The Price of Silence: Media Competition, Capture, and Electoral Accountability

Federico Trombetta*

DISEIS, Faculty of Political and Social Sciences, Università Cattolica del Sacro Cuore di Milano

Domenico Rossignoli

DISEIS and CSCC, Faculty of Political and Social Sciences, Università Cattolica del Sacro Cuore, Milano

December 15, 2020

First version: January 14, 2016

Abstract

Is competition in the mass media market an effective deterrent against media capture? Does it prevent political groups from influencing reporting? This paper shows that in some cases it does not. Building on the literature on media capture, the model highlights that, under fairly generic assumptions, high competition in the media market can drive the cost of media capture to zero, making capture easier. Moreover, it highlights conditions on the parameters where the effect of competition on capture is non-monotonic, i.e. capture may occur for levels of competition lower, but also higher, than those leading to media freedom.

Keywords: Political Agency, Mass Media, Competition, Media Capture.

JEL: D72, D73, D78, L82.

*Corresponding author. federico.trombetta@unicatt.it. We thank the editor, Vincenzo Galasso, and two anonymous referees. This work was supported by the Economic and Social Research Council [grant number DTC - ES/J500203/1] and is based on a chapter in Federico Trombetta's PhD thesis at the University of Warwick. Previous versions of this paper circulated under the title *"Media Competition, Capture, and Electoral Accountability"* and with this title but only one of the authors. Federico Trombetta thanks his supervisors, Ben Lockwood and Helios Herrera, for their invaluable help and advice. Finally, we thank Zeinab Aboutaledi, Robert Akerlof, Carlo Beretta, Michela Boccola, Rocco D'Este, Matthew Ellman, Andy Ferrara, Robert Gay, Giorgio Gulino, Martijn Huysmans, Guido Merzoni, Martina Miotto, Ayush Pant, Kirill Pogorelskiy, Francesco Squintani, Tilko Swalve, Cecilia Testa, Giulio Trigilia, Stephane Wolton and the participants to the 2015 Warwick MRes Dissertation Colloquium, 2016 RES Symposium of Junior Researchers, 2016 Warwick Economics PhD Conference, 2017 CAGE AMES seminar, 2017 EPCS conference, VIII IBEO conference, 2018 Lancaster Summer School in Political Economy, 16th Media Economics Workshop, 12th CESifo Workshop on Political Economy and 2019 APSA Conference. They all provided very useful comments and suggestions. Of course, all the mistakes are ours.

Electronic copy available at: https://ssrn.com/abstract=3160596

1 Introduction

A free media has been seen as a powerful guarantor of political accountability, both theoretically (e.g. Besley 2006) and empirically (e.g. Ferraz and Finan 2008, Snyder and Stromberg 2010). However, the media may be powerful enough to determine an electoral outcome and to promote a bad candidate, even when voters are fully rational and "Bayesian" (Prat 2014, Anderson and McLaren 2012, Enikolopov et al. 2011). As a consequence, an incumbent politician may be interested in controlling what media outlets report, to present a positive image to voters and to stay in power. This paper looks at the effect of competition in influencing the incentives towards media capture, with novel results.

The current literature stresses the positive effect of competition on media freedom: increasing the number of outlets means that the bad politician has more publishers to deal with, so capture is more costly. However, there is a more subtle effect, because the competitive pressure decreases profits, and firms with smaller financial margins may be more willing to sacrifice editorial independence for political money.[1] Hence, they are cheaper to capture.

Overall, the direction of this trade off is not trivial: the "positive" view of the role of competition in deterring capture can be questioned if more competition means smaller (and financially weaker) media outlets, less able to inform the public opinion and to resist to political pressure. Media outlets may be more numerous, but are they freer? The model we present here challenges the dominant view of the literature and highlights that potential risks to media independence from the political power are high not only when competition is too little, but also when it is too much. We believe we are the first to prove, in models with fully bayesian voters, the novel result that increased competition may make media capture easier, and that the standard "positive" result of competition and capture relies on restrictive assumptions about voters' behaviour and media outlets' profits.

More in details: the model builds on Besley and Prat (2006). Voters act as principal while the incumbent (of good or bad type) is the agent. Media outlets may be bribed by the bad politician not to reveal it. Hence, outlets face a trade off between publishing the signal and enjoying the audience-related rents and accepting the politician's bribe instead. Not all the voters are interested in politically related news, hence not all of them will become aware of the incumbent's type if only a small fraction of the outlets is publishing the signal. Moreover, audience-related revenues are not constrained to be linear in readership[2], but we use a generic

[1] Although in a different context (i.e. advertisement driven media bias), this is consistent with the results of Beattie et al. (2017), where they show that online competition for advertisement increases media bias.

[2] Note that we refer to readers as consumers of media contents for simplicity. The paper is agnostic with respect to the type of media firm (newspapers, televisions, websites etc).

Electronic copy available at: https://ssrn.com/abstract=3160596

power function instead. This allows us to assess the role of different specifications of the profit function.[3]

In this setting, we show the existence of an equilibrium where increasing the number of media outlets can make capture overall more expensive for the politician, as long as the number of outlets that need to be silenced increases in the same way. But competition has a decreasing effect on the influence that each individual outlet has on voters: basically, with more competition every outlet is able to inform a smaller fraction of the electorate. In fact, even established media outlets have limits in their ability to inform voters, as the recent spreading of fake news highlights. Hence, when there are enough outlets, and provided that there are not too many voters actively looking for political news, the politician may be willing to allow for some free media outlets, since they will not be powerful enough to change electoral outcomes. This decreases the profits that captured outlet would make by rejecting the bribe from the politician, hence they are cheaper. The overall effect of this trade off induced by competition (more outlets to be silenced, but each of them is cheaper) depends on the relationship between readership and profits.

The total cost of capture is simply the product between the number of outlets to be silenced and the individual bribe and, when the profit function is a power function convex in the readership, the "reduction in bribe" effect prevails on the "increasing in number" one, reducing the total cost of capture as the number of outlets goes to infinity. Intuitively, as the available readership is reduced because of competition, the available extra readership for publishing outlets is reduced as well (because more outlets are free to publish), and its marginal effect on profits is also getting increasingly small. As a consequence, the compensation the politician has to pay for capture gets small quite quickly, and this reduces the total cost of capture faster than the increase in the total cost caused by the higher number of firms that need to be silenced.[4]

On top of this, the model shows conditions on the parameters where the relationship is non-monotonic, i.e. capture may occur for levels of competition lower, but also higher, than those leading to media freedom. Essentially, this happens when an increase in competition, keeping constant the number of free outlets, increases the total cost of capture (because the politician has to silence more of them). But, at some point, more competition implies that the politician can allow some outlets to be free. Hence, the reduction in the "business-as-usual" profits (for

[3]For example, a profit function convex in readership can emerge from a media market modelled as a two-sided one, where outlets are selling content to the readers and advertising space to a monopolist advertiser, who seeks to place advertisements where the readers are.

[4]Note that both the main modifications with respect to Besley and Prat (2006), on voters' interest for political news and on the relationship between readership and profit, are necessary. The online Appendix of Besley and Prat (2006) considers an extension where the politician does not need to capture the whole industry, pointing out that this does not change the result. This happens precisely because the linearity assumption on the profit function is maintained.

Electronic copy available at: https://ssrn.com/abstract=3160596

all captured outlets) can be powerful enough to keep the total cost of capture down. Finally, since the voters' welfare ex ante is strictly decreasing in the ex-ante probability of successful media capture, the effect of competition on welfare can be negative as well.

1.1 Anecdotal evidence

It is possible to find anecdotal confirmation for the two steps leading to the theoretical result: firstly, competition has a negative effect on outlets' profitability. Secondly, financially weak outlets may be more willing to accept political influence.[5] For the first step, Cagé (2019) has precise estimations about the effects of an exogenous increase in media competition on profitability, noticing that "entry reduces the circulation of incumbent newspapers by nearly 20%", and this implies a 38 to 43 % reduction in incumbent's revenues, 16 to 53 % reduction in size and a 9 to 13 % reduction in the share of hard news. Moving to the second step, many different sources show that the media is more easily influenced when revenues are low. The NGO IREX produces a Media Sustainability Index (IREX 2015) stressing that "[o]verall the issue seems to be that media have been weakened by a poor economy and been preyed upon by political money, or political pressure has weakened the economic environment in which media operate, thus *making it easier for political money to distort the market and put independent media at a strong disadvantage*".[6] One example is Bulgaria, where "most traditional media operate at a financial loss, that leads to compromises with editorial independence. With few exceptions, the big advertisers enjoy complete media support. As public institutions remain the biggest advertisers, any government regardless of its political affiliation receives media support".[7] Others are Albania,[8] FYR of Macedonia[9] and Turkey.[10]

[5] Additional anecdotal evidence comes from Drago et al. (2014). They find that the entry of newspapers increases the re-election probability of the incumbent: this is at odds with Besley and Prat (2006), but it is consistent with the results of this paper. Moreover, they find that "competition matters", meaning that the effect of entry does not disappear as more newspapers participate in the market, and in this model we go more depth than the standard monopoly *versus* duopoly approach.

[6] IREX (2015), pag. ix, italics added.

[7] IREX (2015), pag. xi, italics added.

[8] The website `worldaudit.org` points out the risk of political influence on financially weak media in Albania: "many independent media outlets are hampered by a lack of revenue. Publishers and media owners tend to dictate editorial policy based on political and economic affiliations, that, together with the employment insecurity journalists face, nurtures a culture of self-censorship".

[9] According to `fairpress.eu` (Iloska 2014), the country is characterized by a "*large number of broadcast and print outlets* in comparison with its population size". Despite this, "Macedonian media are subject to *severe interference and political pressure*. [...] In the last few years the Government was regularly criticized for its liberal use of promotional advertising, leading to increased financial dependence of media and increasing the number of outlets that favour its position".

[10] The Turkish newspaper "Today's Zaman" (Zibak 2015) claimed that "the diversity and abundance of media outlets in Turkey do not necessarily guarantee the presence of a free, independent and pluralistic media". This highlights two things: on the one hand, the existence of free media even in a country with potentially serious problems of media capture; on the other hand, the fact that a very competitive market is not enough to avoid these problems.

Electronic copy available at: https://ssrn.com/abstract=3160596

1.2 Related literature

This paper contributes to different branches of the economic literature, from the political economy of mass media, to the economic regulation of the media market. There is particular attention on media capture and on the effects that media competition has on political outcomes via media capture.

The relationship between media and politics has been widely studied in the political economy literature, and detailed and comprehensive reviews are provided by Prat and Strömberg (2013), Strömberg (2015), Gentzkow et al. (2016) and Puglisi and Snyder (2016).

Media capture can be seen as a particular way of endogenizing supply-driven media bias,[11] with the important difference that, in media capture models, the political preferences of media outlets are endogenous, and hence determined and constrained by the parameters of the game, and politicians are the capturing entity.[12] Generally speaking, competition is seen as sometimes problematic in models of demand-driven bias (e.g. recent contributions by Perego and Yuksel 2018), while the current literature considers it welfare enhancing in the case of supply-driven bias (e.g. Anderson and McLaren 2012). An exception is Vaccari (2020), whose model of supply-driven bias shows that, despite the possibility of misreporting, voters' welfare can be higher in monopoly than in duopoly.

When looking at the relationship between media capture and competition, the dominant view of the theoretical literature stresses that competition makes capture more difficult. This result is in standard models of political agency and media capture, such as Besley and Prat (2006), Prat (2016) and Torrens (2014),[13] and in models of mobilization and capture such as Gehlbach and Sonin (2014).[14] The reason is similar in all those contributions: given the

[11] The vast political economy literature on media acknowledges the existence of a demand driven media bias as well. See, for example, Strömberg (2004), Mullainathan and Shleifer (2005), Gentzkow and Shapiro (2006), Bernhardt et al. (2008), Chan and Stone (2013), Andina-Diaz and Garcia-Martinez (2016). Models of supply driven media bias (but without an explicit model of media capture) are for example Baron (2006), Anderson and McLaren (2012), Duggan and Martinelli (2011) and Prat (2018), Hafer et al. (2017), Levy et al. (2017).

[12] A different but related type of supply-driven bias is the one induced by advertisers, documented by Reuter and Zitzewitz (2006) and Gambaro and Puglisi (2015). In that setting, Beattie et al. (2017) find that newspapers tend to provide less coverage of car recalls when they involve their advertisers, and that this effect is mitigated by competition in the number of outlets (again, because of the assumption) but exacerbated by competition for advertisement.

[13] Other relevant models of media capture that do not focus on competition are Petrova (2008) and Corneo (2006), where the capturing entities are interest groups or particular factions of society; Kibris and Kocak (2020) look at how the presence of social media can make capture more or less effective, showing that social media can make partial capture ineffective, hence pushing some countries toward complete freedom and other toward complete capture.

[14] A relevant exception is Vaidya and Gupta (2016). They study the effect of media competition on corruption via media capture, finding a mixed result: when the probability that bad news about the incumbent can be discredited is sufficiently high, then it may be cheaper to capture a duopoly than a monopoly, while the opposite is true when the probability is low. However, this result is obtained in a setting where voters are not fully rational, meaning that they ignore the possibility of interactions between the politician and media outlets. Similarly, Drufuca (2014) extends Besley and Prat (2006), endogenizing voters' informational choices and finding that competition may allow for partial capture. However, differently from this paper, voters are unaware of the

Electronic copy available at: https://ssrn.com/abstract=3160596

necessity of capturing the whole industry, in equilibrium the politician will either silence every outlet or none of them, and has to pay monopoly profits to each of them. As a consequence, the cost of media capture (and hence politicians' turnover and voters' welfare) monotonically increases in the number of outlets. The theoretical part of this paper relaxes this assumption, showing under what conditions the result is reversed.

Empirically, the most direct insights on how media capture works come from McMillan and Zoido's (2004) study on Fujimori's media control mechanism in Perù, showing the huge costs he had to pay to silence media channels (with respect to members of congress or judges), and from Szeidl and Szucs (2017), pointing out that media capture, in Hungary, occurs through advertisement misallocation. Di Tella and Franceschelli (2011) find a negative correlation between advertisements bought by the government and the space dedicated to scandals in Argentinian newspapers, while Hamilton (2004) relates the emergence of independent (rather than politically affiliated) newspapers to the increasingly important advertising market. Petrova (2011) has a similar result. Finally, Petrova (2008) finds empirical support for the theory that media freedom is decreasing in income inequality in democracies.

However, there is little precise evidence on the effect of competition on media capture: first, it is hard to observe capture, define it precisely and disentangle it from media bias. Moreover, while local variation in the number or availability of media outlets is normally used for the causal identification of the effects of competition (e.g. Gentzkow et al. 2011, Drago et al. 2014, Barone et al. 2015, Galvis et al. 2016, Cagé 2019), media capture is often measured at national level. In their recent review, Enikolopov and Petrova (2016) find that competition helps in reducing media capture, but the method for testing the presence of media capture is generally indirect. Galvis et al. (2016) looks at the effect of competition on media bias in US late 19th century newspapers, finding that competition reduces such bias. However, it is hard to say whether this bias was due to political capture or to one of the other reasons highlighted by the literature.

This paper is distinguished from standard models of media capture because it looks more closely at the media market structure. In particular, this model is related to those stressing the importance of the "two-sidedness" of the market of media (Argentesi and Ivaldi 2005)[15] and of

possibility of media capture and outlets' possibility of capture does not affect the demand for information (hence bribes do not depend on this endogenous readership). As a consequence, bribes do not need to compensate for losses in readership. Moreover, that model does not derive a general result on the effect of competition on the possibility of capture.

[15] Ellman and Germano (2009), for example, use a two-sided market model in order to see the effect of the advertising industry on media bias, while Godes et al. (2009) and Dukes (2006) use a two-sided model to study how media competition affects pricing strategies and content quality choices respectively. This paper "incorporates" their approach (media outlets selling copies to the readers, i.e. competing on prices, and advertising space to the advertisers, i.e. competing on quantity) in a standard media capture political agency framework.

Electronic copy available at: https://ssrn.com/abstract=3160596

the role of the advertising market, highlighted for example in Germano and Meier (2013) and Blasco et al. (2015).

Finally, this paper adds to the literature on media market regulation. Since there is no general agreement about what a "healthy" broadcasting sector is (Seabright and von Hagen 2007), this paper highlights that the role of competition, in the context of media capture, may be more complex than the standard answer given by the political economy literature.[16]

Outside the formal economic modelling, Hollifield (2006) highlights the possibility of a reverse-U shaped relationship between competition and journalistic performance, listing many different channels that may contribute to it. In contrast to that paper, this work focuses solely on media capture, deriving the non-monotonic relationship as a result of a formal, game theoretical model and looking directly at the effects of political and commercial forces.

The remainder of this paper is as follows. Section 2 describes the setting of the model and comments on the main assumption, while we derive the equilibrium and its consequences on welfare in section 3. Section 4 concludes. Finally, model's proofs, microfoundations and extensions are postponed to dedicated Appendices.

2 The Model

The model builds on Besley and Prat (2006), keeping a similar structure (principal-agent-supervisor, as in Tirole (1986), pure adverse selection). There are two important modifications. Firstly, voters have heterogeneous interests in political news, hence not all of them become informed when one media outlet publishes news about the politician.[17] Secondly, the relationship between readership and outlets' profits is not necessarily linear, but it is assumed to be described by a generic power function. Appendix B shows that it can be derived as the equilibrium profit of a two sided media market where outlets are selling content to the readers and advertising space to a monopolist advertiser.

[16] In particular, Polo (2005) studies whether market incentives are powerful enough to guarantee internal and external pluralism in the media market, finding that the differentiation triggered by the market does not necessarily extend to political views, and that internal pluralism is limited by the personal interests of the media owner. Torrens (2014) looks into the optimal media market structure from a normative perspective, taking into account the possibility of media capture and finding the same results as in Besley and Prat (2006). The basic welfare trade-off is given by the fact that, in his model, more media outlets imply a lower probability of capture but also higher fixed costs to be supported without an increase in the amount of information available. It is interesting to note, however, that Torrens' (2014) main effect of the number of outlets on the possibility of capture is analogous to Besley and Prat (2006) *precisely because* he shares the same assumption about the fact that a single media outlet publishing the news is enough to inform the whole electorate.

[17] Note that this is, broadly speaking, consistent with the result of Durante and Knight (2012), where they point out that the change in viewing habits due to Berlusconi's control of some media outlets is only partial.

Electronic copy available at: https://ssrn.com/abstract=3160596

2.1 The game

2.1.1 Incumbent's type

The players of this game are a politician (he), media outlets (it) and voters (she). In period 1 an incumbent of type $\theta \in \{b, g\}$ is in power, with $Pr(\theta = g) = \gamma$. θ is private information of the incumbent. The "good" incumbent always picks the policy that maximizes voters' welfare, while the "bad" incumbent is only a rent seeker. While in power, he earns rent equal to R.

2.1.2 Signal structure

Media outlets (but not the voters) may receive a common, verifiable signal $s = \{\emptyset, b\}$ of the incumbent type. In particular, $Pr(s = b|\theta = b) = q$, $Pr(s = \emptyset|\theta = b) = 1 - q$ and $Pr(s = \emptyset|\theta = g) = 1$. Upon observing s, the incumbent offers a vector of bribes $\{t_i\}_{i=1,\dots,n}$ in exchange for silence.

Every media outlet then has the option to choose a reporting strategy, defined as $\tilde{s_i} \in \{b, \emptyset\}$. If $s = \emptyset$, then the only option available is $\tilde{s_i} = \emptyset$, since there are no signals and news cannot be fabricated. However, if $s = b$, each outlet can decide between reporting $\tilde{s_i} = b$, enjoying the profits from a higher readership, or accepting t_i while publishing $\tilde{s_i} = \emptyset$. A media outlet that chooses $\tilde{s_i} = b$ is referred to as an outlet that *publishes the news about the incumbent*.

2.1.3 Voters' types

Voters are heterogeneous in their interest in politics, meaning that only some of them will be interested in political news. Formally, there are two types of consumers/voters.[18] A fraction α of them is composed of *interested voters*, who are willing to consume political news from any outlet willing to publish them. Hence, they observe whether some of the outlets have published the news about the politician and they consume that content. They are not going to consume news from any outlet otherwise. In terms of Bayesian updating, note that it is enough that one outlet publishes the news in order for them all to become informed about the signal.

The other $1 - \alpha$ voters are *rationally ignorant*, meaning that they have no interest in expending money or effort to buy political content. As a consequence, unlike the interested voters, they do not actively seek outlets reporting news about the politician, hence they do not pay attention to whether any of the outlets has published the news about the incumbent. However, they read the media for other reasons (e.g. they like sport, gossip, gardening etc.), and hence they are equally divided amongst all the outlets, irrespective of the signal that they publish.[19]

[18] In total, consumers/voters are a large number normalized to 1.

[19] Hence, we are implicitly assuming that the market is covered. This is both consistent with the theoretical

Electronic copy available at: https://ssrn.com/abstract=3160596

Hence, a fraction of rationally ignorant voters may become informed about the politician's type by reading, for other reasons, one of the outlets publishing the signal.[20] Voters know their type and $\alpha \in (0,1)$ is common knowledge. As is quite standard in these models, every reader/voter reads at most one piece of news.

As the only relevant piece of news that outlets can publish is the fact that the incumbent is bad, we define *informed* voters those who observe at least one $\tilde{s}_i = b$, hence they are aware of the fact that $s = b$ has been received by media outlets (and hence $\theta = b$). Voters observing only $\emptyset$ for all the outlets they consider are defined as *uninformed*. This definition refers to the signal they observe, and it is independent on whether there is something to be informed about (i.e. $s = b$) or not. In other words, when there is no signal to publish, either because the incumbent is a good type or because outlets received no signal, all voters are uninformed even without media capture. Moreover, in case of complete capture, all voters are uninformed as well. In case of partial capture, some voters are informed and some of them are not (more details below). Note that both interested and rationally ignorant voters can become informed about the (bad) type of the incumbent. This is a consequence of the outlet they read. In particular, every interested voter will become informed if at least one outlet publishes the signal, while the fraction of rationally ignorant voters that becomes informed depends on the fraction of outlets publishing the signal. All voters are fully rational and Bayesian, meaning that they take into account the possibility they are observing $\tilde{s}_i = \emptyset$ because outlet i has been captured by a bad incumbent. The sole difference is that interested voters are assumed to check the headlines of all the available outlets while rationally ignorant voters consume one of the available outlets for reasons that are different from its political news section, without checking the rest (e.g. because they have high search cost). Hence, in terms of objective functions, we assume that all voters get a payoff of 1 for every period where a good incumbent is in power, and 0 otherwise. Moreover, rationally ignorant voters experience a search cost of $\xi > 1$ for every outlet they check after the first one.

approach of Besley and Prat (2006) and with the business-stealing effect of newspaper entry shown in Cagé (2019).

[20]This precise assumption about the behaviour of rationally ignorant voters is not crucial for our main result. This holds as long as a fraction of rationally ignorant voters becomes informed when some outlets are publishing the signal, and this fraction is increasing in the fraction of outlets publishing the signal. The result would change, in the relevant case of $\alpha < \frac{1}{2}$, if rationally ignorant voters had a strict preference for outlets not reporting about politics, because they give more space to the topics they like (we thank one of the referees for pointing this out). In this case, capture would not be necessary at all, as rationally ignorant voters would remain uninformed in any case. Absent other considerations, even a monopolist may choose self-censorship. However, this assumption would be somewhat extreme, as it implies that those voters derive more utility from the additional space left to their favourite topic than from the possibility of learning the truth about the incumbent politician.

Electronic copy available at: https://ssrn.com/abstract=3160596

2.1.4 Media outlets

The number of media outlets, n, is exogenously given and it will be the main aspect of the comparative statics analysis. In general, media outlets derive revenues from two sources: audience-related revenues and money from the politician. Formally, the total profits are defined by Π_i. The component coming from readership is defined by $\pi(r_i) = (r_i)^\delta$, with $\delta > 0$, where r_i is the readership/viewership of outlet i. Note that $\delta = 1$ incorporates the case of Besley and Prat (2006), while $\delta > 1$ can be the equilibrium result of a two sided media market, as explained in Appendix B. The bribe offered to outlet i is defined by t_i. For simplicity, it is assumed that outlets offer their contents for free.[21]

After the vector of bribes is decided, outlets observe it and each of them simultaneously decides whether to accept the individual offer or not. Defining I the set of media that accepts the offer, the incumbent gets a payoff of $R - \sum_{i \in I} t_i$ if he is elected and of $-\sum_{i \in I} t_i$ if he is voted out of office. R is drawn from a distribution F_R with support $[0, +\infty)$. The distribution is common knowledge, while the realization is private information of the incumbent and the outlets, i.e. both the incumbent and the outlets learn the realization of R at the beginning of the game. Voters only know the distribution.

At the end of period one, voters decide whether to confirm the incumbent or to choose a challenger that is good with probability γ. It is assumed that every voter votes sincerely.[22] In period 2 there is voters' and politicians payoff payment only.

2.2 Summary of the timing

1. θ is realized. If $\theta = g$ then $s = \emptyset$ with probability 1. If $\theta = b$, $s = b$ with probability q and $s = \emptyset$ with probability $(1 - q)$. The incumbent observes the media signal and decides $\{t_i\}_{i=1,\dots,n}$. The incumbent and the outlets learn R.

2. Each media i observes s and $\{t_i\}_{i=1,\dots,n}$ and decides whether to accept or reject t_i. If she rejects, she reports the true signal (if $s = b$) competing with the other outlets that reported the news, if she accepts she reports $\tilde{s}_i = \emptyset$.

3. Voters make readership decisions. Rationally ignorant voters do not observe the vector of reports $\{\tilde{s}_i\}_{i=1,\dots n}$ and they just split themselves among all the outlets, observing just the report of the outlet they pick, i.e. $\tilde{s}_i$. Interested voters instead observe the vector

[21] This assumption makes the model more tractable, but it can be shown that it appears quite easily as an equilibrium result in a model where outlets choose the price of their contents in a competitive way and are sufficiently interested in maximizing the readership.

[22] Note that, with two alternatives, this is a weakly undominated voting strategy. This is like assuming that every voter votes as if she was pivotal.

Electronic copy available at: https://ssrn.com/abstract=3160596

$\{\tilde{s}_i\}_{i=1,...n}$ and either split themselves among the outlets choosing $\tilde{s}_i = b$ or do not consume any content.

4. Consumers/voters use the information they have to update beliefs and vote. If the incumbent is voted out, the new incumbent is randomly drawn with $Pr(\theta = g) = \gamma$. Period 1 ends.

5. In period 2, payoffs for both periods are paid and the game ends.

2.3 Discussion of the assumptions

In terms of assumptions, the most important difference between this model and the literature on media capture is the heterogenity in voters' interest in politics. This implies that this model does not assume that having one outlet publish the news is enough to inform the whole electorate.

Gentzkow and Shapiro (2008) use the argument of re-broadcasting as a justification for the assumption in Besley and Prat (2006). However, "silenced" media may not be willing to re-broadcast anything, since they have been compensated in for not doing so. Moreover, in reality there are many ways of re-broadcasting a news item. What matters in this model is the message transmitted to the readers about the type of the incumbent, and in reality the same news can be re-broadcast in more or less informative ways.

Moreover, it must be noted that even in places traditionally associated with media capture (e.g. Italy, Russia), the capture never reached the whole media industry (in Italy it did not even reach the whole television industry when Mr Berlusconi was simultaneously Prime Minister and owner of the three main private television stations). McMillan and Zoido (2004), for example, point out that Montesinos in Peru was not bribing the whole media industry, but was choosing the outlets with the highest viewership/readership, and this is consistent with this model. Hence, the possibility that capture does not involve the whole market should at least be considered.

The second important difference is the generic way of describing the relationship between readership and profits. Note, first of all, that the linear case is just a special case of this specification. Secondly, Appendix B will provide a microfoundation, based on the two sided market literature, of a profit function where $\delta > 1$.

Electronic copy available at: https://ssrn.com/abstract=3160596

3 Equilibrium and welfare

3.1 Solving the game

The model is solved by backward induction, focusing on showing the existence of a symmetric[23] sincere pure strategy[24] perfect Bayesian equilibrium. We construct the equilibrium using a series of lemmas: all the proofs are in Appendix A. Of course, it makes sense to focus only on the case where $\theta = b$ and $s = b$, since nothing interesting happens in the rest of the game.

First of all, let us look at voters' choice. Note that, irrespective of their type, the voters' information set is binary (i.e. they observe $\emptyset$ or that there is at least one b). This is because rationally ignorant voters will just observe the report of the outlet they consume, while interested voters can use the whole vector of reports. Lemma 1 describes their equilibrium choices, assuming sincere voting. It is reminded that an informed voter is a voter that observes at least one $\tilde{s}_i = b$, hence she knows that $\theta = b$. A uninformed voter is a voter that observes only $\tilde{s}_i = \emptyset$.

Lemma 1 *In a sincere voting equilibrium, all uninformed voters vote for the incumbent and all informed voters vote for the challenger.*

Intuitively, in this type of model no news is good news, and this is true even when voters take into account the possibility of media capture. As a result, the politician only needs to keep half the voters uninformed to win elections and remain in power.[25]

Given the assumption about voters' heterogeneous interest in political news, it is straightforward to derive the readership of each outlet depending on its reporting strategy. In particular, define I^C the set of outlets that rejected the bribe from the incumbent (with cardinality $m \geq 0$) and I the set of outlets that accepted the bribe. It is easy to see that $r_j = \frac{1-\alpha}{n} \; \forall j \in I$ and $r_k = \frac{\alpha}{m} + \frac{1-\alpha}{n} \; \forall k \in I^C$.[26]

In other words, n outlets enjoy some readership coming from the rationally ignorant voters, while only those outlets publishing news about the politician will enjoy the additional readership of interested voters. As a consequence,

$$\pi_k = \left(\frac{\alpha}{m} + \frac{1-\alpha}{n}\right)^{\delta} \quad \forall k \in I^C \quad \pi_j = \left(\frac{1-\alpha}{n}\right)^{\delta} \quad \forall j \in I \tag{1}$$

The politician determines the optimal number of outlets to silence knowing that all of the

[23] I.e. every voter of the same type follows the same strategy.

[24] As tie breaking rules, we assume that indifferent voters choose the incumbent, indifferent outlets accept the bribe and the indifferent politician chooses to capture.

[25] As an indifference breaking rule, we give a small "incumbency advantage" to the politician in power assuming that, in case of a 50-50 result, he would be re-elected.

[26] This abstracts from the outlets' pricing decisions. However, Appendix B shows that an equilibrium with zero price can be easily obtained.

Electronic copy available at: https://ssrn.com/abstract=3160596

α interested voters will become informed once a single outlet publishes the news, while the fraction of the other $1-\alpha$ rationally ignorant voters that become informed is increasing in the fraction of media outlets reporting the news. Hence, if every outlet publishes the news, then all the voters become aware of the type of the politician, while if $m = 0$ then none of them are. To stay in power, given Lemma 1, the bad politician needs at least 50 per cent of the voters to be uninformed. Because getting a higher percentage of uninformed voters is irrelevant in terms of re-election, but costly in terms of bribes, the politician knows that he can have a certain number m of outles "allowed" to publish the news about his type, without affecting his re-election. In particular, m must be such that

$$\alpha + (1-\alpha)\frac{m}{n} \leq \frac{1}{2} \tag{2}$$

Note that, if $\alpha \in \left[\frac{1}{2}, 1\right]$, i.e. if there is a majority of interested voters, then the result is the same as in Besley and Prat (2006), where the bad politician has to silence the whole industry. Hence, the interesting case is when $\alpha \in \left(0, \frac{1}{2}\right)$ and we stick to this case for the rest of the paper. In this respect, Hamilton (2004) points out that interested readers/voters are usually a minority, compared with the rationally ignorant. Hence, the case considered here is likely to reflect reality.

Equation (2) can be rearranged as

$$\frac{m}{n} \leq \frac{1-2\alpha}{2(1-\alpha)}$$

As a consequence, defining λ the fraction of outlets that the politician has to silence in order to be re-elected, we can see that, in case of capture and with $\alpha < \frac{1}{2}$, it is optimal for him to have

$$1-\lambda = \frac{1-2\alpha}{2(1-\alpha)}$$

and hence

$$\lambda = \frac{1}{2(1-\alpha)} \tag{3}$$

Given that λ is not a function of n, from now on $\lceil \lambda n \rceil$, i.e. the smaller integer greater or equal to λn, defines the number of outlets that the politician silences in equilibrium. Importantly, $\lambda \in \left(\frac{1}{2}, 1\right)$, hence any capture must involve more than half of the outlets. This follows from the assumption of even division of rationally ignorant voters among all the available outlets: even if there are no interested voters, still the capture of half of the market is needed in order to keep half of the voters uninformed and win re-election.

It is now possible to characterize (in Lemma 2) the bribe structure and the total equilibrium

Electronic copy available at: https://ssrn.com/abstract=3160596

cost of capture in the lowest-cost equilibrium, from the point of view of the incumbent.

Lemma 2 *If* $\alpha < \frac{1}{2}$ *there exists an equilibrium where capture happens if* $\lceil \lambda n \rceil \left[\left(\frac{\alpha}{\lfloor (1-\lambda) n \rfloor + 1} + \frac{1-\alpha}{n} \right)^{\delta} - \left(\frac{1-\alpha}{n} \right)^{\delta} \right] \leq R$ *and outlets are free otherwise. To be re-elected at the minimum cost, the politician offers a positive bribe* $t_i = \left(\frac{\alpha}{\lfloor (1-\lambda) n \rfloor + 1} + \frac{1-\alpha}{n} \right)^{\delta} - \left(\frac{1-\alpha}{n} \right)^{\delta}$ *to exactly* $\lceil \lambda n \rceil$ *outlets, where* λ *is defined in equation (3), and* $t_j = 0$ *to the remaining outlets. There are no other pure strategy PBE using weakly undominated strategies and sincere voting that do not satisfy those properties in terms of capture, its total cost and equilibrium bribes.*[27]

The formal proof of this equilibrium is in Appendix A. Note, however, that there are no unilateral profitable deviations. Outlets not receiving any bribe cannot do anything other than publish the signal. On the other hand, the politician has to pay to every bribed outlet its outside option, i.e. the profits each of them would make if, when the other $\lceil \lambda n \rceil - 1$ outlets are captured, it would decide to deviate from accepting the offer, publishing the news and hence competing with the other $\lfloor (1-\lambda) n \rfloor$ free outlets, minus the profits the outlet is making by staying silent.

In this case, then, $m = \lfloor (1-\lambda) n \rfloor + 1$ and hence the profits from a deviation, following (1), would be $\left(\frac{\alpha}{\lfloor (1-\lambda) n \rfloor + 1} + \frac{1-\alpha}{n} \right)^{\delta}$. The politician has to pay the difference between this and the amount of profit made under capture to all the $\lceil \lambda n \rceil$ outlets he needs to capture. The total amount to be paid is

$$K = \lceil \lambda n \rceil \left[\left(\frac{\alpha}{\lfloor (1-\lambda) n \rfloor + 1} + \frac{1-\alpha}{n} \right)^{\delta} - \left(\frac{1-\alpha}{n} \right)^{\delta} \right] \tag{4}$$

Moreover, the politician cannot hope to stay in power by bribing a lower number of outlets (as seen above) or with a lower offer, since it would be rejected. Clearly, it is optimal for the bad politician to bribe the outlets if this amount is lower than the office rent he could realize by staying in power in period 2 (defined as R), and hence capture occurs, in equilibrium, when

$$\lceil \lambda n \rceil \left[\left(\frac{\alpha}{\lfloor (1-\lambda) n \rfloor + 1} + \frac{1-\alpha}{n} \right)^{\delta} - \left(\frac{1-\alpha}{n} \right)^{\delta} \right] \leq R \tag{5}$$

It is immediately clear that the effect of n on this condition is non trivial. On one hand, raising n implies, as in Besley and Prat (2006), that the politician has to silence more outlets. On the other hand, raising n also increases competition in the slice of market that remains free (if this exists, of course). This reduces the outside option for every firm and makes capture more

[27] There can be equilibria with positive but low offer to outlets not supposed to be captured. But those are payoff equivalent (for the politician and for outlets of the same group) to the stated one.

Electronic copy available at: https://ssrn.com/abstract=3160596

attractive (and cheaper, for the politician). Henceforth, we focus on the equilibrium described by lemma 2. Given this:

Proposition 1 *If $\alpha < \frac{1}{2}$ and $\delta > 1$ then, in the limit for n going to infinity, competition drives the total cost of capture to zero.*

Intuitively, as the extra available readership is reduced because of competition among free media outlets, its marginal effect on profits is also getting increasingly small. As a consequence, the compensation the politician has to pay for capture gets small quite quickly, and in the limit this reduces the total cost of capture faster than the increase in the total cost caused by the higher number of firms that need to be silenced.[28] Hence, excessive competition is actually bad for media freedom.

Figures 1 and 2 illustrate of the effect of δ on the total equilibrium cost of capture (normalized so that $K(n = 1) = 1$ irrespective of δ). When it is below 1 (blue solid line), the cost tends to "explode", hence competition makes capture more costly (in the limit) precisely because the "increasing in number" effect dominates the "outside option reduction effect". When δ is big enough (red dotted line), then the total cost of capture is always decreasing in competition, irrespective of the number of free outlets.

The most interesting case occurs for intermediate values of δ (green dashed line), where the effect of competition on capture can be non-monotonic. K still goes to 0 in the limit, but this effect kicks in only when competition is sufficiently high, i.e. there is a sufficiently large number of media outlets so that one of them publishing the news is not enough to inform the majority of the voters. Section 3.2 discusses this in greater detail. Finally, note that the basic message of Figures 1 and 2 is not affected by α (provided that $\alpha < \frac{1}{2}$).

3.2 Non-monotonic effect of competition

Can this negative result of competition be reconciled with the more positive message of Besley and Prat (2006)? It seems to be the case, at least for specific values of δ. In fact, it can be shown that, when $\delta \in (1, 2]$, the effect of competition on media capture can be non-monotonic.

To see this, note that since $\lambda > \frac{1}{2}$, total capture will be necessary for at least $n = 1$ and $n = 2$. The aforementioned restriction on δ guarantees that, before the competition effect kicks in reducing the outside options of captured outlets (i.e. as long as $\lfloor (1 - \lambda)\, n \rfloor = 0$), K is increasing in n. This is formalized in the following corollary:

[28] Note that n enters linearly in the numerator and with a power greater than 1 in the denominator.

Electronic copy available at: https://ssrn.com/abstract=3160596

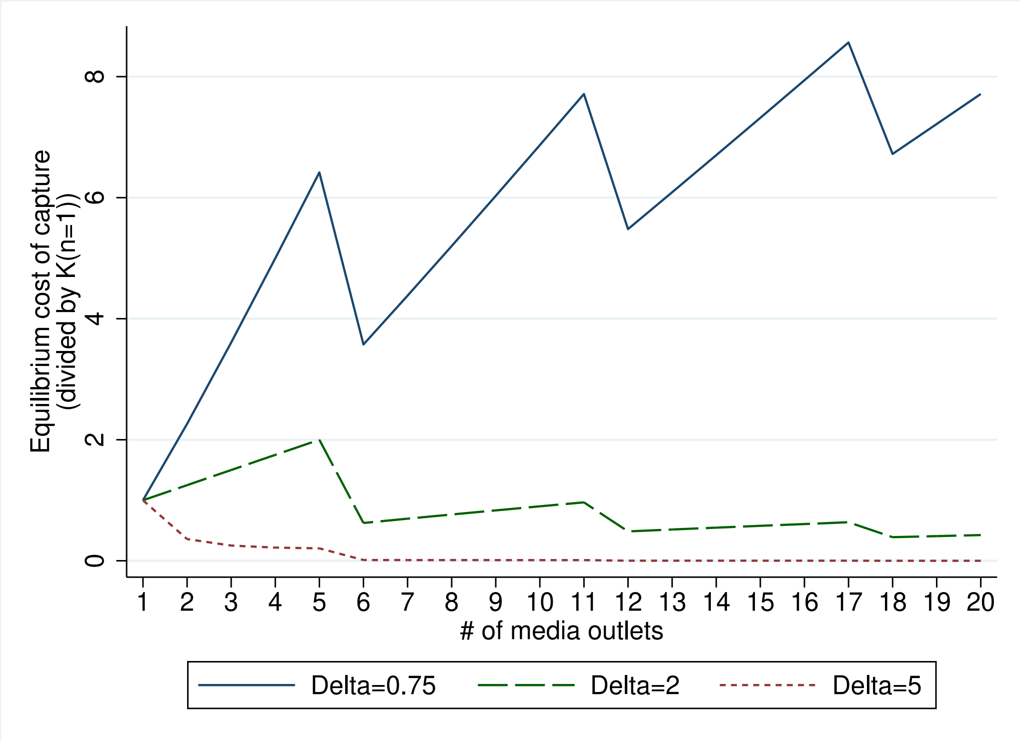

Figure 1: Total equilibrium cost of capture (divided by $K(n = 1)$) for different values of δ when $\alpha = 0.4$. The dotted red line is $K(\delta = 5)$, blue solid line is $K(\delta = 0.75)$, green dashed line is $K(\delta = 2)$. Linear interpolation.

Corollary 1 *If $\alpha < \frac{1}{2}$ and $\delta \in (1, 2]$ and $R \in (K(1); K(n^*))$, where n^* is the maximum number of outlets such that the politician has to capture the whole industry, then we observe media capture for $n < \underline{n}$ and for some $n > \bar{n}$, so the effect of n on the possibility of media capture is non-monotonic.*

This means that media will be captured when their number is too small or too big, since competition would, at some point, make them so cheap that it will be convenient for the incumbent to silence (some of) them. To understand the behaviour of the cost function, Figure 3 simulates the model with parameters consistent with Corollary 1.

The number of media outlets is on the x-axis, while the cost of silencing enough of them to have a bad incumbent re-elected when the outlets get the signal is on the y-axis. For the other parameters, $R = 1$ (i.e. the realization of R, known by the politician and media outlets but not by the voters), $\alpha = 0.4$, $\delta = 2$.

The non-monotonic effect of competition is readily apparent: the incumbent can capture enough outlets and stay in power after a bad signal is received when the blue solid line (the total equilibrium cost of capture) is below the orange dotted line (office rent). That is, when there are at most 3 or at least 6 media outlets. In between, there will be no capture as it would be too costly for the incumbent. Note that, depending on parameters, there may be multiple

Electronic copy available at: https://ssrn.com/abstract=3160596

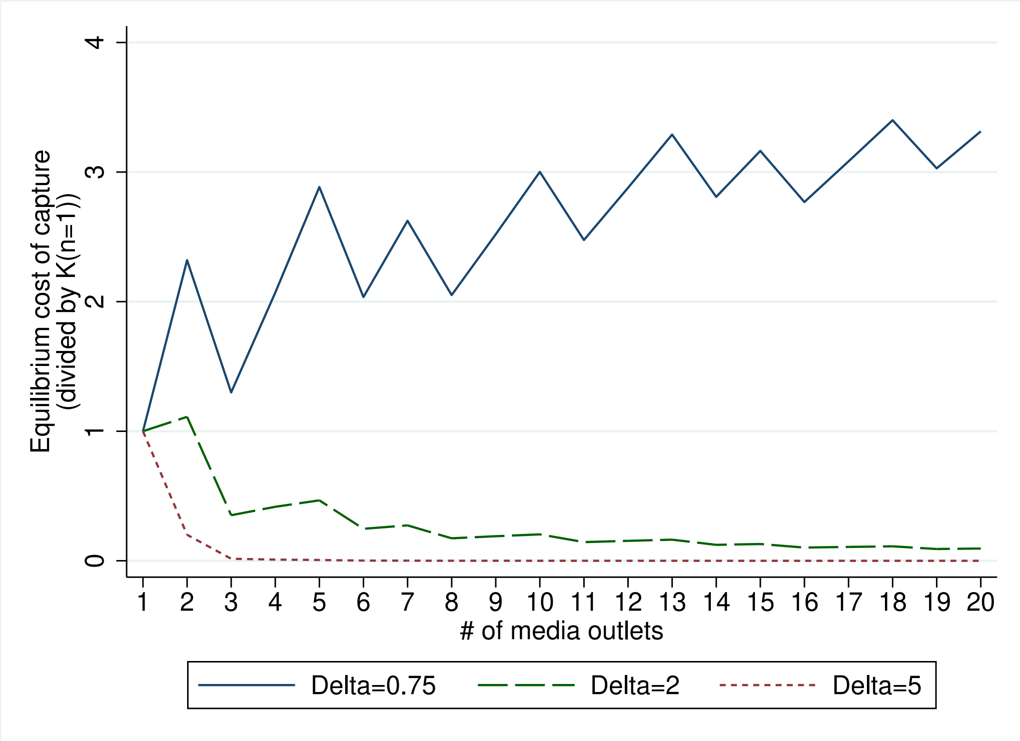

Figure 2: Total equilibrium cost of capture (divided by $K(n = 1)$) for different values of δ when $\alpha = 0.2$. The dotted red line is $K(\delta = 5)$, blue solid line is $K(\delta = 0.75)$, green dashed line is $K(\delta = 2)$.Linear interpolation.

intervals where, as competition increases, capture becomes incentive compatible (or not). Their complete characterization is very complicated. Corollary 1 just ensures that we observe capture with too little and too much competition, with some market configurations with free media in between. However, not necessarily all market configurations in between are characterized by free media.

It is clear from the graph that rounding plays a role.[29] In particular, the cost of capture is increasing in n as long as the number of outlets is such that the politician has to silence the whole market. It "jumps down" when n goes from 5 to 6 because of the competition effect given by the possibility of having one free outlet (this lowers the outside option of every captured outlet and hence the total cost). The behaviour is similar for the remaining parts of the graph, with jumps when n goes from 11 to 12, from 17 to 18 and so on. Note, however, that the "slope" of the cost function is progressively decreasing as n grows, because n enters at the denominator with a power of two.

[29]The graph where n is treated as a real, rather than as a natural number, is shown in Appendix D.

Electronic copy available at: https://ssrn.com/abstract=3160596

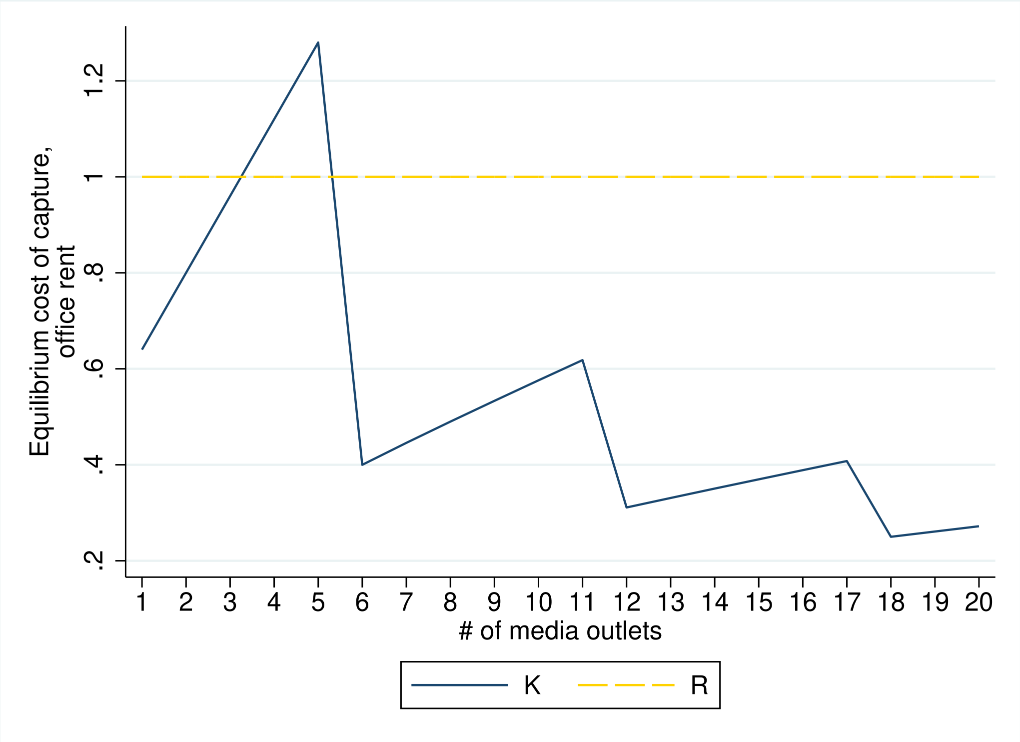

Figure 3: Model simulation for different values of n when $R = 1$, $\alpha = 0.4$, $\delta = 2$. Linear interpolation.

3.3 Welfare of the voters

It is now possible to look at the (*ex ante*) welfare of the voters in the equilibrium outlined above, and how it is affected by competition and the presence of media capture. As already mentioned, from the point of view of the voters office rents R are assumed to be drawn from a generic distribution F_R, with support $\Re^+$. As a consequence, when $\alpha < \frac{1}{2}$, the *ex ante* probability of successful media capture, conditional on having a bad incumbent in power and on $s = b$, is defined as

$$\sigma = 1 - F_R\left(\lceil \lambda n \rceil \left[\left(\frac{\alpha}{\lfloor (1-\lambda)\, n \rfloor + 1} + \frac{1-\alpha}{n} \right)^{\delta} - \left(\frac{1-\alpha}{n} \right)^{\delta} \right] \right)$$

With this definition, the probability that a bad incumbent is voted out is $(1-\sigma)q$ and the expected turnover is $(1-\gamma)(1-\sigma)q$. In the standard Besley and Prat (2006) model, since n was monotonically decreasing σ, then n was supposed to increase the expected turnover. Interestingly, Drago et al. (2014) find that this is not the case, at least for the entry of local newspapers in Italian municipalities. In this model, when $\delta > 1$, n increases σ in the limit, falling as a consequence the expected turnover. This is consistent with Drago et al. (2014).

Finally, the *ex ante* voters' welfare is defined as

$$W := \gamma(2) + (1-\gamma)\left[q\,(1-\sigma)\,\gamma\right] \tag{6}$$

Electronic copy available at: https://ssrn.com/abstract=3160596

As expected, (6) shows that voters' welfare is decreasing in the probability of media capture. As a consequence, the effect of media competition on voters' welfare can be described as follows:

Proposition 2 *If $\alpha < \frac{1}{2}$ and $\delta > 1$ competition has, in the limit, a decreasing effect on voters' welfare.*

This result suggests that some care is required when thinking about competition as a tool for avoiding media capture. Under some conditions, excessive competition can be counter-productive. Furthermore, the effects of γ and α on welfare are as expected, and are summarized in Lemma 3. A higher fraction of interested voters and a higher average quality of politicians improves welfare.

Lemma 3 *W is increasing in both γ and α.*

3.4 Discussion and robustness of the results

We study several extensions of the model in Appendix C. In particular, Appendix C.1 considers an extension where some outlets are "no news" outlets, i.e. they do not receive any signal about the incumbent politician (and this is common knowledge). We show that allowing for their existence does not affect the main results of this paper when competition increases among news outlets. Moreover, we show that higher competition among "no news" outlets makes media capture monotonically easier (at the point to make it unnecessary). This result is broadly in line with Durante et al. (2019) argument on the role of all-entertainment television.

Appendix C.2 shows the existence of an equilibrium basically equivalent to this one in a model where outlets may be able to fabricate stories, and voters cannot identify them. It requires fabrication to be observable by the politician, profit maximizing outlets and good politicians willing to engage in media capture as much as bad politicians, whenever it is needed for their re-election.

Appendix C.3 considers the case of ex ante asymmetric outlets. The analysis is quite complex as the precise effect of competition depends on how new entrants affect the readership of incumbent outlets, and this can happen in all sort of ways. However, we can show that the main forces operating in the benchmark model are acting in the asymmetric case as well: increased competition may just increase the amount of bribes to be paid (and hence the total cost of capture), but it may also allow the politician to leave (one or more) outlets free, reducing the bribe of captured outlets and reducing the total cost. Moreover, we show that it is always better to capture many small outlets rather than few big ones, for any given level of capture. Finally

Electronic copy available at: https://ssrn.com/abstract=3160596

we show, through a numerical example, that a similar non-monotonic effect of competition on media capture can arise in that case as well.[30]

4 Conclusion

This paper shows that competition in the mass media market does not have a universally positive role in deterring media capture by bad politicians. It builds on the existing models of political agency and media capture showing that competition may reduce the total cost of capture, when voters are heterogeneous in their interest for political news and profits are modelled as a power function convex in readership (something that can arise from a two-sided-market modelling strategy), thus hampering media outlets independence from political influence.

These findings are particularly relevant in the light of the digital revolution, that reduces the fixed cost of production allowing for a proliferation of media outlets. At the same time, however, concerns about political influence on media are far from being eliminated, and the model in this paper suggests a channel through which competition may actually be instrumental to capture.

In terms of policies, we suggest the importance of going beyond the idea that enhancing competition in the media market is always a way to guarantee media freedom. What really matters are the profits that outlets are able to make by publishing relevant information about politicians: if competition reduces them too much, outlets' reporting independence is under threat.

Further research is surely needed to better understand the scope and the robustness of our results. On the one hand, we shut down ideology completely. Clearly the model could be re-interpreted as involving just the "pivotal" group of voters and the media outlets they are interested in, but ideology (of both voters and outlets) may interact in interesting ways with the incentives to capture the media: opposition outlets may be harder to capture, but their silence could be more convincing. Secondly, it would be important to have measures of media capture at a local level. This would be important for two different reasons: on the one hand, to explore whether media capture is a more recurrent phenomenon at the national or at the local level, and on the other hand to be able to use local variation in the number of outlets for identification purposes.

[30] In Appendix C.3 we assign exogenously a parameter measuring the "influence" of each individual outlet. As one of the referees correctly pointed out, influence may actually be endogenous to the probability of capture conjectured by the voter. Although we do not solve this case formally, we conjecture that it would imply equilibria characterized by "self-fulfilling prophecies", where outlets expected to be captured are indeed cheaper (because of low influence) and hence likely to be captured. And vice-versa.

Electronic copy available at: https://ssrn.com/abstract=3160596

References

Anderson, S. P. and McLaren, J. (2012) Media Merges and Media Bias with Rational Consumers. *Journal of the European Economic Association*, 10(4): 831-859.

Andina-Diaz, A. and Garcia-Martinez, J. E. (2016) Reputation and news suppression in the media industry. *working paper.*

Argentesi, E. and Ivaldi, M. (2005) Market definition in printed media industry: theory, practice and lessons for broadcasting. *CEPR Working Paper.*

Baron, D. (2006) Persistent Media Bias. *Journal of Public Economics*, 90: 1-36.

Barone, G., D'Acunto, F. and Narciso, G. (2015) Telecracy: Testing for Channels of Persuasion. *American Economic Journal: Economic Policy*, 7(2): 30-60.

Beattie, G., Durante, R., Knight, B. and Sen, A. (2017) Advertising Spending and Media Bias: Evidence from News Coverage of Car Safety Recalls. *NBER working paper 23940.*

Bernhardt, D., Krasa, S. and Polborn, M. (2008) Political Polarization and the Electoral Effects of Media Bias. *Journal of Public Economics*, 98(5-6): 1092-1104.

Besley, T. (2006) *Principled Agents? The Political Economy of Good Government.* New York: Oxford University Press.

Besley, T. and Burgess, R. (2002) The Political Economy of Government Responsiveness. Theory and Evidence from India. *Quarterly Journal of Economics*, 117(4): 1415-1451.

Besley, T. and Prat, A. (2006) Handcuffs for the Grabbing Hand? The Role of the Media in Political Accountability. *American Economic Review*, 96(3): 720-736.

Blasco, A., Pin, P. and Sobbrio, F. (2015) Paying Positive to Go Negative: Advertisers' Competition and Media Reports. *Working paper.*

Cagé, J. (2019) Media Competition, Information Provision and Political Participation: Evidence from French Local Newspapers and Elections, 1944-2014. *Journal of Public Economics*, forthcoming.

Canes-Wrone, B., Herron, M. C. and Shotts, K. W. (2001) Leadership and Pandering: A Theory of Executive Policymaking. *American Journal of Political Science*, 45(3): 532-550.

Card, D. (1992) Using Regional Variation in Wages to Measure the Effects of the Federal Minimum Wage. *Industrial and Labor Relations Review*, 46(1): 22-37.

Chan, J. and Stone, D. F. (2013) Media proliferation and partisan selective exposure. *Public Choice*, 156: 467-490.

Corneo, G. (2006) Media Capture in a Democracy: The Role of Wealth Concentration. *Journal of Public Economics*, 90(1-2): 37-58.

Coppedge et al. (2019) V-Dem Methodology v9. *Varieties of Democracy (V-Dem) Project*

Di Tella, R. and Franceschelli, I. (2011) Government Advertising and Media Coverage of Corruption Scandals. *American Economic Journal: Applied Economics*, 3(4): 119-51.

Drago, F., Nannicini, T. and Sobbrio, F. (2014) Meet the Press: How Voters and Politicians Respond to Newspapers Entry and Exit. *American Economic Journal: Applied Economics*, 6(3): 159–188.

Drufuca, S. M. (2014) Information, Media and Elections: Incentives for Media Capture. *working paper.*

Duggan, J. and Martinelli, C. (2011) A Spatial Theory of Media Slant and Voter Choice. *Review of Economic Studies*, 78(2): 640-666.

Dukes, A. (2006) Media Concentration and Consumer Product Prices. *Economic Inquiry*, 44(1): 128-141.

Durante, R. and Knight, B. (2012) Partisan Control, Media Bias and Viewer Responses: Evidence from Berlusconi's Italy. *Journal of the European Economic Association*, 10(3): 451-481.

Electronic copy available at: https://ssrn.com/abstract=3160596

Durante, R., Pinotti, P., and Tesei, A. (2019) The political legacy of entertainment TV. *American Economic Review*, 109(7): 2497-2530.

Ellman, M. and Germano, F. (2009) What do the Papers Sell? A Model of Advertising and Media Bias. *The Economic Journal*, 119: 680-704.

Enikolopov, R. and Petrova, M. (2016) Media Capture: Empirical Evidence. In *Handbook of Media Economics*, S. Andersen, D. Strömberg, J. Waldfogel (eds.), Elsevier.

Enikolopov, R., Petrova, M. and Zhuravskaya, E. (2011) Media and Political Persuasion: Evidence from Russia. *American Economic Review*, 101(7): 3253-85.

Ferraz, C. and Finan, F. (2008) Exposing corrupt politicians: the effects of Brazil's publicly released audits on electoral outcomes. *Quarterly Journal of Economics*, 123(2): 703-745.

Galvis, A. F., Snyder Jr., J. M. and Song, B. K. (2016) Newspaper Market Structure and Behavior: Partisan Coverage of Political Scandals in the United States from 1870 to 1910. *The Journal of Politics*, 78(2): 368-381.

Gambaro, M. and Puglisi, R. (2015) What do ads buy? Daily coverage of listed companies on the Italian press. *European Journal of Political Economy*, 39, 41-57.

Gehlbach, S. and Sonin, K. (2014) Government control of the media. *Journal of Public Economics*, 118, 163-171.

Gentzkow, M. and Shapiro, J. M. (2006) Media Bias and Reputation. *Journal of Political Economy*, 114(2): 280-316.

Gentzkow, M. and Shapiro, J. M. (2008) Competition and Truth in the Market for News. *Journal of Economic Perspectives*, 22(2): 133-154.

Gentzkow, M., Shapiro, J. M. and Sinkinson, M. (2011) The Effect of Newspaper Entry and Exit on Electoral Politics. *American Economic Review*, 101(7): 2980-3018.

Gentzkow, M., Shapiro, J.M. and Stone, D.F. (2016) Media Bias in the Marketplace: Theory. In *Handbook of Media Economics*, S. Andersen, D. Strömberg, J. Waldfogel (eds.), Elsevier.

Germano, F. and Meier, M. (2013) Concentration and self-censorship in commercial media. *Journal of Public Economics*, 97: 117-130.

Godes, D., Ofek, E. and Sarvary, M. (2009) Content vs. Advertising: The Impact of Competition on Media Firm Strategy. *Marketing Strategy*, 28(1): 20-35.

Hafer, C. Landa, D. and Le Bihan, P. (2017) Who owns the story? News-gathering competition and political Accountability. *working paper*.

Hamilton, J. T. (2004) *All the News That's Fit To Sell*. Princeton, Princeton University Press.

Hollifield, C. A. (2006) News Media Performance in Hypercompetitive Markets: An Extended Model of Effects. *International Journal on Media Management*, 8: 60-70.

Iloska, A. (2014) *FYR Macedonia: A large decrease in press freedom since 2008 – prevailing economic interests and increasing politicisation of the media scene*. Available from: http://www.fairpress.eu/blog/2014/07/07/macedonia-a-large-decrease-in-press-freedom-since-2008-prevailing-economic-interests-and-increasing-politicisation-of-the-media-scene/. [Accessed: 29th May 2015]

IREX (2015) *Media Sustainability Index (MSI) study for Europe and Eurasia. Executive Summary*. Availabe form: https://www.irex.org/projects/media-sustainability-index-msi [Accessed: 31st July 2015].

Kibris, O. and Kocak, K. (2020) Social Media and Press Freedom: A Global Games Approach. *working paper*.

Levy, G., Morendo de Barrida, I. and Razin, R. (2017) Persuasion and Correlation Neglect. *working paper*.

McMillan, J. and Zoido, P. (2004) How to Subvert Democracy: Montesinos in Perù. *Journal of Economic Perspectives*, 18(4): 69-92.

Electronic copy available at: https://ssrn.com/abstract=3160596

Mullainathan, S. and Shleifer, A. (2005) The Market for News. *American Economic Review*, 95(4): 1031-1053

Perego, Y. and Yuksel, S. (2018) Media competition and social disagreement. *Working paper.*

Petrova, M. (2008) Inequality and Media Capture. *Journal of Public Economics*, 92(1-2): 183-212.

Petrova, M. (2011) Newspapers and Parties: How Advertising Revenues Created an Independent Press. *American Political Science Review*, 105(4): 790-808.

Polo, M. (2005) Regulation for Pluralism in the Media Markets. *Working paper.*

Prat, A. (2018) Media Power. *Journal of Political Economy*, 126(4): 1747-1783.

Prat, A. (2018) Media Capture and Media Power. In *Handbook of Media Economics*, S. Andersen, D. Strömberg, J. Waldfogel (eds.), Elsevier.

Prat, A. and Strömberg, D. (2013) The Political Economy of Mass Media. *Working paper.*

Puglisi, R. and Snyder, J.M. (2016) Empirical Studies of Media Bias. In *Handbook of Media Economics*, S. Andersen, D. Strömberg, J. Waldfogel (eds.), Elsevier.

Reuter, J. and Zitzewitz, E. (2006) Do Ads Influence Editors? Advertising and Bias in the Financial Media. *The Quarterly Journal of Economics*, 121(1): 197–227.

Seabright, P. and von Hagen, J. (2007) *The Economic Regulation of Broadcasting Markets: Evolving Technology and Challenges for Policy.* Cambridge, Cambridge University Press.

Snyder, J. and Strömberg, D. (2010) Press Coverage and Political Accountability. *Journal of Political Economy*, 118(2): 355-408.

Strömberg, D. (2004) Mass Media Competition, Political Competition, and Public Policy. *Review of Economic Studies*, 71(1): 265-284.

Strömberg, D. (2015) Media and Politics. *Annual Review of Economics.* 7: 173-205.

Szeidl, A. and and Szucs, F. (2017) Media Capture through Favor Exchange. *Working paper.*

Tirole, J. (1986) Hierarchies and Bureaucracies: On the Role of Collusion in Organizations. *Journal of Law, Economics and Organization*, 2(2), 181-214.

Torrens, G. (2014) Optimal Regulation of the Media Industry. *Working paper.*

Vaccari, F. (2020) Direct Competition in the News Market. *Working paper.*

Vaidya, S. and Gupta, R. (2016) Corruption via Media Capture: the Effect of Competition. *Southern Economic Journal*, 82(4): 1327-1348.

`worldaudit.org` (2015) *Press freedom survey on 186 countries.* Available from: `http://www.worldaudit.org/presstable.html`. [Accessed: 29th May 2015].

Zibak, F. I. (2015) Diversity not viewed as a measure to assess media freedom in Turkey. *Today's Zaman*, 20th April. Available from: `http://www.todayszaman.com`. [Accessed: 29th May 2015].

Electronic copy available at: https://ssrn.com/abstract=3160596

Appendix A Proofs

Proof of of Lemma 1. First, let us recall that voters do not know the realization of R, but they know that it is a random variable drawn from a generic cumulative distribution function F_R.[31]

Then, by straightforward application of Bayes' rule, it is clear that the posterior of each voter after observing at least one $\tilde{s}_i = b$ must be below γ, hence informed voters choose the challenger.

When the voter observes either $\tilde{s}_i = \emptyset$ (because rationally ignorant) or $\{\tilde{s}_i\}_{i=1,...,n} = \emptyset$ (because interested), it is easy to see that the posterior is (weakly) above γ when $(1-\sigma)q \geq 0$, where σ is the probability the voter assign to the event of capture of the outlet(s) she is consuming. Again, this is always true, hence uninformed voters find optimal to confirm the incumbent. ■

Proof of Lemma 2. To characterize formally the equilibrium in the game between the politician and the outlets described by lemma 2, we follow closely the proof used in the 2001 working paper version of Besley and Prat (2006).

First of all, it is without loss of generality to order the observed vectors of transfers $\{t_i\}_{i=1,...,n}$ such that $t_1 \leq t_2 \leq ... \leq t_n$. Defining $I_i = 1$ if outlet i accepts the offer and $I_i = 0$ if she rejects it, we characterize the best response recursively.

Given I_1, I_2, ..., I_{i-1}, $I_i = 1$ if and only if

$$t_i \geq \left[\left(\frac{\alpha}{i-\sum_{j<i} I_j} + \frac{1-\alpha}{n}\right)^{\delta} - \left(\frac{1-\alpha}{n}\right)^{\delta}\right] \tag{A.1}$$

Since the left hand side (henceforth, LHS) is non-decreasing in i and the right hand side (henceforth, RHS) is non-increasing in i, there must be a $k \in [0, n]$ such that $I_i = 1$ for every $i \geq k+1$ and $I_i = 0$ otherwise.

Note that this implies $t_k < \left[\left(\frac{\alpha}{k-\sum_{j<k} I_j} + \frac{1-\alpha}{n}\right)^{\delta} - \left(\frac{1-\alpha}{n}\right)^{\delta}\right] = \left[\left(\frac{\alpha}{k} + \frac{1-\alpha}{n}\right)^{\delta} - \left(\frac{1-\alpha}{n}\right)^{\delta}\right]$ and $t_{k+1} \geq \left[\left(\frac{\alpha}{k+1} + \frac{1-\alpha}{n}\right)^{\delta} - \left(\frac{1-\alpha}{n}\right)^{\delta}\right]$. As a consequence, an outlet $i \leq k$ does not want to deviate and accept the offer because

$$t_i \leq t_k < \left[\left(\frac{\alpha}{k} + \frac{1-\alpha}{n}\right)^{\delta} - \left(\frac{1-\alpha}{n}\right)^{\delta}\right] \leq \left[\left(\frac{\alpha}{i-\sum_{j<i} I_j} + \frac{1-\alpha}{n}\right)^{\delta} - \left(\frac{1-\alpha}{n}\right)^{\delta}\right]$$

A similar type of reasoning shows that $i \geq k+1$ does not want to deviate rejecting the offer, since

$$t_i \geq t_{k+1} \geq \left[\left(\frac{\alpha}{k+1} + \frac{1-\alpha}{n}\right)^{\delta} - \left(\frac{1-\alpha}{n}\right)^{\delta}\right] = \left[\left(\frac{\alpha}{i-\sum_{j<i} I_j} + \frac{1-\alpha}{n}\right)^{\delta} - \left(\frac{1-\alpha}{n}\right)^{\delta}\right]$$

Hence, equation (A.1) describes actual best responses. Finally, note that in equilibrium $k = \lfloor (1-\lambda)\, n \rfloor$, because the incumbent does not need to capture $\lfloor (1-\lambda)\, n \rfloor$ outlets, and hence the first $\lfloor (1-\lambda)\, n \rfloor$ offers can be equal to zero. Then, the lowest positive transfer must satisfy

$$t_{k+1} \geq \left[\left(\frac{\alpha}{\lfloor (1-\lambda)\, n \rfloor + 1} + \frac{1-\alpha}{n}\right)^{\delta} - \left(\frac{1-\alpha}{n}\right)^{\delta}\right]$$

Finally, note that a strictly positive bribe to the outlets that the politician does not wish to capture is payoff equivalent (for the politician and for outlets of the same group, i.e. captured and free) in equilibrium, hence we focus on the equilibra where all the first t_k bribes are zero. It is rational for the politician to engage in media capture if the total cost is weakly lower than R. We show that there are no other pure strategy perfect Bayesian equilibria with sincere voting and in weakly undominated strategies that do not satisfy the properties of the statement. The voters' side is obvious. For the interaction between incumbent and outlets, note that there is not asymmetric information (outlets know R) and that, in equilibrium, the politician will either capture just enough outlets to win the elections or none

[31] This assumption is innocuous but it helps welfare considerations. If R was known the tie-breaking rule we assume (vote for the incumbent if indifferent) is sufficient to ensure the same equilibrium.

Electronic copy available at: https://ssrn.com/abstract=3160596

of them. Moreover, any conjecture that outlets make about other outlets' actions must be correct, in equilibrium. Hence, any outlet accepting a bribe must correctly conjecture that $\lceil \lambda n \rceil$ outlets are captured (including itself), in equilibrium. Hence, by rejecting the bribe the outlet would get $\left(\frac{\alpha}{\lfloor (1-\lambda)n \rfloor+1}+\frac{1-\alpha}{n}\right)^{\delta}$, so in order not to deviate the bribe must be at least $\bar{t}_i = \left[\left(\frac{\alpha}{\lfloor (1-\lambda)n \rfloor+1}+\frac{1-\alpha}{n}\right)^{\delta} - \left(\frac{1-\alpha}{n}\right)^{\delta}\right]$. Suppose there exists an equilibrium with capture and at least one $t_i < \bar{t}_i$. Then, outlet i would profitably deviate rejecting the bribe and publishing the news. ■

Proof of Proposition 1. To see this, it is enough to take the limit of (4) for n going to infinity. Note, however, that it is possible to rewrite K as follows:

$$\begin{aligned} K &= \lceil \lambda n \rceil \left[\left(\frac{\alpha}{\lfloor (1-\lambda)\, n \rfloor + 1} + \frac{1-\alpha}{n}\right)^{\delta} - \left(\frac{1-\alpha}{n}\right)^{\delta}\right] \\ &= \frac{\lceil \lambda n \rceil}{n}\left[n\left(\frac{\alpha}{\lfloor (1-\lambda)\, n \rfloor + 1} + \frac{1-\alpha}{n}\right)^{\delta} - n\left(\frac{1-\alpha}{n}\right)^{\delta}\right] \\ &= \frac{\lceil \lambda n \rceil}{n}\left[n\left(\frac{\alpha}{\frac{\lfloor (1-\lambda)n \rfloor + 1}{n}} + 1-\alpha\right)^{\delta}\frac{1}{n^{\delta}} - n\,(1-\alpha)^{\delta}\,\frac{1}{n^{\delta}}\right] \\ &= \frac{\lceil \lambda n \rceil}{n}\frac{1}{n^{\delta-1}}\left[\left(\frac{\alpha}{\frac{\lfloor (1-\lambda)n \rfloor}{n} + \frac{1}{n}} + 1-\alpha\right)^{\delta} - (1-\alpha)^{\delta}\right] \end{aligned}$$

To calculate $\lim_{n\to\infty} K$, we use the fact that $\lim_{n\to\infty}\frac{\lceil \lambda n \rceil}{n} = \lambda$ and $\lim_{n\to\infty}\frac{\lfloor (1-\lambda)n \rfloor}{n} = 1-\lambda$. Moreover, note that $\lim_{n\to\infty}\frac{1}{n^{\delta-1}} = 0$ when $\delta > 1$. Hence,

$$\begin{aligned} \lim_{n\to\infty} K &= \lambda 0\left[\left(\frac{\alpha}{1-\lambda+0} + 1-\alpha\right)^{\delta} - (1-\alpha)^{\delta}\right] \\ &= 0 \end{aligned}$$

■

Proof of Corollary 1. The fact that, for $\delta > 1$, media capture will be observed for sufficiently high competition follows directly from Proposition 1.

The increasing effect of n on K requires the additional constraint on δ. To see this, we treat n as a continuous variable and look at the derivative of K with respect to n, making sure that it is positive at least as long as $\lfloor (1-\lambda)\, n \rfloor = 0$, i.e. as long as the politician has to capture the whole market if he wants to stay in power. Define

$$K(n) = n\left[\left(\alpha + \frac{1-\alpha}{n}\right)^{\delta} - \left(\frac{1-\alpha}{n}\right)^{\delta}\right]$$

Taking the derivative,

$$\begin{aligned} \frac{\partial K}{\partial n} &= \left(\alpha + \frac{1-\alpha}{n}\right)^{\delta} - \left(\frac{1-\alpha}{n}\right)^{\delta} - \frac{(1-\alpha)\delta}{n}\left[\left(\alpha + \frac{1-\alpha}{n}\right)^{\delta-1} - \left(\frac{1-\alpha}{n}\right)^{\delta-1}\right] \\ &= \left(\alpha + \frac{1-\alpha}{n}\right)^{\delta}\left(1 - \frac{(1-\alpha)\delta}{\alpha n + 1 - \alpha}\right) - \left(\frac{1-\alpha}{n}\right)^{\delta}(1-\delta) \end{aligned} \tag{A.2}$$

Note that the second part of (A.2) is surely positive because $\delta > 1$. A sufficient condition for $\frac{\partial K}{\partial n} > 0$ is $1 - \frac{(1-\alpha)\delta}{\alpha n + 1 - \alpha} \geq 0$, which simplifies to $\alpha \geq \frac{\delta - 1}{n - 1 + \delta}$.

Electronic copy available at: https://ssrn.com/abstract=3160596

Suppose now that parameters are such that the condition above does not hold. Then, K is increasing in n when

$$\left(\frac{\frac{1-\alpha}{n}}{\frac{\alpha n+1-\alpha}{n}}\right)^{\delta} > \frac{\frac{(1-\alpha)\delta}{\alpha n+1-\alpha}-1}{\delta-1}$$

This simplifies to

$$\left(\frac{1-\alpha}{\alpha n+1-\alpha}\right)^{\delta} > \frac{(1-\alpha)\delta-\alpha n-1+\alpha}{(\alpha n+1-\alpha)(\delta-1)} \tag{A.3}$$

As the LHS of (A.3) is smaller than 1, it tends to 0 as δ increases. Moreover, the RHS is increasing in δ. To see this, note that

$$\begin{aligned}\frac{\partial RHS}{\partial\delta} &= \frac{(1-\alpha)(\alpha n+1-\alpha)(\delta-1)-(\alpha n+1-\alpha)\left[(1-\alpha)\delta-(\alpha n+1-\alpha)\right]}{((\alpha n+1-\alpha)(\delta-1))^2} \\ &= \frac{(\alpha n+1-\alpha)\alpha n}{((\alpha n+1-\alpha)(\delta-1))^2} > 0\end{aligned}$$

As a consequence, it is necessary to find an upper bound of δ such that (A.3) is always true. As this is analytically very complicated, we just show that, for $\delta = 2$, (A.3) is satisfied, and as a consequence it is satisfied for every $\delta \in (1, 2]$. Replacing in (A.3) we obtain:

$$\left(\frac{1-\alpha}{\alpha n+1-\alpha}\right)^{2} > \frac{(1-\alpha)-\alpha n}{(\alpha n+1-\alpha)}$$

$$\frac{(1-\alpha)^2}{\alpha n+1-\alpha} > 1-\alpha-\alpha n$$

$$(1-\alpha)^2 > (1-\alpha-\alpha n)(1-\alpha+\alpha n)$$

$$(1-\alpha)^2 > (1-\alpha)^2-(\alpha n)^2$$

that is always true.

As a consequence, for $\delta\in(1,2]$ K is strictly increasing in n as long as the politician needs to capture the whole market, and the total cost goes to zero as n increases. Hence, if R is such that capture is profitable for sufficiently low competition but it becomes too costly as n increases and the politician has to capture the whole market, then we observe a non-monotonic effect of competition on media capture. ■

Proof of Proposition 2. The result follows directly from Proposition 1 and equation (6). ■

Proof of Lemma 3.
First, by straightforward differentiation $\frac{\partial W}{\partial\gamma} = 2(1-q(1-\sigma)\gamma)+q(1-\sigma) > 0$.

The derivation of the effect of α presents some technical issues as the equilibrium total cost of capture, $K = \lceil\lambda n\rceil\left[\left(\frac{\alpha}{\lfloor(1-\lambda)n\rfloor+1}+\frac{1-\alpha}{n}\right)^{\delta}-\left(\frac{1-\alpha}{n}\right)^{\delta}\right]$, includes ceiling and floor functions and hence, recalling that $\lambda = \frac{1}{2(1-\alpha)}$, it is not continuous everywhere in α. However, we can show the following results.

First, wherever it is differentiable, $\frac{d\lceil\lambda n\rceil}{d\lambda} = \frac{d\lfloor(1-\lambda)n\rfloor}{d\lambda} = 0$. Second, for any n, λ can only weakly increase (decrease) $\lceil\lambda n\rceil$ ($\lfloor(1-\lambda)n\rfloor$). Third, K is either flat or increasing in λ, hence in α.

Finally, we can show that $\frac{\partial K}{\partial\alpha}$, i.e. the direct effect of α on K keeping λ constant, is positive. A sufficient condition is $n \geq \lfloor(1-\lambda)n\rfloor+1$, that is always true as $\lambda > \frac{1}{2}n$.

Hence, any increase in α will increase K, making capture more difficult and, as a consequence, increasing voters' welfare. ■

Electronic copy available at: https://ssrn.com/abstract=3160596

Appendix B Microfounding the profit function

As mentioned in sections 2 and 3, the relationship between outlets' profits and readership pays an important role in our results. One way of micro-founding a more generic relationship is through a two-sided market approach, where outlets are assumed to be selling contents to the readers and advertising space to a monopolist advertiser, who is interested in placing advertisements where they will reach a large audience.

The timing of the media market part of the game, that determines the shape of the profit function and hence the bribe that the politician has to pay recalls Ellman and Germano (2009),[32] is as follows.

1. Every media outlet $i \in N$ sets the price of its content, $p_i \geq 0$, achieving as a consequence a readership r_i. Interested voters/consumers are buying the content (one copy each) as long as it publishes the political news and as long as $p_i \leq \bar{p}$, where $\bar{p} \sim U[0,1]$ is a positive individual reservation price. Since these consumers/voters are interested only in the political news, and this piece of news will be the same in every outlet, they treat the m outlets as homogeneous, and hence they will all buy their copy from the outlet setting the lowest price. Rationally ignorant voters/consumers are just equally split between the outlets with the lowest price.[33]
2. Given the readership, outlets choose the unit price of advertising space, q_i.
3. Finally, the monopolist advertiser, knowing the readership and the price, chooses the quantity of advertising it wants to buy.

In this set up, every media outlet $i \in N$ derives profit from readership directly and from advertising space. Formally,

$$\pi_i = \pi_{r,i} + \pi_{a,i} \tag{B.1}$$

where $\pi_{r,i}$ and $\pi_{a,i}$ are the profits that outlet i makes from readership and from advertising space respectively. When the decision about the quantity and price of advertising is made, the readership of every outlet has already been determined, hence the (monopolist) advertiser's problem is

$$\max_{y_1,\dots,y_n} \sum_{i=1}^{n} r_i \sqrt{y_i} - \sum_{i=1}^{n} q_i y_i$$

where y_i is the quantity of advertising purchased from outlet i, r_i is the readership of that outlet (determined in stage 1) and q_i is the market price of a unit of advertising on outlet i, already chosen by each outlet i.

The justification for this objective function is found in the literature on advertising and the media market. As pointed out by Hamilton (2004), "once people are watching a program or reading a news entry, advertisers care about the chance to divert their attention to a commercial product". So, following this idea and similarly to the microfoundation of advertiser's demand in Ellman and Germano (2009), we assume that each reader/consumer's demand for the advertised good is increasing and concave in the quantity of advertising in the publication he buys.[34] In other words, the quantity of advertising space boosts the demand for the advertised good at a decreasing rate. As in Ellman and Germano (2009), the advertiser is interested in the total demand for the good, so she multiplies the individual demand determined by the quantity of advertising on outlet i by the readership of that outlet, summing across all outlets. This leads directly to the objective function. Note that, as in Dukes (2006), the objective function is additively separable in the media outlets; moreover it is linear in the readership, as in Ellman and Germano (2009) and it exhibits decreasing marginal returns in the quantity of advertisement on the same outlet as in Godes et al. (2009).[35]

[32] The idea behind this timing is that readership choices and editorial choices tend to be stable, while you can sign advertising contracts based on them. However, this timing choice is not crucial for the results of this paper.

[33] As long as this price is below their reservation price.

[34] The squared root is chosen for convenience. It is easy to see that, defining $z \in (0,1)$ the exponent on y_i, then $\delta = \frac{1}{1-z} > 1$, hence the negative limit effect of competition is always there. If $z \in (0, \frac{1}{2}]$ then the non-monotonicity in the effect of competition on media capture is always there as well.

[35] The idea is that advertisement matters in order to make the readers of a certain outlet aware of a product they may decide to buy, and the probability of a reader becoming aware of the product is increasing at a decreasing rate in the quantity of advertisement on the specific outlet.

Electronic copy available at: https://ssrn.com/abstract=3160596

The problem is concave and, from first order conditions, the inverse demand function for every outlet is given by

$$y_i = \left(\frac{r_i}{2q_i}\right)^2 \quad \forall i \in N$$

Moving now to the outlets, each one will choose q_i to maximize its profits, knowing how the market would react to its decision. As a consequence, the problem for every outlet i is:

$$\begin{aligned} &\max_{q_i} (q_i - c)\, y_i \\ &\text{s.t.} \quad y_i = \left(\frac{r_i}{2q_i}\right)^2 \end{aligned} \tag{B.2}$$

where c is the cost of hosting advertising space (in terms of foregone "useful" space in a newspaper or on a website etc.) that is strictly positive but arbitrarily small. For reasons that will be justified shortly, it is assumed $c \leq \frac{\alpha}{8}$.
Solving (B.2),

$$q_i^* = 2c$$

and

$$y_i^* = \frac{r_i^2}{16c^2}$$

So, the profits from advertising for the media outlet are given by

$$\pi_{a,i}^* = \frac{r_i^2}{16c}$$

that is strictly increasing in r_i. Note that the advertiser is also making positive profits on every outlet, since

$$\pi_{ADV,i}^* = r_i \frac{r_i}{4c} - 2c\frac{r_i^2}{16c^2} = \frac{r_i^2}{8c}$$

where $\pi_{ADV,i}^*$ is the equilibrium profit level for the advertiser on outlet i.

Going backwards to stage 1, note that outlets may, in principle, adopt a different pricing strategy depending on whether they are publishing the signal or not, hence whether they are trying to "attract" also interested readers or not. However, it is easy to note that, as long as $m \geq 2$ and $n - m \geq 2$, the standard features of a Bertrand competition apply in this setting. Every outlet will try to undercut the others in order to reach more readers. Given the zero marginal cost assumption, the only equilibrium is the one where $p_i = p_j = 0$ for $\forall \quad i, j \in N$. The readership decision is the same as above, hence the profits are a convex function of outlets' readership. In particular,

$$\pi_{i,b} = \frac{1}{16c}\left(\frac{\alpha}{m} + \frac{1-\alpha}{n}\right)^2 \quad \forall i \in I^C \quad \pi_{i,\emptyset} = \frac{1}{16c}\left(\frac{1-\alpha}{n}\right)^2 \quad \forall i \in I$$

For cases where Bertrand competition does not apply, the following lemma is sufficient for a zero price equilibrium:

Lemma B1 *If $c \leq \frac{\alpha}{8}$ then every outlet, irrespective of the market configuration and on whether they are captured or not, will find optimal to set a price equal to 0 in order to maximize the readership.*

Proof of Lemma B1. If there is one free (say i) and (at least) one captured (say j) outlet, then the captured one has the incentive to undercut the free one, since rationally ignorant voters would just pick the cheapest one. Hence, outlet i can either choose a positive price and sell in equilibrium to interested readers only, or set $p_i = 0$ getting a readership $r_i = \alpha + \frac{1-\alpha}{2}$.
If the optimal price is strictly positive, it must be the $\text{argmax}_{p_i} p_i (1 - p_i)\, \alpha + \frac{1}{16c}\left[(1 - p_i)\, \alpha\right]^2$, since she will sell to interested voters only and their demand, as a consequence of the assumption about the individual reservation price, is:

$$D(p_i) = \begin{cases} 0 & \text{if } p_i \geq 1 \\ \alpha & \text{if } p_i = 0 \\ (1 - p_i)\, \alpha & \text{if } p_i \in (0, 1) \end{cases}$$

Electronic copy available at: https://ssrn.com/abstract=3160596

Note that, after few manipulations, the objective function can be written as

$$h(p_i) := \alpha \left[\left(\frac{\alpha}{16c} - 1 \right) p_i^2 - \left(\frac{\alpha}{8c} - 1 \right) p_i + \frac{\alpha}{16c} \right] \tag{B.3}$$

so the function is quadratic in p_i. Moreover, note that $h(p_i) = 0 \, \forall p_i \geq 1$ and that $\lim_{p_i \to 0} h(p_i) = \frac{\alpha^2}{16c} < \frac{\left(\alpha + \frac{1-\alpha}{2}\right)^2}{16c}$. A necessary condition for an interior solution is the concavity of (B.3), hence $\frac{\alpha}{16c} - 1 < 0$ or $c > \frac{\alpha}{16}$. However, this is not sufficient. In fact, if $\frac{\alpha}{8c} - 1 > 0$, i.e. if $c < \frac{\alpha}{8}$, then $h(p_i)$ would reach its maximum for a $p_i < 0$, which of course is ruled out by the constraints. Hence, if $\frac{\alpha}{16} < c < \frac{\alpha}{8}$, then the only admissible solution is $p_i = 0$, since the function would be strictly decreasing for $p_i \in [0, 1)$. Moreover, note that if $c < \frac{\alpha}{16}$, then $h(p_i)$ is a convex function in $p_i \geq 0$. There are two possibilities, in this case. Either the minimum of the function is in $p_i \geq 1$ or it belongs to the interval $(0, 1)$. In the first case, $h(p_i)$ would be strictly decreasing in $(0, 1)$, and as a consequence the solution of the maximization problem is $p_i = 0$. The same is true also for the second case, since the function would be strictly convex in $[0, 1]$ and as a consequence the maximum can only be on a corner. Since $h(0) > 0 = h(1)$, then the unique solution is $p_i = 0$.
Finally, consider the case of $n = 1$. In case of capture, her objective function will be

$$h'(p_i) = p_i (1 - p_i)(1 - \alpha) + \frac{1}{16c} [(1 - p_i)(1 - \alpha)]^2$$

and, for the same argument as above, $p_i^* = 0$ if $c \leq \frac{1-\alpha}{8}$ that is greater than $\frac{\alpha}{8}$. If she publishes the signal, her objective function is

$$h''(p_i) = p_i (1 - p_i) + \frac{1}{16c} [(1 - p_i)]^2$$

and, for the same argument as above, $p_i^* = 0$ if $c \leq \frac{1}{8}$ that is greater than $\frac{\alpha}{8}$. Hence, the assumption of $c \leq \frac{\alpha}{8}$ ensures that the optimal price is 0 in every possible market configuration and irrespective of the capturing decision. ■

As proved in Lemma B1, as long as c is small enough[36] even the monopolist outlet behaves in the same way as in the "Bertrand competition" environment, and as a consequence $\pi_{r,i}^* = 0$ and $\pi_i^* = \pi_{a,i}^* = \frac{r_i^2}{16c}$ and all the rationally ignorant voters are equally divided between all the outlets.

Finally, note that many types of media outlets offer their content for free (websites, most of the TV channels, radio channels, free newspapers), deriving 100 per cent of their profits from advertising and, as pointed out by Ellman and Germano (2009), revenues from advertising account for 50-80 per cent of the total revenues of "standard" newspapers. Hence, the assumption is not far from reality.

[36]The assumption of $c \leq \frac{\alpha}{8}$ is made for simplicity, since even captured outlets have a readership and hence a pricing decision to make. Hence, for example if $n = 2$ and the politician needs to capture every outlet and the optimal outside option choice for an outlet that rejects the bribe involves a positive price, then the other one may find it optimal to impose a positive and slightly lower price. But this would affect the readership of those outlets and hence the number of readers/voters informed and so on. Hence, this assumption plays a role only when Bertrand competition does not apply.

Electronic copy available at: https://ssrn.com/abstract=3160596

Appendix C Extensions of the model

This Appendix considers several extensions of the model. In particular, section C.1 considers a model where some of the outlets do not receive the signal, i.e. there are outlets that focus on "soft news" only. Section C.2 considers a version of the main model where outlets are allowed to fabricate a signal, when they do not receive one. Finally, section C.3 considers the case of outlets *ex ante* asymmetric.

C.1 "No news" outlets

Keeping everything else unchanged, we assume that the total number of outlets is now $N = n + z$. Of those, n outlets are "news outlets", hence they receive the signal (with the same assumptions as in the main body of the paper) and z outlets are "no news outlets". They never receive the signal and focus on other issues. It is common knowledge whether outlets are n-types or z-types.

The consumption choices of voters are unchanged, hence interested voters will just be available for n-type outlets publishing the signal, while rationally ignorant voters can pick a z-type outlet as well.

We show that, basically, an increase in competition among z-type outlets is always beneficial for the bad politician. First of all, we show that, when no news outlets are sufficiently numerous, the bad politician is always re-elected without media capture.

Lemma C1 *If $z \geq \lceil \frac{1}{1-2\alpha} n \rceil$, the bad politician is re-elected without media capture.*

Proof of lemma C1.
Suppose $s = b$ and that every outlet receiving the signal chooses to publish the news. As the sequentially rational voting strategy described in lemma 1 is unchanged,[37] the politician is re-elected without capture if

$$\alpha + (1-\alpha)\frac{n}{n+z} \leq \frac{1}{2}$$

Re-arranging, this requires $z \geq \frac{1}{1-2\alpha} n$, hence the statement of the lemma. ■

Intuitively, this happens because a sufficiently high number of voters is kept uninformed even without capture.

Even if z is sufficiently small, its effect on K is always negative. Similarly to the main model, in an equilibrium with capture the bad politician can allow for a number of free outlets m^* such that

$$m^* = \left\lfloor \frac{1-2\alpha}{2(1-\alpha)}(n+z) \right\rfloor$$

Note that an increase in z makes m^* weakly bigger, and of course m^* reduces the total cost of capture, as can be seen from equation C.1.

$$K = (n - m^*)\left[\left(\frac{\alpha}{m^*+1} + \frac{1-\alpha}{n+z}\right)^{\delta} - \left(\frac{1-\alpha}{n+z}\right)^{\delta}\right] \tag{C.1}$$

Moreover, the individual bribe to be paid to captured outlets is

$$b_i = \left(\frac{\alpha}{m^*+1} + \frac{1-\alpha}{n+z}\right)^{\delta} - \left(\frac{1-\alpha}{n+z}\right)^{\delta}$$

Assuming that m^* does not change with z (this would only increase the negative effect) and using chain rule, it is clear that $\frac{\partial b_i}{\partial z} < 0$ for $\delta > 1$. Hence, even a discrete increase in z reduces the individual bribe the politician has to pay to captured outlets.

Finally, from equation (C.1) it is clear that the role of an increase in n is unchanged in this extension. Figure C1 shows how K changes for different values of z.

[37] Consumers of z-type outlets are indifferent between incumbent and challenger, hence they stick with the incumbent. A different voting strategy would just change the threshold on z that allows for no capture.

Electronic copy available at: https://ssrn.com/abstract=3160596

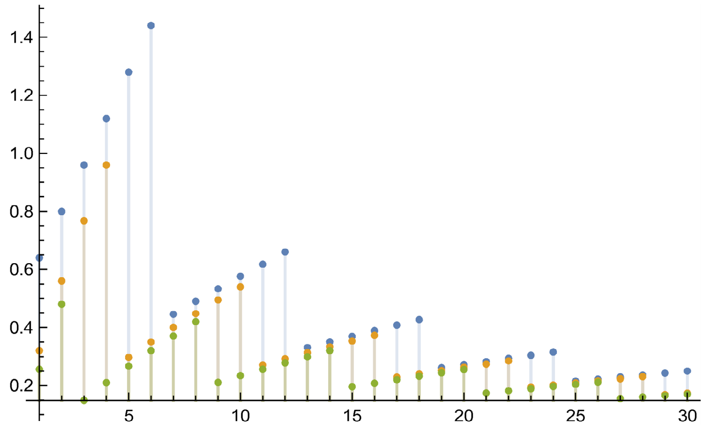

Figure C1: Plot of K for $z = 0$ (blue), $z = 2$ (yellow), $z = 4$ (green) as a function of n. Other parameters: $\delta = 2$, $\alpha = 0.4$.

C.2 News fabrication

In this section we allow for fabrication of signals. In particular, we assume that all the outlets can receive a fabricated signal $\tilde{b}$ with probability $\phi \in (0, 1)$ instead of $s = \emptyset$. An outlet receiving $s = \tilde{b}$ can publish $\tilde{s}_i = b$ and the voter cannot distinguish between true and fabricated piece of news (but of course voters are aware of the possibility that pieces of news can be fabricated).

To summarize, outlets can receive 3 realizations of the signal: $s = b$ with probability q if $\theta = b$, $s = \tilde{b}$ with probability $\phi(1 - q)$ if $\theta = b$ and with probability ϕ if $\theta = g$, $s = \emptyset$ otherwise. For tractability, we keep the assumption that all the outlets observe the same signal. As they may have an interest in doing so, both good and bad politicians can now engage in media capture. We show that, for every ϕ, there exist an equilibrium with the same characteristics.

Proposition C1 *If $\alpha < \frac{1}{2}$, for every $\phi \in (0, 1)$ there exist a symmetric pure strategy PBE where the equilibrium cost of capture is given by*

$$K = \lceil \lambda n \rceil \left[\left(\frac{\alpha}{\lfloor (1 - \lambda) n \rfloor + 1} + \frac{1 - \alpha}{n} \right)^{\delta} - \left(\frac{1 - \alpha}{n} \right)^{\delta} \right]$$

and both types of incumbent engage in media capture with the same probability.

Proof of proposition C1.
We complete the proof in several steps.
Setp 1: if voters believe both types of politician engage in capture with the same probability (i.e. $\sigma_g = \sigma_b$) and that outlets publish $\tilde{s} = b$ whenever they can, then informed voters choose the challenger and uninformed voters choose the incumbent. To see this, consider the belief updating for interested voters:

$$Pr\left(\theta = g | \text{at least one } \tilde{s}_i = b\right) = \frac{\phi(1 - \sigma_g^{'})\gamma}{\phi(1 - \sigma_g^{'})\gamma + (1 - \gamma)[q(1 - \sigma_b^{'}) + (1 - q)\phi(1 - \sigma_b^{'})]}$$

where $\sigma_\theta^{'}$ is the (conjectured) probability that a type θ incumbent engages in total capture.[38] If $\sigma_g^{'} = \sigma_b^{'}$, then

$$Pr\left(\theta = g | \text{at least one } \tilde{s}_i = b\right) < \gamma$$

because $\phi < q + (1 - q)\phi$ and

$$Pr\left(\theta = g | \{\tilde{s}_i\}_{i=1,\ldots n} = \emptyset\right) = \frac{\gamma((1 - \phi) + \phi\sigma_g^{'})}{\gamma((1 - \phi) + \phi\sigma_g^{'}) + (1 - \gamma)[(1 - q)(1 - \phi) + (q + (1 - q)\phi)\sigma_b^{'}]} > \gamma$$

[38]There are some market configurations where partial capture is off the equilibrium path. We assume that voters update in the same way in those cases as well.

Electronic copy available at: https://ssrn.com/abstract=3160596

because $q < 1$. A similar logic applies to rationally ignorant consumers using an outlet supposed to be silenced in an equilibrium with capture, as

$$Pr\left(\theta = g|\tilde{s}_i = b\right) = \frac{\phi(1-\sigma_g)\gamma}{\phi(1-\sigma_g)\gamma + (1-\gamma)[q(1-\sigma_b) + (1-q)\phi(1-\sigma_b)]} < \gamma$$

if $\sigma_g = \sigma_b$. Finally, the case of rationally ignorant consumers using an outlet supposed to be free in an equilibrium with capture (if it exists) is as follows:

$$Pr\left(\theta = g|\tilde{s}_i = b\right) = \frac{\phi\gamma}{\phi\gamma + (1-\gamma)[q + (1-q)\phi]} < \gamma$$

As a consequence, the sequentially rational re-election strategy does not change, provided that both types of incumbent behave in the same way.

Step 2. As observing $\tilde{s} = b$ is still informative, voters' consumption behaviour does not change with respect to the benchmark model. As a consequence, profit maximizing outlets will publish $\tilde{s} = b$ whenever they can.

Step 3. Given the re-election strategy below, it is straightforward to notice that both types of incumbent have exactly the same incentive structure, once they know outlets received either $s = b$ or $s = \tilde{b}$. As a consequence, the equilibrium cost of capture is the same for both types, namely

$$K = \lceil \lambda n \rceil \left[\left(\frac{\alpha}{\lfloor (1-\lambda)\, n \rfloor + 1} + \frac{1-\alpha}{n} \right)^{\delta} - \left(\frac{1-\alpha}{n} \right)^{\delta} \right]$$

and the number of outlets they need to silence is again the same as in the benchmark. Hence, $\sigma_g = \sigma_b$ and $\sigma_g^{'} = \sigma_b^{'}$ is the correct belief given the incumbent and the outlets' equilibrium strategies. ■

Intuitively, as long as falsification does not always happen and both types of incumbent are expected to behave in the same way, $\tilde{s} = b$ induces voters to choose the challenger and $\tilde{s} = \emptyset$ induces voters to confirm the incumbent. Given this, the rest of the incentives are the same as in the benchmark model, and of course profit maximizing outlets have an interest in publishing $\tilde{s} = b$ whenever they can do so or they are not silenced, and interested voters are still looking for this, as it is still informative.

Clearly, this result relies on outlets being purely profit motivated, and not caring about who is in power or the truthfulness of the stories they publish. Moreover, it requires politicians of both types to be equally willing to engage in capture. Relaxing those assumptions as well is unquestionably interesting, and we mention the need to a better understanding of media capture with ideologically motivated outlets among the avenues for further research. But we believe it goes beyond the scope of this paper.

C.3 Asymmetric outlets

The case of ex ante asymmetric outlets is complicated, as the precise effect of competition depends on how new entrants affect the readership of incumbent outlets. However, we can show that the main forces operating in the benchmark model are acting in the asymmetric case as well. For tractability, we assume $\delta = 2$ throughout this Appendix.

C.3.1 Influence of each outlet

In order to capture ex ante asymmetry, we assume that each outlet i is characterised by a parameter ω_i measuring its "influence". It is exogenously assigned and captures the relative ability of each outlet to reach out readers. Hence, if there are n outlets in the economy, $\sum_{i=1}^{n} \omega_i = 1$.

In terms of readership, reminding that I defines the set of captured outlets and I^C the set of free outlets, we have that $r_i = \omega_i(1-\alpha) \forall i \in I$ and $r_i = \alpha \frac{\omega_i}{\sum_{j \in I^C} \omega_j} + \omega_i(1-\alpha) \forall i \in I^C$. Intuitively, this means that each outlet is able to get a share of rationally ignorant voters equal to its influence, and that publishing outlets get a share of interested voters equal to their influence relative to the total influence of publishing outlets.

Electronic copy available at: https://ssrn.com/abstract=3160596

C.3.2 Cost of capture

The rest of the model is unchanged. As a consequence, capture is meaningful for the bad politician, after $s = b$, if

$$\alpha + (1-\alpha)\sum_{j\in I^C}\omega_j \leq \frac{1}{2} \tag{C.2}$$

Basically, the bad politician needs to silence outlets whose combined level of influence is sufficiently high to keep enough voters uninformed.

Moreover, the bribe that the politician has to pay to each captured outlet, as a function of its influence, is

$$b_i = \left[\left(\alpha\frac{\omega_i}{\sum_{j\in I^C}\omega_j + \omega_i} + \omega_i(1-\alpha)\right)^2 - (\omega_i(1-\alpha))^2\right] \tag{C.3}$$

As a consequence, we can claim the following proposition, that follows a very similar logic to Proposition 1 in the online appendix of Besley and Prat (2006):

Proposition C2 *There exists a pure strategy PBE with sincere voting where the minimum total cost the politician pays for media capture is*

$$K = min_I \sum_{i\in I}\left[\left(\alpha\frac{\omega_i}{\sum_{j\in I^C}\omega_j + \omega_i} + \omega_i(1-\alpha)\right)^2 - (\omega_i(1-\alpha))^2\right] \tag{C.4}$$

subject to

$$\sum_{j\in I^C}\omega_j \leq \frac{1-2\alpha}{2(1-\alpha)}$$

and $K \leq R$.

Proof of Proposition C2.
The strategies for the voters are unchanged with respect to the benchmark model.

Moving to the interaction between the incumbent and the outlets, note that in any equilibrium where it accepts a bribe outlet i must correctly conjecture that a set of outlets with combined influence $\sum_{j\in I^C}\omega_j$ (and that does not include i) publishes the signal. Hence, the bribe that compensates for the lower profits in case of silence is given by (C.3). The total cost of capture is then simply the sum of bribes for captured outlets, and the politician will choose those that minimize it (as per equation (C.4)) provided that the influence of free outlets is not too high (given by the constraint (C.2)) and that the overall cost is below office rents. ■

From the examination of (C.2), (C.3) and (C.4), it is clear that the precise effect of competition depends on how any new entrant affects the influence of all the existing outlets. However, the three forces that play a role in the benchmark model are active in this extension as well. In a nutshell,

- More competition may just increase the number of outlets to be captured, without relaxing the constraint given by (C.2);
- More competition may reduce ω_i, making individual bribes cheaper;
- More competition may relax the constraint given by (C.2), hence allowing for more/bigger free outlets and as a consequence decreasing individual bribes and, possibly, the total cost, without reducing the effectiveness of capture.

C.3.3 Analysis

A first result we can formally prove is that, in case of total capture, K is increasing in the number of outlets.

Lemma C2 *If I^C is empty, then K is strictly increasing in n.*

Electronic copy available at: https://ssrn.com/abstract=3160596

Proof of lemma C2.
From equation (C.3), when I^C is empty we can rewrite b_i as

$$\begin{aligned} b_i &= \left[(\alpha + \omega_i(1-\alpha))^2 - (\omega_i(1-\alpha))^2\right] \\ &= \alpha\left[\alpha + 2(1-\alpha)\omega_i\right] \end{aligned}$$

As a consequence,

$$\begin{aligned} K &= \sum_{i=1}^{n} b_i \\ &= \sum_{i=1}^{n} \alpha\left[\alpha + 2(1-\alpha)\omega_i\right] \\ &= \alpha\left[\sum_{i=1}^{n} \alpha + 2(1-\alpha)\sum_{i=1}^{n}\omega_i\right] \\ &= \alpha\left[n\alpha + 2(1-\alpha)\right] \end{aligned}$$

where the last line use the fact that $\sum_{i=1}^{n}\omega_i = 1$. ■

The second result we can prove is that, for any level of target influence $\sum_{i\in I^C}\omega_i$, it is cheaper to reach that amount of influence through the capture of multiple small outlets rather than through the capture of one big outlet. We define with $b_i(\omega_i)$ the bribe that has to be paid to outlet i of influence ω_i in order to silence it. Moreover, we assume that the politician wants to allow free outlets for a total influence equal to $1-\lambda$ and that there exists a set of outlets such that the exact level of influence $1-\lambda$ can be reached either by silencing outlet i letting $j = 1, ..., k$ free or by silencing outlets $j = 1, ..., k$ keeping outlet i free. For any $\sum_{j\in I^C}\omega_j = (1-\lambda)$, the bribe to outlets that have to be captured irrespective of the option of capturing the big one or many small outlets remains the same, hence we can compare the two scenarios outlined above just by comparing the bribe the politician has to pay to outlet i when $j = 1, ..., k$ are free and to outlets $j = 1, ..., k$ when outlet i is free. Lemma C3 shows that the former is higher, hence the possibility of reaching the desired influence threshold capturing many small outlets can make capture cheaper.

Lemma C3 *For any* $\sum_{j\in I^C}\omega_j = (1-\lambda)$, $b_i(\omega_i = 1-\lambda) > \sum_{j=1}^{k\geq 2} b_j(\omega_j)$.

Proof of lemma C3.
Using equation (C.3),

$$\begin{aligned} b_i(\omega_i = 1-\lambda) &= \left[\left(\alpha\frac{\omega_i}{(1-\lambda)+\omega_i} + \omega_i(1-\alpha)\right)^2 - (\omega_i(1-\alpha))^2\right] \\ &= \alpha\left(\frac{\omega_i}{(1-\lambda)+\omega_i}\right)^2(\alpha + 2(1-\alpha)(1-\lambda+\omega_i)) \end{aligned}$$

and

$$\begin{aligned} \sum_{j=1}^{k\geq 2} b_j(\omega_j) &= \sum_{j=1}^{k\geq 2}\left[\left(\alpha\frac{\omega_j}{(1-\lambda)+\omega_j} + \omega_j(1-\alpha)\right)^2 - (\omega_j(1-\alpha))^2\right] \\ &= \alpha\sum_{j=1}^{k\geq 2}\left(\frac{\omega_j}{(1-\lambda)+\omega_j}\right)^2(\alpha + 2(1-\alpha)(1-\lambda+\omega_j)) \end{aligned}$$

where obviously $\omega_j < \omega_i \forall j$ and $\sum_{j=1}^{k\geq 2}\omega_j = \omega_i$. It is also true that $\omega_i = 1-\lambda$, but we do not replace it so that the comparison is easier to follow.

Electronic copy available at: https://ssrn.com/abstract=3160596

Collecting terms, $b_i(\omega_i = 1-\lambda) > \sum_{j=1}^{k\geq 2} b_j(\omega_j)$ implies

$$(\alpha + 2(1-\alpha)(1-\lambda))\left[\left(\frac{\omega_i}{(1-\lambda)+\omega_i}\right)^2 - \sum_{j=1}^{k\geq 2}\left(\frac{\omega_j}{(1-\lambda)+\omega_j}\right)^2\right] +$$
$$+ 2(1-\alpha)\left[\left(\frac{\omega_i}{(1-\lambda)+\omega_i}\right)^2 \omega_i - \sum_{j=1}^{k\geq 2}\left(\frac{\omega_j}{(1-\lambda)+\omega_j}\right)^2 \omega_j\right] > 0$$

As both $(\alpha + 2(1-\alpha)(1-\lambda))$ and $2(1-\alpha)$ are strictly positive and $\omega_j < \omega_i \forall j$, a sufficient condition for the inequality to be true is

$$\left(\frac{\omega_i}{(1-\lambda)+\omega_i}\right)^2 \geq \sum_{j=1}^{k\geq 2}\left(\frac{\omega_j}{(1-\lambda)+\omega_j}\right)^2 \tag{C.5}$$

Suppose that the RHS of (C.5) is composed by two outlets, whose combined influence is equal to w_i. We define it Γ. In order to show that (C.5) holds, we show that shifting influence from the biggest to smaller outlets always decreases the cost.

$$\begin{aligned}\Gamma &= \left(\frac{\omega_i - \epsilon}{(1-\lambda)+\omega_i - \epsilon}\right)^2 + \left(\frac{\epsilon}{(1-\lambda)+\epsilon}\right)^2 \\ &= \left(\frac{\omega_i - \epsilon}{2\omega_i - \epsilon}\right)^2 + \left(\frac{\epsilon}{\omega_i + \epsilon}\right)^2\end{aligned}$$

We show that, $\forall \epsilon \in \left[0, \frac{1}{2}\omega_i\right]$, $\frac{\partial \Gamma}{\partial \epsilon} \leq 0$.[39]
In particular, note that

$$\frac{\partial \Gamma}{\partial \epsilon} = 2\omega_i \left(\frac{\epsilon}{(\omega_i+\epsilon)^3} - \frac{(\omega_i - \epsilon)}{(2\omega_i - \epsilon)^3}\right)$$

and

$$\frac{\partial^2 \Gamma}{\partial \epsilon^2} = 2\omega_i \left(\frac{\omega_i - 2\epsilon}{(\omega_i+\epsilon)^4} - \frac{(\omega_i - 2\epsilon)}{(2\omega_i - \epsilon)^4}\right) \geq 0$$

as $2\omega_i - \epsilon \geq \omega_i + \epsilon$ as long as $\epsilon \leq \frac{1}{2}\omega_i$.
The second derivative always positive implies that the first derivative of Γ is monotonically increasing in ϵ. Hence, it reaches its maximum when $\epsilon \longrightarrow \frac{1}{2}\omega_i$. We show that this maximum is 0, hence the first derivative is negative.

$$lim_{\epsilon \longrightarrow \frac{1}{2}\omega_i} \frac{\partial \Gamma}{\partial \epsilon} = 2\omega_i \left(\frac{\frac{\omega_i}{2}}{\left(\frac{3\omega_i}{2}\right)^3} - \frac{\frac{\omega_i}{2}}{\left(\frac{4\omega_i - \omega_i}{2}\right)^3}\right) = 0$$

Note that this result does not depend on a specific value of ω_i, nor by the fact that we assumed Γ is composed by two outlets (the same argument applies if we split outlets further). It shows that (C.5) always holds and as a consequence the statement of the lemma is true. ■

The result of lemma C3 points in the same direction as proposition 1: if competition increases the availability of smaller outlets that allow to get to the threshold, it makes capture cheaper.

Finally, the following numerical example shows that the non-monotonic effect of competition on the possibility of media capture can hold in this environment as well. Table C1 summarizes the influence of each outlet in different market configurations. Moreover, we assume $\alpha = 0.4$.

It is straightforward to note that, from 1 to 3 outlets, total capture is the only option available to a bad politician. In fact, even the outlet with the smaller possible influence is always able to inform enough voters so that the bad politician does not get re-elected. To see this, note that $\alpha + (1-\alpha)0.2 = 0.52$. However, with 4 outlets, ω_4 is sufficiently small so that the politician does not need to capture that outlet as well. But of course this also decreases the bribe for the 3 outlets that the politician still needs to capture. Table C2 summarizes those bribes and the total cost of capture that follows.

If R is between 0.65 and 0.79 we would observe capture with 1 and with 4 outlets, and free media

[39] $\epsilon > \frac{1}{2}\omega_i$ changes the labelling of the biggest outlet, hence the same argument applies but it is reversed.

Electronic copy available at: https://ssrn.com/abstract=3160596

Number of firms	1	2	3	4
ω_1	1	0.6	0.5	0.45
ω_2		0.4	0.3	0.28
ω_3			0.2	0.19
ω_4				0.08

Table C1: Distribution of influence for different number of firms

Number of firms	1	2	3	4
b_1	0.64	0.448	0.4	0.299
b_2		0.352	0.304	0.201
b_3			0.256	0.143
K	0.64	0.8	0.96	0.643

Table C2: Distribution of bribes for different number of firms

with 2 and 3 outlets.

Electronic copy available at: https://ssrn.com/abstract=3160596

Appendix D n as a real number

Figure D1 shows what happens if n is treated as a real number, rather than as a natural one. This is obviously an approximation, since n is the number of outlets and hence it is discrete by nature. However, it provides a different way of showing the non-monotonicity of K in n. It increases as long as increasing the number of outlets dominates the effect of reducing their outside options, and then it starts decreasing converging to 0 in the limit.
As a consequence, media capture occurs when there is a too small or a too large number of outlets.

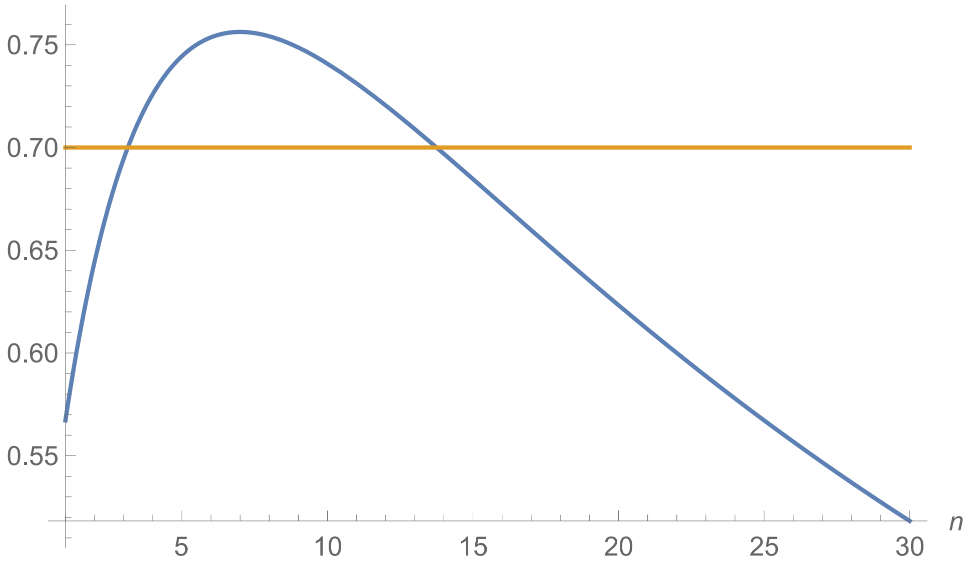

Figure D1: Plot of K (blue) and R (orange) as a function of n setting $\delta = 2$, $\alpha = 0.45$ and $R = 0.7$.

Electronic copy available at: https://ssrn.com/abstract=3160596