals. More explicitly, if a reader usually buys *La Repubblica* (center-left oriented Italian daily) but at a certain point in time *Libero* (a right oriented daily) publishes an exclusive reportage on the Prime Minister (whatever party he belongs to), he will buy it even if ideologically very distant from that journal. The important assumption obviously is that the information provided is hard and not biased, so the only choice available to the outlet is to report or not a fact and not how to present it.

It follows that, since all the consumers in group j buy from the only informative outlet, its profit will be:

$$\pi_j^m = (p^m - c) \times \mu_j - f \quad (12)$$

Substituting for $p^m = p^* + B$ we obtain:

$$\pi_j^m = \sqrt{sf\mu_j} + B\mu_j - f \quad (13)$$

Moreover I assume that the following condition holds in equilibrium:

$$p^* + p^m + \frac{s}{2} < \bar{u} + B \quad (14)$$

This restriction means that a consumer located furthest from the informative outlet will be willing to sustain the entire cost to access the information. Given the previous observations, if the incumbent wants to hide the information for some groups he has to make sure that all the outlets in each group are silenced. For this reason, an outlet asks the incumbent what it would be its profit, given that all the other outlets in its group are silenced (i.e. the monopoly profit in information). Only offering that amount the politician would be sure to succeed in keeping uninformed the entire group. It follows that if the politician wants to silence group j , given the number of the equilibrium entrants and the profit π_j^m , the total amount of bribe he should pay to secure captured media is:

$$TC_j = n_j^* \times \pi_j^m = \sqrt{\frac{s}{f}\mu_j} \times \left[\sqrt{sf\mu_j} + B\mu_j - f \right] \quad (15)$$

where TC indicates total bribes.

Notice that on one hand, a higher substitutability rate between the outlets (low s) and high fixed costs make cheaper for the politician to silence the media, on the other, market size has a positive effect on bribes; the density of the group population turns out to be a crucial variable to explain media capture. Indeed the presence of high set up costs, which is the case of media sector, and as a consequence the presence of economies of scale, increases the impact of market size on firms' entry decision. That is the reason why I focus on the ethno linguistic fragmentation of the population; this feature makes the reference market for the media perfectly (or quasi-perfectly) segmented, decreasing the size of the potential audience for each firm and in turn the opportunity for newspapers entry.

Since I assume single district elections, the incumbent needs the votes of at least half of the population to be reelected. To determine whether media capture will be observed in equilibrium we have to compute the total cost $f(C)$ the incumbent has to pay to succesfully bribe the media.

Recalling that he has to silence at least N^* groups such that: $\sum_{i \in N^*} \mu_i \geq 1/2$ we have just to sum TC_j over N^* .

It follows:

$$f(C) = \sum_{i \in N^*} TC_i = \sum_{i \in N^*} n_i^* \times \pi_i^m \quad (16)$$

Using these results I can rewrite the propositions in the previous section and study more deeply the political equilibrium.

Proposition 3 *If $S < \frac{R+r}{p}$, then the politician will decide to steal and will successfully capture the media whenever:*

$$\sum_{i \in N^*} n_i^* \times \pi_i^m < pS - (1-p)(R+r) \quad (17)$$

and substituting with (15) I obtain:

$$\sum_{i \in N^*} \sqrt{\frac{s}{f}} \mu_j \times \left[\sqrt{sf\mu_j} + B\mu_j - f \right] \leq pS - (1-p)(R+r) \quad (18)$$

Proposition 4 *If $S > \frac{R+r}{p}$, media capture will be observed in equilibrium whenever :*

$$\sum_{i \in N^*} \sqrt{\frac{s}{f}} \mu_j \times \left[\sqrt{sf\mu_j} + B\mu_j - f \right] \leq p(R+r) \quad (19)$$

Proof. See the Appendix A. ■

Discussion As I already pointed out, whether the value of $(R+r)$ positively or negatively affects equilibrium media capture, it depends on the gain of stealing relative to the one of holding office. In both inequalities instead, the "market" variables enter with the same sign; in particular, the transportation cost s , the population density μ_j and the value consumers assign to information B , make bribing more costly for the politician.

On the other hand the more efficient is the judiciary system (p low), the less media capture and stealing will be likely. The expected value of reelection and its effect depend on whether the

judiciary is efficient or not, such that if the politician faces an higher probability to be imprisoned, he will be less prone to run the risk of stealing and as a consequence to influence the news.

Let me stress in particular the role of transportation cost and market size as determinants of media capture;

i) The parameter s can be interpreted as the hedonic heterogeneity of consumers. Its negative effect on media capture is channeled through number of firms and prices; given a certain market size a higher s leads to a higher equilibrium price, thus, increasing the potential profit margin for each firm, more firms will enter in equilibrium. Since the politician has to bribe all the outlets active in a certain group, a higher hedonic heterogeneity reduces the probability of media capture.

ii) The density μ_j in group j can be interpreted as a measure of market size. Media industry is characterized by increasing returns to scale due to the presence of high fixed costs, therefore a higher market size will determine a higher number of active firms in equilibrium. Since in this section I assume perfect market segmentation an increase in ethno linguistic fragmentation (higher N) leads to a decrease in the market size for each group. This in turn negatively affects the number of entrant firms in each group. Therefore the politician needs to spend less to keep a certain group uninformed. The size of the group affects media independence also through another channel: market size has to exceed the threshold (10). So if a group is very small might be the case that no firm finds it profitable to enter, leaving the group without newspapers. This phenomenon is certainly taken into account by the politician when he has to decide which groups to keep uninformed in order to gain reelection; it is reasonable to expect him to seek the votes of these small groups since he does not need to face the cost of media capture.

Summing up:

1) Given a certain market size, higher hedonic heterogeneity of consumers' preferences raises the number of active outlets. This source of pluralism turns out to be good for press freedom since does not prevent voters to get the information from different newspapers. This is the usual positive effect of pluralism on media independence, emphasized in the literature and in the competition policy debate.

2) For a given population size, the higher the fragmentation, that is the number of groups, the lower will be the group market size and consequently the number of active firms targeting it. Thus the politician will more easily succeed in keeping the group uninformed. I want to highlight that, although the number of firms in each group turns to be reduced, high ethno linguistic heterogeneity does not need to decrease the total number of newspapers across groups observed

in equilibrium. This leads, as I will point out in the concluding remarks, to important policy and empirical implications; having more outlets overall and implementing policies aimed at increasing the pluralism, it is not necessarily desirable. I claim that if the market is segmented such policies might fail to enhance media freedom.

Notice that the reason why the incumbent has to silence only N^* groups is due to the extreme assumption of perfect segmentation.

Indeed I am assuming that information cannot be transmitted across groups due to the strong linguistic barriers, therefore even if half of the population is informed about the politician misconduct, there is no way some rumour reaches the rest of the population if the media targeting it are silenced.

4 Imperfect Segmentation

In this section I relax the hypothesis of perfect segmentation, pursuing a generalization of the previous setup. All the former assumptions still hold with the exception that now a portion α of consumers are able to overcome the cultural and linguistic barriers eventually buying not only from outlets targeting their group but also from outlets supplying a different group. In this scenario, even if the politician succeeds to silence all the media in a group, there will be a mobile fraction of its members which get informed (unless all the other group's media are silenced too). Since consumers are perfectly rational, I will assume that if mobile readers of group j have to choose between an informative outlet targeting group i and a silenced one targeting group s , they will buy from the informative outlet. Thanks to the continuity assumption of individuals distribution the fraction α can be interpreted as the probability with which each consumer in a group becomes informed buying a newspaper in another language. The hypothesis of imperfect segmentation will directly affect the cost function that now I indicate as $f(C)'$, and the incumbent's expected gain of reelection. In this case the potential market size for each entrant changes, modifying the equilibrium in prices and in the number of active firms in the media sector.

As before I will start from the political setup.

Under this new scenario the expected politician's payoffs of section two become:

$$\text{i) } E(NC|S) = p \times S$$

$$\text{ii) } E(NC|NS) = R + r$$

$$\text{iii) } E(C|S) = p(1 - \alpha)(S + R + r) - f(C)'$$

$$\text{iv) } E(C|NS) = R + r - f(C)'$$

It is very intuitive to understand why the expected gain of silence the media in case of stealing, has changed with respect to the previous specification; in a group with captured outlets, the politician obtains less votes than before due to the presence of mobile voters who can get informed reading free newspapers from other groups and, as a consequence, the probability of reelection is lower.

The previous propositions can be restated as the following:

Proposition 5 *If $S < \frac{R+r}{p}$, the politician will decide to steal and capture the media whenever:*

$$f(C)' < p(1 - \alpha)(S + R + r) - (R + r) \quad (20)$$

Proposition 6 *If $S > \frac{R+r}{p}$, the politician will have the incentive to bad behave and silence the media whenever:*

$$f(C)' < p(1 - \alpha)(R + r) - p\alpha S \quad (21)$$

Notice that this time the thresholds depend negatively on the parameter α . The intuition behind is very straightforward; flexible readers, being able to overcome cultural and linguistic barriers, mitigate the negative effects of segmentation and render the enterprise of controlling the media, more difficult for the politician.

As before, studying the media industry, I will determine the cost function $f(C)'$.

4.1 The Media Sector

Since the main setup remains the same, I will just compute the equilibrium in price, in the number of entrants and I will pin down the new monopoly profit (i.e. the reservation utility) the incumbent has to pay to each outlet in a group in order to influence the news. In this section I will assume, for simplicity, that the density μ_j is equal $\forall j$, that is all the groups are identical in terms of population. Since this framework entails a symmetric equilibrium this assumption insures that the equilibrium number of firms will be the same in each group, i.e. $n_i^* = n^*, \forall i$.

Now each outlet in group j will compete with the firms of the same group for readers in city j , and with firms targeting other groups for the mobile readers.

4.1.1 An Example with three groups

To give you the intuition let me present an example in the case of only three groups, then I will extend the formula to the case of N groups. Imagine that the first group is characterized by English outlets, the second by Arab outlets and the third group by Hyspanic newspapers.

A firm in the English group will face the following demand:

$$D_i^1(p_i, p) = \frac{p + \frac{s}{n_1} - p_i}{s} \times \mu_1 + \frac{p + \frac{s}{n_1+n_2} - p_i}{s} \alpha \mu_3 + \frac{p + \frac{s}{n_1+n_3} - p_i}{s} \alpha \mu_2 \quad (22)$$

The first term represents the usual demand of English speaking consumers, the second term represents the demand of Hyspanic mobile readers, for which firm i faces the competition of Arab outlets, while the last term indicates the demand of Arab mobile readers for which firm i compete with Hyspanic outlets.

Notice that the higher the parameter α , the less segmentated will be the market and the more the scenario can be traced back to the case with all the firms located around the same circle.

Indeed in the extreme case of $\alpha = 1$, we would have all the newspapers in different languages competing among themselves and formally this would traslate into the standard Salop model. Thanks to the previous assumption I can write (22) as:

$$D_i^1(p_i, p) = \frac{p - p_i}{s} \times \mu(1 + 2\alpha) + \frac{\mu}{n}(1 + \alpha) \quad (23)$$

Let me restate (23) in the case of N groups:

$$D_i^1(p_i, p) = \frac{p - p_i}{s} \times \mu[1 + (N - 1)\alpha] + \frac{\mu}{n}(1 + \alpha) \quad (24)$$

Let me pin down the equilibrium in the media market of group j .

Equilibrium in price

Firm i will solve:

$$Max_{p_i} \left[(p_i - c) \left(\frac{p - p_i}{s} \times \mu[1 + (N - 1)\alpha] + \frac{\mu}{n}(1 + \alpha) \right) - f \right] \quad (25)$$

Differentiating with respect to p_i and then setting $p_i = p$ gives: $p' = c + \frac{s(1 + \alpha)}{n[1 + (N - 1)\alpha]}$.

Equilibrium in the number of entrants

From the zero profit condition I can derive the number of firms in equilibrium:

$$\pi_j = (p - c) \frac{\mu}{n} (1 + \alpha) - f = \frac{s\mu}{n^2} \times \frac{(1 + \alpha)^2}{[1 + (N - 1)\alpha]} - f = 0 \quad (26)$$

The equilibrium prices and number of firms for each group are:

$$p_j^{**} = c + \sqrt{\frac{sf}{\mu[1 + (N - 1)\alpha]}} \quad (27)$$

and

$$n_j^{**} = (1 + \alpha) \sqrt{\frac{s\mu}{f[1 + (N - 1)\alpha]}} \quad (28)$$

Comments

i) With imperfect segmentation the price charged by the firms is lower the higher the share of mobile readers for each group. This is due to the fact that competition faced by firm i increases in the term $(N - 1)\alpha$;

ii) The number of entrants changes with respect to the case of perfect segmentation since the potential firms can react to imperfect segmentation not only through price setting but also through their entry decision. The equilibrium number of entrants is now driven also by the portion of mobile consumers α ; on one hand a higher α increases the potential market size faced by each firm, leading to a higher n_j^{**} , on the other hand it increases the competition with newspapers in other languages, thus deterring entry. The condition for having at least one entrant in equilibrium becomes:

$$(1 + \alpha) \sqrt{\frac{s\mu}{f[1 + (N - 1)\alpha]}} \geq 1 \quad (29)$$

It is easy to verify that (29) is satisfied whenever:

$$\mu_j > \frac{1}{s} (f[1 + (N - 1)\alpha]) \left(\frac{1}{1 + \alpha} \right)^2 \quad (30)$$

This is the threshold for the population density, under which a group remains "naturally" uninformed. The variables which affect (30) are the same as in the second section; a lower hedonic heterogeneity of consumers (low s), high fix set up costs and a smaller market size (low μ_j) dampen entry. On the contrary, the parameter α has two effects which go in opposite directions;

on one hand it leads to a higher potential market size, on the other it makes the competition stiffer for a potential entrant. Yet the former effect dominates, so a higher α will make (30) easier to be satisfied.

4.2 The Equilibrium Media Capture II

The logic behind the determination of the equilibrium is the same as before, however the imperfect segmentation hypothesis makes the computation more complicated. As before I focus the attention on a pure strategy perfect Bayesian Equilibrium in which outlet i asks the incumbent what it would be its profit if it were the only one in group j to provide information. Now the outlet knows that its potential demand is made by two components; the readers of its own group for which it is the unique informative supplier and the mobile readers of all the other groups for which outlet i faces the competition of firms targeting not silenced groups.

Proposition 7 *It can be shown that the price firm i can charge is²:*

$$p_i = c + \frac{s}{\alpha(N-1)} \left[1 + \frac{\alpha}{1 + (N - N^{**})n} + \frac{\alpha(N - N^{**})}{1 + n} \right] \quad (31)$$

where N^{**} are the number of silenced groups, while n is the number of entrants in equilibrium.

Notice that as I will show below, N^{**} depends on the fraction of mobile consumers.

Therefore if an outlet in group j has the monopoly in information he will get the following profit:

$$\pi_j^{m'}(\alpha) = \left\{ \frac{s\mu}{(N-1)} \left[1 + \frac{\alpha}{1 + (N - N^{**})n} + \frac{\alpha(N - N^{**})}{1 + n} \right] \left[\frac{1}{\alpha} + \frac{1}{1 + (N - N^{**})n} + \frac{(N - N^{**})}{(N-1)(1+n)} \right] - f \right\} \quad (32)$$

As I derive ³; $\frac{\partial \pi_j^m(\alpha)}{\partial \alpha} > 0$. This implies that a higher fraction of mobile readers makes media capture more difficult for the incumbent, increasing the price of the bribe he has to pay.

In particular an increase in α has two effects which go in opposite directions; on the one side a larger number of mobile readers increase the potential market size for the firm i ; on the other hand the

² The proof is in Appendix B.

³ The proof is in Appendix B.

less segmented the markets are, the higher the competition an outlet faces. Since the first effect dominates the second, $\frac{\partial \pi_j^m(\alpha)}{\partial \alpha} > 0$ follows.

Summing up, if the politician wants to silence group j , given the number of the equilibrium entrants and the profit $\pi_j^{m'}(\alpha)$, the total amount of bribes he should pay to secure captured media is:

$$TC_j' = n_j^{**} \times \pi_j^{m'} = (1 + \alpha) \sqrt{\frac{s\mu}{f[1 + (N - 1)\alpha]}} \times \pi_j^{m'}(\alpha)$$

With imperfect segmentation the substitutability rate between outlets and the market size still play a crucial role in affecting media capture; low transportation costs decrease the bribe the incumbent has to pay, while a higher market size (μ), that is a lower number of ethnic groups, has still a positive effect on bribes. Notice from (33) that our parameter of interest (α) clearly has a positive effect on bribes; the higher the fraction of mobile consumers, the higher the compensation an outlet asks to the politician for the lost revenues from being informative.

Now I can compute the total cost $f(C)'$ the incumbent has to sustain to succesfully bribe the media. Remember that with perfect segmentation in order to be sure of reelection, the incumbent had to keep uninformed at least N^* groups such that:

$$\sum_{i \in N^*} \mu_i \geq 1/2.$$

With imperfect segmentation the incumbent knows that in every group there is a portion of consumers α that can get the information from active outlets in another language. So in any group where media have been silenced the share of votes the politician gains is: $(1 - \alpha)$. Summing up, the incumbent will have to hide information for N^{**} groups, such that:

$$\sum_{i \in N^{**}} (1 - \alpha)\mu_i \geq 1/2, i.e. \sum_{i \in N^{**}} \mu_i \geq \frac{1}{2(1 - \alpha)}.$$

One can immediately observe that with mobile consumers the politician has to keep uninformed more than half of total population. This is because he loses anyway some votes from those who move and get aware of its misconduct buying from other groups' papers.

It follows that total cost of bribing will be:

$$f(C)' = \sum_{i \in N^{**}} TC_i' = \sum_{i \in N^{**}} n_i^{**} \times \pi_j^{m'}(\alpha) \quad (33)$$

I conclude this section rewriting the propositions (5) and (6), and analyzing the political equilibrium.

Proposition 8 *If $S < \frac{R+r}{p}$, the politician will decide to steal and media capture will occurs if:*

$$f(C)' < p(1 - \alpha)(S + R + r) - (R + r) \quad (34)$$

and substituting with (34), I find:

$$\sum_{i \in N^{**}} \left\{ (1 + \alpha) \sqrt{\frac{s\mu}{f[1 + (N - 1)\alpha]}} \times \pi_j^{m'}(\alpha) \right\} \leq p(1 - \alpha)(S + R + r) - (R + r) \quad (35)$$

Proposition 9 *If $S < \frac{R+r}{p}$, the politician will steal and media will be captured whenever:*

$$\sum_{i \in N^{**}} \left\{ (1 + \alpha) \sqrt{\frac{s\mu}{f[1 + (N - 1)\alpha]}} \times \pi_j^{m'}(\alpha) \right\} < p(1 - \alpha)(R + r) - p\alpha S \quad (36)$$

Proof. See the Appendix A. ■

Comments

As I already pointed out, it is easy to identify the determinants of media capture. In the case of imperfect segmentation the parameter of interest is the fraction of mobile consumers, α . Ethno linguistic fragmentation through market size (μ_j) and hedonic heterogeneity (s) still play a crucial role in affecting the presence of bribing in equilibrium but their effect is augmented by the voters "rate of mobility" α . Let me repeat the channels through which this variable operates; first, it increases the potential market size leading to a higher number of active firms. This raises the number of firms per group the incumbent has to bribe. Second, it affects the way consumers can access to information; bribing all the outlets in a group does not guarantee all the votes to the politician. A share of those voters is able to read informative outlets in other languages. As a consequence, the incumbent needs to hide information for a larger portion of the population to be sure of reelection.

4.3 Comparative Statics

I want to sum up the main results of the model making comparisons between different scenarios. First of all I look at the more general model, the one with a share of mobile readers in the population. Indeed letting α to be zero brings you back to the case of perfect segmentation. Lets consider expression (36) that provides the condition under which media are captured in equilibrium.

For a given level of ethno linguistic fragmentation (μ_j), the higher consumers' hedonic heterogeneity (s) the less likely will be media capture; since outlets differentiate themselves on the main issue but not on the information they provide, the politician has to silence all the media targeting a group to gain its support. Given that a higher s boosts the number of outlets targeting a group, it will increase the cost borne by the incumbent for capturing. On the opposite, for a given level of horizontal differentiation within group, the higher is the number of groups (i.e. higher ethno linguistic fragmentation) the lower the market size for each potential entrant. This effect decreases the number of outlets in a group, in turn the cost of media capture shrinks and it is more likely to have silenced media in equilibrium. Notice that the impact of linguistic fragmentation is driven by the information acquisition process of consumers; if nobody in a group is able to read newspapers in different languages, the politician just needs to silence all the outlets to gain the votes of its members. This is due to the strong linguistic and cultural barriers which lead to perfectly separated markets. In fact the negative effect of linguistic differentiation is mitigated by the presence of a share of mobile voters in every group. Imagine the extreme situation in which all the voters are mobile (i.e. $\alpha = 1$); the right hand side of (36) would be negative that is, the politician expected gain from bribing the outlets and stealing would be negative. As a consequence he would never decide to capture the media cause he would have to bribe the firms active in the whole market.

5 Concluding Remarks

This paper has developed a framework in which to analyze the phenomenon of media capture. I focused on two elements that in my opinion are crucial in determining media capture; hedonic heterogeneity and ethno linguistic fragmentation of the population.

The first is a feature of consumers' utility implying different individual preferences on the main issue covered by newspapers which leads to a horizontal differentiated market and in turn rises the number of media outlets supplied in equilibrium. Under this type of heterogeneity consumers can freely acquire information from any outlet; therefore a politician will need to bribe a very

large number of outlets to gain political support. On this respect it is interesting to understand the determinants of hedonic heterogeneity and I think that education and income might be two plausible candidates. This would imply that in underdeveloped environments, characterized by low income and education, the presence of free media would be less likely.

The second element I focus on, is ethno linguistic fragmentation which generates a segmented market; when consumers are separated by strong linguistic or cultural barriers, they cannot obtain information from each others' news outlet and as a result, by influencing only a subset of few newspapers, politicians are able to obtain a sufficient number of votes for reelection.

In my model linguistic fragmentation affects the number of equilibrium entrants in each group, shrinking its market size; when a firm decides whether to enter and which group to target, the presence of high fixed set up costs creates a scale effect whose magnitude depends on the size of the potential market. As a consequence, higher segmentation reduces the scope for economies of scale in turn deterring entry; in fact there will be some groups too small to attract any outlet and which, as I have shown, remain naturally uninformed. I believe that this analysis with endogenous media entry can provide interesting empirical predictions on the relationship between an economy's total number of firms and media capture; I argue that it might be misleading to compare the absolute pluralism in media market among countries in order to establish the quality of the press since high ethno linguistic heterogeneity does not need to reduce the number of outlets overall nonetheless, as I derived, it can undermine independence of the press.

This result has clear implications for regulatory policies of media market; in particular, standard indexes of market structure such as the number of outlets supplied and their concentration may say little about the extent of media freedom since different sources of media pluralism may have opposite implications for the ability of politicians to influence citizens' information.

For example in an highly fragmented environment, it might be helpful to implement policies aimed at increasing the number of local newspapers, targeting a specific geographical area or a specific ethnic/language group.

I would like to empirically explore some of the implications of my model on a cross section of countries.

Some empirical literature has stressed the correlation between public targeted transfers and diffusion of information; as I mentioned, Besley and Burgess show a partial evidence of this correlation in India, taking into account extraordinary transfers in case of floods and droughts. The question they address is whether informed voters are more effective in holding the politician accountable.

However, in their framework the distribution of news is totally exogenous for the government. I would focus the attention on a different relation between politicians' behavior and the media; under some circumstances a politician might have the possibility to decide which groups of voters to leave uninformed and to which direct public transfers. Then, one testable prediction would be that in countries characterized by lower level of corruption, since informed voters respond more to policies, the incumbent would please them with targeted transfers, extracting resources from uninformed citizens. On the contrary, in countries characterized by high levels of corruption or where democratic institutions work less well, the targeted transfers would be in favour of the uninformed voters. To test this possibility I would use spending in infrastructures (as roads, bridges, railways, and dams), the type of targeted public spending commonly used to gain votes.

Moreover at the moment, I am pursuing an extension to study whether a self interested politician would prefer to use media capture, cash transfers to voters or both so as to increase its political support and analyze how this decision is linked to the degree of voters' ethnicization.

Overall, I think that this project can shed light on the possibility for the media sector to foster the quality of politics especially in developing countries, where cultural and ethnic polarization play a key role.

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6 Appendix A

Proof of propositions 1 and 2

The unique pure strategy equilibrium is characterized as follows:

1. Voters believe that $S = 0$ if they do not received any report from the media. In this case they vote for the incumbent since they perceive the opponent as an identical type. If the media are not silenced they do not reappoint the politician in case of $S \neq 0$.

2. Outlet i in group j accepts the bribe b_i only if $b_i \geq \pi_j^m$.

3. a. If $S < \frac{R+r}{p}$, the incumbent offers $b_i = \pi_j^m$ to all outlets if $f(C) < pS - (1-p)(R+r)$ where $f(C)$ is the total cost of bribing, i.e $f(C) = \sum_{i \in N^*} n_i^* \times \pi_i^m$.

3. b. If $S > \frac{R+r}{p}$, the incumbent offers $b_i = \pi_j^m$ to all outlets if $f(C) < p(R+r)$ where $f(C)$ is the total cost of bribing, i.e $f(C) = \sum_{i \in N^*} n_i^* \times \pi_i^m$.

Following Besley and Pratt I show that this is the unique SPBE in weakly undominated strategies

Voters strategy can only be conditioned on the information they acquire reading newspapers. If they receive a report on the misbehavior of the politician it is a strictly dominant strategy to not reappoint him. Is the politician reappointed in case voters learn $S \neq 0$? This is impossible since

if this were the case the politician would not suppress the information. Thus in every PSPBEW (pure strategy perfect Bayesian Equilibrium) the incumbent is reelected only if voters know that $S = 0$.

Now I want to show that in every PSPBEW an outlet accepts $b_i \geq \pi_j^m$ and rejects $b_i < \pi_j^m$. The profit of i cannot exceed π_j^m , thus i must accept any offer larger than π_j^m . Moreover, given the strategy of outlets, the incumbent either buys off all of them or none of them. Assume that there exists an equilibrium in which outlets accept an offer $b_i < \pi_j^m$. Now suppose that outlet i deviates rejecting the offer; then, being the only informative outlets in group j he gets π_j^m . For this reason $b_i < \pi_j^m$ cannot characterize an equilibrium.

It follows that in any PSPBEW the incumbent silence the media if; 1) $f(C) < pS - (1-p)(R+r)$ and $S < \frac{R+r}{p}$, or 2) $f(C) < p(R+r)$ and $S > \frac{R+r}{p}$.

7 Appendix B

Proof of proposition 7.

To determine the bribe asked by an outlet in the case of imperfect segmentation, imagine an equilibrium in which the politician silenced N^{**} bribing $n \times N^{**}$ firms.

Assume that firm i in group $j \in N^{**}$ deviates and decides to publish a story about the politician misconduct.

The demand it would face is:

$$D_i = \left[\mu + \frac{p - p_i}{s} \alpha \mu (N - 1) + \alpha \mu \left(\frac{1}{1 + (N - N^{**})n} + \frac{N - N^{**}}{1 + n} \right) \right] \quad (37)$$

Indeed all the readers in group j would buy from the informative outlet, but now firm i would also compete with informative outlets of other groups $(N - N^{**})$, for the mobile readers.

Thus firm i solves:

$$Max_{p_i} \left[(p_i - c) \left(\mu + \frac{p - p_i}{s} \alpha \mu (N - 1) + \alpha \mu \left(\frac{1}{1 + (N - N^{**})n} + \frac{N - N^{**}}{1 + n} \right) \right) - f \right] \quad (38)$$

Differentiating with respect to p_i and setting $p = p_i$ gives:

$$p_i = c + \frac{s}{(N - 1)} \left[\frac{1}{\alpha} + \frac{1}{1 + (N - N^{**})n} + \frac{(N - N^{**})}{1 + n} \right] \quad (39)$$

Therefore the commercial profit of firm i in case it decides to deviate from the equilibrium is:

$$\pi_i(\alpha) = \left\{ (p_i - c) \left[\mu + \alpha \mu \left(\frac{1}{1 + (N - N^{**})n} + \frac{N - N^{**}}{1 + n} \right) \right] - f \right\} \quad (40)$$

Substituting the previous expression for p_i we obtain:

$$\pi_i(\alpha) = \left\{ \frac{s\mu}{(N - 1)} \left[\frac{1}{\alpha} + \frac{1}{1 + (N - N^{**})n} + \frac{(N - N^{**})}{1 + n} \right] \left[1 + \alpha \left(\frac{1}{1 + (N - N^{**})n} + \frac{N - N^{**}}{1 + n} \right) \right] - f \right\} \quad (41)$$

This is the reservation utility of an outlet which has to be offered by the incumbent to avoid deviation and succeed in silencing the media.

To determine $\frac{\partial \pi_j^m(\alpha)}{\partial \alpha}$ let me indicate:

$$\pi_i(\alpha) = \{\varphi(\alpha) \times \psi(\alpha) - f\}$$

$$\text{with } \varphi(\alpha) = \frac{s\mu}{(N - 1)} \left[\frac{1}{\alpha} + \frac{1}{1 + (N - N^{**})n} + \frac{(N - N^{**})}{1 + n} \right] \text{ and } \psi(\alpha) = \left[1 + \alpha \left(\frac{1}{1 + (N - N^{**})n} + \frac{N - N^{**}}{1 + n} \right) \right].$$

It is easy to verify that $\frac{\partial \varphi(\alpha)}{\partial \alpha} < 0$ while $\frac{\partial \psi(\alpha)}{\partial \alpha} > 0$ and that the positive effect dominates such that:

$$\frac{\partial \pi_j^m(\alpha)}{\partial \alpha} > 0 \quad (42)$$

Notice that a higher α on a side, increases the market size leading to a higher profit, on the other side, increasing the competition between the informative outlets, leads to a lower price and as a consequence a lower commercial profit.

Since the positive effect dominates it means that a larger fraction of mobile readers makes media capture more expensive for the incumbent.