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Scandals, Media Competition and Political Accountability

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Scandals, Media Competition and Political Accountability

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Abstract

We present a model of a media market in which a set of news outlets compete to break news. In our model, each media receives some information on whether a politician in office is corrupt. Media outlets can decide whether to break the story immediately or wait and fact-check, taking into account that if another media breaks the news, the profit opportunity disappears. We show that as the number of competitors increases, each outlet becomes more likely to break the news without fact-checking. Therefore, as the number of media increases, the incumbent politician is more likely to be accused of corruption by the media: this makes the re-election of incumbents more difficult and increases political turnover. In particular, we show that if voters consult with higher priority the media outlets that report about a scandal, increasing the number of competitors decreases the probability of having an honest politician in office.

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1 Introduction

The news media play a fundamental role in providing political information to citizens and keeping candidates and elected officials accountable to public opinion (Strömberg, 2015). In order to fulfill their role, news media act as a filter between the information they receive from their sources and the information they transmit to the public. At the heart of this process lies what is often called fact-checking, which means verifying the claims of a source before publishing a report. A crucial question, therefore, is whether competition gives media outlets the incentive to undertake this very important task.

In this paper we show that this might not be the case: in our model, competition between media outlets crowds out fact-checking and leads to faster but more inaccurate reporting. In order to investigate what broader effects this might have on society, we introduce an electoral choice and describe how the less fact-checked information provided by the media to voters can distort the choice.

In our model, we consider a set of news outlets competing to break a news. Each media receives some information on whether a politician in office is corrupt. Media outlets can decide whether to break the story immediately or wait and fact-check. The benefit of fact-checking is to allow a media outlet to be sure about the validity of the rumour. Since publishing a fake story is costly for the media outlet [1], fact-checking therefore prevents fake scandals from making the news and affecting a reader's electoral choice. The cost of fact-checking consists in having to put the publication of a story on hold, thus giving other firms the opportunity to break the news, leaving the firm that decided to fact check with nothing.

We show that, as the number of competitors increases, each outlet becomes more likely

[1] The channel through which publishing a fake scandal is costly for a media outlet is not made endogenous in our model. Two explanations can be libel lawsuit and reputation. However, how these two channel interact with the dynamics of publication and with the number of outlets is left unanswered by our model and could be object of future research.

to break the story without fact checking. This, in turn, makes incumbent politicians increasingly likely to be accused of corruption, hurting their chances of re-election. This does not only affect corrupt incumbents, but also honest incumbents which might be ousted from office and replaced with corrupt challengers.

Interestingly, we show that if there is a *pecking order* such that whenever some media outlet reports the scandal, readers are exposed to that news (for example because they preferably buy the newspaper whose headline mentions the scandal, or because they google search for scandals involving the politician) then increasing the number of media makes it less likely for an honest politician to win the election.

The changes in the media landscape that happened in recent years, especially due to the ever growing importance of the internet, seem to well fit the conditions implied by our model for a decrease in news quality (and the resulting effect on the quality of elected politicians).

First of all, the internet has dramatically decreased the entry barriers into the news media sector: setting up a blog does not require significant capital or expertise, but gives anybody access to a potentially vast market of readers [2]. Secondly, the role of the internet and social media in the spread of news has transformed the way in which media outlets compete. In a world of around the clock news, being the first to cover an event is fundamental to increase traffic and earn through advertisements. Moreover, news of scandals travel very fast on social media. Since not reporting on a scandal does not go viral, readers are more likely to be exposed to the outlets that talk about a scandal rather than to those that don't.

In light of this, the mechanism described in our model might help interpreting the consistent decrease in the level of trust in the accuracy and fairness of media that took place in the last two decades. According to a poll by Gallup in 2017 in the United States, confidence

[2] The trend towards an increased number of media outlets is not limited to the internet: see for example Cagé (2016).

in printed newspapers stands at around 27%, whereas it is even lower for other media such as television news (24%) and internet news (16%)[3].

Moreover, our work can pose a caveat on the idea that pluralism should bolster the quality of news, which is the backbone of theories such as the *marketplace for ideas* and that is also predicted by models such as Besley and Prat (2006). In other words, whilst pluralism and competition might insure against the risk of capture by interest groups, the decrease in fact-checking might act as a countervailing effect.

1.1 Historical Evidence: Yellow Journalism

Looking at the history of journalism there are several examples of how competition can lead to a lowering of publication standards: an interesting case in point is the so called Yellow Journalism period in the United States towards the end of the nineteenth century. As the number of media outlets increased, prices decreased and competition started to be centred on circulation, especially in large cities such as New York, where entrepreneurial and ambitious media owners such as Joseph Pulitzer and William Randolph Hearst led the industry. Competition was fierce and newspapers battled to attract potential buyers on the streets with enlarged headlines mentioning sensational, scandal-ripe and often completely unsubstantiated stories [4].

Consistently with this view, Zaller (1999) underlines how the first half of the twentieth century saw both a toning down from the sensationalism and muckraking of the yellow journalism era and a dramatic fall in competition.

One of the consequences of the aggressive reporting style of the yellow journalism era can

[3] http://www.gallup.com/poll/212852/confidence-newspapers-low-rising.aspx

[4] For an account of yellow journalism and circulation war, refer for example to https://publicdomainreview.org/collections/yellow-journalism-the-fake-news-of-the-19th-century/

be found in the Spanish-American war of 1898. The newspapers led by Pulitzer and Hearst, as a matter of fact, played a decisive role in making public opinion call for a war. One of the highlights of the media campaign against Spain was the stream of accusations (mostly not backed up by evidence) following the sinking of the USS Maine ship in the Havana Harbour. As the historian Allan Keller wrote: "*Had these publishing titans not decided to slug it out toe to toe, the efforts of the downtrodden Cubans to throw off the yoke of Spanish oppression might never have burgeoned into a war between Spain and the United States*".

The story of the Spanish-American war also brings to mind the much more recent case of Iraq and the alleged weapons of mass destruction possessed by Saddam Hussein's regime; that is another important example of a competitive and pluralistic media failing to debunk a fake story, which then led to a tragic and costly war.

1.2 Selection of Related Literature

The potentially negative effects of media competition have been picked up by media scholars. This is a quote from a book by Thompson (2013): "*The pressure to run a story before one's competitors acts as an incentive to disclose information that could spark off a scandal, or which could fuel a scandal which is already underway*" [5].

From an empirical point of view, the question of what are the consequences of a more pluralistic media market has been addressed by several scholars. For example, Gentzkow et al. (2011) use a long time series of newspaper entry and exit to study its effects on political participation and electoral competition, focussing on the years 1869-1928. They

[5] In a similar way, Garrard and Newell (2006) claim that: "[...] *modern scandals are mediated, shaped to varying degrees by the priorities of those reporting them. This has rightly led some commentators to wonder whether the priorities of capitalist (even public-service) media competition have produced behaviour disfunctional for the liberal democracies that modern industrial capitalism tends to produce. [...] Whilst the latter require the spread of serious information and debate, the competitive priorities of the former, particularly mass-circulation tabloids, point increasingly to sensationalism, titillation, entertainment and trivialisation.*"

find that newspaper entry increases turnout but they find it has no significant effects on incumbency advantage. Despite not being statistically significant, their point estimates of the effect of an additional newspaper on incumbency advantage are negative, i.e. in the direction predicted by our model.

Drago et al. (2014) carry out a similar exercise with data on Italian local newspapers. They find, in line with Gentzkow et al. (2011), a positive effect of the number of newspapers on voters' participation in elections. In terms of incumbency advantage, they find an increase in the re-election probability of mayors who decide to rerun (they find no significant difference in the probability for incumbents to run for re-election). The authors claim that the positive effect on incumbency advantage is mostly due to increased incentives rather than selection: in fact, they find that an increase in the number of newspapers has no effect on the characteristics of elected officials, but it positively affects the efficiency of public policy.

Another paper addressing the effects of an increase in the number of media outlets is the above-mentioned Besley and Prat (2006). Their model shows that media pluralism decreases the risk of capture by corrupt politicians. The main idea is that as the number of media increases, a corrupt politician or interest group would have to pay monopolist profits to each outlet in order to prevent the publication of a scandal: therefore, the larger the number of media, the more expensive it is for interest groups to prevent the publication of a corruption scandal and the better for voters. Our model shows that if the concern is not capture but reporting accuracy, competition can instead be detrimental for voters welfare.

Our work is also related to Cagé (2017). Her model is based on vertical product differentiation and it shows that the effect of entry on quality depends on the heterogeneity of readers: with no heterogeneity, there is no change in quality but simply a splitting of the market, whereas with heterogeneous readers newspapers differentiate on quality in order to soften price competition. Moreover, with heterogeneity on more dimensions, duopolists reduce quality on the less heterogeneous dimension. In our model, on the other hand, readers are homogeneous, but nonetheless we get that an increase in the number of firms leads to news of lower quality. Whereas we abstract from price competition, firms compete on breaking the news, and the cost of quality is represented by increased time to publication: the increased competition on being first on a news is what leads to a decrease in quality as the number of firms increases. Finally, compared to Cage's model, our model can deal with any number of firms and not just monopoly versus duopoly.

Finally, Gratton et al. (2017) present a model of strategic leak timing which is also connected with out work. In their model, good and bad leakers (who respectively have a true or a fake piece of information on a political scandal), try to influence the outcome of an election. In their model the media is not specifically modeled, but once a leak is released, a learning process takes place, which can uncover the truth. In our model, instead, the initial leak reaches all media at the same time and we focus on the gatekeeping role of profit maximizing media outlets in deciding whether to release the information, with the objective of media being profit.

2 The Model

Consider a media market composed by N media outlets playing across 2 periods. In each period, a state of the world $\omega \in \{0, 1\}$ is independently drawn such that $Pr(\omega = 1) = p$. When the realization of the state is $\omega = 1$ there is a political scandal, whereas $\omega = 0$ means that there is no scandal. We will later addition this simple model of media competition without politicians with an electoral choice between an incumbent and a challenger in order to evaluate the effects of news reporting on elections.

With probability $q \in (0, 1]$, each media i receives an independent signal s_i about ω, distributed according to some full support density function $f_\omega(s)$ for each state of the world ω, with cumulative distribution function $F_\omega(s)$. Let $\psi(s) = \frac{f_1(s)}{f_0(s)}$ denote the likelihood ratio at s. We will assume that $\psi(s)$ is increasing in s which implies $F_1(s) > F_0(s)$ for all s (first order stochastic dominance). Notice that this assumption means that higher values of the signal are more likely in case of scandal. Furthermore, we will also assume that $\lim_{s\to+\infty}\psi(s) = +\infty$ and $\lim_{s\to-\infty}\psi(s) = 0$, so that posterior beliefs converge to 0 and 1 when s goes to $-\infty$ and $+\infty$ respectively.

After observing s_i, each media company simultaneously decides whether to publish announcing a scandal or whether to fact-check the information received with a new signal. We assume that fact-checking allows the media to receive a fully informative signal of the state of the world before deciding whether to publish the scandal or not. Medias who did not receive the signal can't neither publish nor fact-check.

The size of the media market is normalized to 1 and we assume that the revenues from publishing a scandal are equally split among the media outlets who published the scandal first. In particular, this means that the revenue from publishing a fact-checked scandal that was already published by another media outlet without fact-checking is 0.

Publishing fake scandals is costly for media because at the end of the first period, the state of the world is exogenously revealed and the media outlets that published a fake scandal are replaced by an equal number of identical ones.

In the second period, the game is repeated. We assume that the value of the market in the second period is $R > 1$. The reason for this assumption is that we think of the second period as a reduced form for all future periods in an infinitely repeated game.

3 Analysis

Let's analyze the model starting from the second period. In the second period there is no disciplining effect from the possibility of being replaced. Therefore, all media publish, no matter what the state of the world is. It follows that the utility from staying in the market in period 2, or the opportunity cost of publishing a fake scandal, is $c = \frac{R}{N}$.

Let's now move to period 1: each media infers the state of the world conditional on the signal they received using Bayesian updating. Given the prior p that there is a scandal, each media updates according to the posterior:

$$\hat{p}(s) = \frac{pf_1(s)}{pf_1(s) + (1-p)f_0(s)},$$

Lemma 1. *$\hat{p}(s)$ is increasing in s and the image of $\hat{p}$ is $(0,1)$.*

Proof. All proofs can be found in the appendix. □

Let's for a moment focus on a single media company. Denote by r_j the revenue from publishing without fact-checking conditional on the state $\omega = j$ for $j \in \{0,1\}$. Finally, let's define by $\gamma \in [0,1]$ the probability that none of the other media publish a scandal without fact checking conditional on the scandal being true. Notice that these quantities depend on the equilibrium behaviour of the media firms and will be made endogenous in the following pages. For now, assume that $R > N$, meaning that c is large enough such that $c > 1$: in other words, publishing a certainly fake news is worse than not publishing; moreover, notice that by construction $r_1 \geq \frac{1}{N}$, since at worst all media publish without fact-checking and the revenue is $\frac{1}{N}$.

Lemma 2. *When $N = 1$, the monopolist media always fact-checks the scandal. When $N > 1$, in any equilibrium a media outlet uses a strategy characterized by a cut-off point s^*,* *such that the media outlet publishes if $s > s^*$ and fact-checks otherwise.*

From the perspective of the monopolist, fact checking is always better than publishing directly, because she does not face the risk that another media publishes without fact-checking, leaving her without market revenues. On the contrary, when there are more than two firms, they have to trade-off the informational gain of fact-checking with the probability of having less revenues either because another media published without fact-checking or because if they publish after fact-checking the revenues are always split with all other media.

We still need to prove the existence of the equilibrium. In particular, let's consider a symmetric equilibrium. From the previous lemma we know that if s^* is the threshold that characterizes the equilibrium strategy of a media outlet, it has to be that $\gamma = (1 - q(1 - F_1(s^*)))^{N-1}$. Moreover, in a symmetric equilibrium, we can also rewrite the expressions of r_j as functions of s^*. In particular:

$$r_j = \sum_{k=0}^{N-1} \frac{1}{k+1} \binom{N-1}{k} (q(1 - F_j(s^*))^k (1 - q(1 - F_1(s^*)))^{N-1-k}$$

First of all, we will prove that the expected revenues of publishing increase in the threshold s^* used by the opponents. In other words, r_j is an increasing function of s^*.

Lemma 3. $r_j = \frac{1}{N} \frac{1-(1-q(1-F_j(s^*)))^N}{q(1-F_j(s^*))}$ *and r_j is strictly increasing in s^* and decreasing in q.*

The fact that r_j is strictly increasing in s^* means that the revenue from publishing without fact-checking is higher if the other media require a higher threshold for publishing. This gives the media outlet an incentive to publish without fact checking. However, a larger s^* also translates into a lower probability of direct publishing for the other media. Therefore, also fact checking becomes more profitable, since it becomes less likely that one of the competitors published without fact-checking.

Having characterized the revenues from publishing, we can go back to our equilibrium in cutoff strategies. A symmetric equilibrium requires the following fixed-point equation to hold:

$$s^* = \hat{p}^{-1}\left(\frac{c - r_0}{c - r_0 + r_1 - \frac{(1-q(1-F_1(s^*)))^{N-1}}{N}}\right).$$

Theorem 4. *The game has a unique symmetric equilibrium, in which all media outlets publish the news without fact-checking if $s > s^*$ and fact-check if $s \leq s^*$.*

The fact that $\frac{c-r_0}{c-r_0+r_1-\frac{(1-q(1-F_1(s^*)))^{N-1}}{N}}$ is decreasing in s^* means that from the perspective of an individual media outlet, higher standards in the industry (i.e. a higher s^*) mean a lower indifference point in terms $\hat{p}(s)$ to publish without fact checking. In other words, this model describes an environment in which there is an incentive to free ride on the high fact-checking standards of the media industry.

What can we say about the threshold s^* that media outlets use to decide whether to fact check or publish? A natural question concerns the amount of information that will make media indifferent between the two options. The following lemma finds sufficient conditions for $\hat{p}(s^*)$ to be larger or smaller than p. In the case of $\hat{p}(s^*) > p$, media outlets only ever report a scandal when the information they receive makes them more confident than the prior about the existence of the scandal. In other words, the bar for publication is higher than the prior. If instead $\hat{p}(s^*) < p$, there are situations in which the evidence is against the scandal but the outlet nonetheless decides to publish. Whereas we rule out *fully* fake news with the assumption that $R < N$, publishing a scandal despite evidence going against it might also be considered a (slightly milder) version of fake news.

We will see in the next section that this property is important for the welfare implications of the model.

3.1 Fact-checking and competition

So far we have proved that there is more fact checking under monopoly than when there are two or more firms competing. In the next proposition we generalize this result to an arbitrary increase in the number of firms:

Proposition 5. *Increasing the number of firms decreases fact-checking, i.e.* s^* *decreases in* N.

The intuition of the result is the following: an increase in the number of firms makes fact-checking less profitable because it increases the probability that another firm publishes without fact-checking and it also increases the number of firms to share the revenues with in case no other media publishes without fact-checking. Moreover, sharing the market with a larger number of firms decreases the value of being in the market in the second period. As a result, increasing N leads media outlets to have lower standards for publishing a scandal. This result can be seen as a caveat to the reliability of competitive markets to deliver informative and fact-based media commentary, as maintained by the proponents of the theory of the marketplace of ideas.

4 Fact-checking and Political Accountability

This section adds an electoral choice to our model of media competition in order to evaluate how media behaviour influences the choices of voters, therefore influencing whether politicians are re-elected or ousted from office[6].

There are two candidates. Each of them can be *corrupt* or *honest*, depending on whether he is involved in a scandal or not. The utility from electing a clean candidate is 1, that

[6]We focus our analysis on an electoral competition scenario but the results of this section could also be interpreted as a more general welfare analysis.

from electing a dirty one is normalized at zero. Assume that both candidates have the same ex ante quality, meaning that they have the same unconditional probability of being dirty, and for the time being let's assume that voters and media outlets assign the same prior probability to the candidate being dirty, denoted by p as in the above analysis. Moreover, let's assume that only the incumbent can be involved in a scandal newspapers can write about (for example because scandals involve their behaviour in office, or because the scandal of the incumbent will only be realized if he or she are elected). We will assume that voters are fully rational and update their prior by both reading about a scandal and not reading about a scandal (in other words, no news is good news).

In this section we will assume that readers only consult one media outlet. Since politicians are characterized by the same prior p, all that matters for the electoral choice is the direction of the update and not the size. Therefore, the electoral decision is the same independent of whether the reader consumes a fact-checked or a non-fact checked piece of news: any informative news of a scandal will lead to the dismissal of the incumbent in favour of the challenger [7] One explanation for that might be that readers do not know the timing of the leak and therefore cannot infer from the timing of publication whether the news is fact-checked or not [8].

For maximum simplicity, let's first assume that the economy is composed of only one reader [9]. The first scenario we are going to analyze is one in which the reader picks randomly one of the media outlets. The outlet can be the same or change across the two stages of the game. The question we would like to answer is whether, in this economy, more media lead to a higher or lower probability of electing an honest politician (which we sometimes denote

[7] An extension of the model with different priors p for challenger and incumbent would make the intensity of information important.

[8] A model exploring the dynamics connected to the timing of leaks is Gratton et al. (2017), in which the credibility of news depends on the timing of the release.

[9] With multiple readers, the results of this section would have to account for the probability that a majority of readers read a media publishing or not publishing the scandal in the first period. However, the intuition of the results would remain very similar.

as welfare).

As we know from the analysis in the previous section, increasing N decreases the threshold s^* that each media uses to decide whether to publish without fact checking. As a result, the reader is more likely to encounter a scandal when consulting the news media and therefore she is less likely to vote for the incumbent. This means that dirty incumbents are less likely to be re-elected, but at the same time also clean incumbents are less likely to be re-elected. The following proposition proves that the trade-off can be resolved in both ways.

Proposition 6. *When the reader selects one outlet randomly, the probability of having a clean politician in office can increase or decrease with N.*

A necessary (but not sufficient) condition for an increase in N to be welfare improving is therefore that $f_1(s^*) > f_0(s^*) + N f_1(s^*) F_1(s^*)^{N-1}$. In other words, the equilibrium threshold for publication $\hat{p}(s^*)$ has to be sufficiently larger than p, meaning that media outlets switch from fact-checking to publishing only when sufficiently bad news about the scandal arrives. From Lemma 5 we know that this can only happen if $N < (1-p)R + p$. Notice that if fact checking were not possible, the optimal threshold for publication would be exactly the one distinguishing bad news from good news, i.e. $\hat{p}(s^*) = p$. As a result, as we increase N, the probability of having fact-checking decreases (both mechanically by the increase in N and indirectly through the decrease in s^*), but at the same time the decrease in s^* might be welfare improving given the decreased probability of having fact checking.

In order to consider a case in which fact-checking is not relevant for welfare except that through s^*, let's now assume that elections are imminent and that any fact checked news will therefore necessarily arrive after the new leader has been elected. In this situation, non-fact checked news actually might serve a socially beneficial purpose, i.e. that of providing information on a scandal in time for the electoral choice, and in fact we show that increasing

N always increases welfare:

Proposition 7. *With imminent elections, increasing N increases welfare if and only if $\hat{p}(s^*) > p$.*

The intuition of this result is that if fact checking is not useful for electoral purposes, the optimal publication threshold s^* is finite. In particular, given the symmetry of the problem, a media outlet trying to maximize the voter's welfare would report the scandal if $\hat{p}(s^*) > p$ and withhold it if $\hat{p}(s^*) < p$. As we have seen from Lemma 5, market competition can make s^* lie both above and below this threshold. Therefore, when elections are imminent increasing the number of media is welfare improving if the market equilibrium makes media too reluctant to report news of a scandal.

Let's now consider a different case, in which the reader, instead of selecting a newspaper at random independently of whether it mentions the scandal or not, reads one among the outlets (if any) which published the news of the scandal. In this case, compared to the previous one, the reader never misses a non-fact checked news. This means that if the politician is corrupt, the reader always ends up knowing it, either through a non-fact checked or through a fact checked news. As a result, all corrupt leaders are voted out of office, but some clean ones are, too. The expression for welfare becomes the following:

$$1 - p^2 - p(1-p)(1 - F_0(s^*)^N)$$

From this expression, it is immediate to see that as N increases, welfare decreases, since $F_0(s^*)$ decreases.

Proposition 8. *If readers read one outlet among those (if any) which talk about the corruption scandal, then welfare decreases as N increases.*

This results tells us that as N increases, welfare increases only if the standards for publication of a scandal become stricter, i.e. s^* increases. However, we showed that what happens is exactly the opposite. The intuition for the welfare decrease is that with many media, it is more likely that one will get a high enough signal for publication. As a result, a reader will be very likely to find a scandal in the news and therefore to vote for the challenger even if the incumbent is clean.

Notice that both our welfare results point out that in the internet age, in which decreased entry barriers for media led to an increase in the number of outlets N, the resulting competitive pressure might be detrimental for welfare. The reason is that fact-checking is more likely to be election-relevant and that, at the same time, readers are more easily exposed to media mentioning a scandal (for example through social media). As a result, when evaluating the effect of the number of media on welfare, details such as the electoral relevance of fact checks and readers selection of the outlet to consult play a fundamental role.

5 Discussion

In this section we will discuss some key elements of the model and possible future extensions.

The first fundamental ingredient is the initial signal, that we assume all media receive at the same time. A particularly interesting extension of our model would be to have leaks being spread by interest groups acting strategically. For example, an interest group siding with the challenger might have the interest to spread scandals concerning the incumbent. In this extended game, leakers could have either the timing of the information (in a similar fashion as in Gratton et al. (2017)), or the number of outlets receiving the leak, or even the realization of the signal s.

Another possible extension would be to allow media outlets to invest in fact-checking (for example by employing investigative journalists). This would be reminiscent of industrial organization models of investment in the quality of products with varying degrees of competition.

The other key element of our model is the cost for publishing a fake scandal, which we consider exogenous (it might represent for example libel lawsuits). In real journalism, however, it is often up to competitors to expose as fake the scandal raised by another media outlet. Allowing for similar dynamics could be a significant addition to our model.

Finally, our political accountability results rest on the assumption that politicians have a fixed type, either honest or corrupt. However, it would be interesting to model corruption as an endogenous choice of politicians. In an environment where many fake scandals make the news, politicians might have a stronger incentive to become corrupt, as in a self-fulfilling prophecy.

6 Conclusion

This paper shows that increasing the competitive pressure to break a news can lead media outlets to be less demanding in the amount of evidence required to publish a story. In particular, we consider a case in which media outlets can accuse a politician of being involved in a scandal prior to an election: we show that when readers consult with priority one (if any) of the media talking about a scandal, then increasing the number of competitors decreases the probability of having a clean politician in office. Our results aim to pose a caveat to the claim that media pluralism always benefits democracy, suggesting that an increase in competition in the media sector might be socially damaging.

References

T. Besley and A. Prat. Handcuffs for the grabbing hand? media capture and government accountability. *The American Economic Review*, 96(3):720–736, 2006.

J. Cagé. *Saving the Media.* Harvard University Press, 2016.

J. Cagé. Media competition, information provision and political participation: Evidence from french local newspapers and elections, 1944-2014. Technical report, CEPR Discussion Papers, 2017.

F. Drago, T. Nannicini, and F. Sobbrio. Meet the press: How voters and politicians respond to newspaper entry and exit. *American Economic Journal: Applied Economics*, 6(3): 159–188, 2014.

J. Garrard and J. L. Newell. *Scandals in past and contemporary politics.* Manchester University Press, 2006.

M. Gentzkow, J. M. Shapiro, and M. Sinkinson. The effect of newspaper entry and exit on electoral politics. *The American Economic Review*, 101(7):2980–3018, 2011.

G. Gratton, R. Holden, and A. Kolotilin. When to drop a bombshell. *The Review of Economic Studies*, 85(4):2139–2172, 2017.

D. Strömberg. Economic and social impacts of the media. *Handbook of Media Economics*, 1, 2015.

J. B. Thompson. *Political scandal: Power and visability in the media age.* John Wiley & Sons, 2013.

J. Zaller. Market competition and news quality. In *Annual Meetings of the American Political Science Association, Atlanta, GA.* Citeseer, 1999.

A Proofs

Lemma 1. *$\hat{p}(s)$ is increasing in s and the image of $\hat{p}$ is $(0,1)$.*

Proof.

$$\hat{p}(s) = \frac{pf_1(s)}{pf_1(s) + (1-p)f_0(s)} = \frac{p}{p + \frac{1-p}{\psi(s)}}$$

And

$$\hat{p}'(s) = \frac{p(1-p)}{(p\psi(s) + (1-p))^2}\psi'(s) > 0$$

Finally, the image of $\hat{p}$ is the set $(0,1)$ because $\hat{p}$ is a continuous function and the $\lim_{s\to+\infty} \hat{p}(s) = 1$ and $\lim_{s\to-\infty} \hat{p}(s) = 0$. □

Lemma 2. *When $N = 1$, the monopolist media always fact-checks the scandal. When $N > 1$, in any equilibrium media uses a strategy characterized by a cut-off point s^*, such that the media publishes if $s \geq s^*$ and fact-checks otherwise.*

Proof. The pay-off from publishing the news is $\Pi_1 = \hat{p}(s)r_1 + (1-\hat{p}(s))(r_0 - c)$. The pay-off from fact-checking is $\Pi_0 = \hat{p}(s)\frac{\gamma}{N}$. The indifference point is such that $\Pi_1 = \Pi_0$ and it yields the following condition:

$$\hat{p}(s^*) = \frac{c - r_0}{c - r_0 + r_1 - \frac{\gamma}{N}}. \tag{1}$$

The right-hand-side of equation 1 is a constant bounded by 0 and 1. To see that it is higher than 0 notice that both the numerator and the denominator are positive. The numerator because by definition $r_0 \leq 1$ and $c > 1$, the denominator because $r_1 \geq \frac{1}{N} \geq \frac{\gamma}{N}$. It is lower than one because the numerator is always lower than the denominator (strictly if $N > 1$).

The left-hand-side of equation 1 is increasing in s and the range is $(0,1)$. Therefore, there always exists a unique s^* that solves the indifference condition and, in any equilibrium, media publishes the scandal if $s \geq s^*$ and fact checks otherwise. □

Lemma 3. *$r_j = \frac{1}{N}\frac{1-(1-q(1-F_j(s^*)))^N}{q(1-F_j(s^*))}$ and r_j is strictly increasing in s^* and decreasing in q..*

Proof. First recall that

$$\frac{1}{k+1}\binom{N-1}{k} = \frac{1}{k+1}\frac{(N-1)!}{k!(N-1-k)!} = \frac{1}{N}\frac{N!}{(k+1)!(N-1-k)!} = \frac{1}{N}\binom{N}{k+1}.$$

Plugging-in this identity in r_j and multiplying and dividing by $q(1-F_j(s^*))$ we get:

$$r_j = \frac{1}{N}\frac{1}{q(1-F_j(s^*))}\sum_{k=0}^{N-1}\binom{N}{k+1}(q(1-F_j(s^*)))^{k+1}(1-q(1-F_j(s^*))^{N-1-k}$$

We add and subtract $\frac{1}{N}\frac{(1-q(1-F_j(s^*)))^N}{q(1-F_j(s^*))}$ and we can now rewrite the expression as:

$$r_j = \frac{1}{N}\frac{1}{q(1-F_j(s^*))}\sum_{k=-1}^{N-1}\binom{N}{k+1}(q(1-F_j(s^*)))^{k+1}(1-q(1-F_j(s^*))^{N-1-k} - \frac{1}{N}\frac{(1-q(1-F_j(s^*)))^N}{q(1-F_j(s^*))}$$

.

Now, substituting $k = k' - 1$, we have that the summation of the previous equation is simply the sum of the probabilities of all possible events of a discrete binomial distribution which have to sum 1. Therefore we are left with

$$r_j = \frac{1}{N}\frac{1}{q(1-F_j(s^*))} - \frac{1}{N}\frac{(1-q(1-F_j(s^*)))^N}{q(1-F_j(s^*))} = \frac{1}{N}\frac{1-(1-q(1-F(s^*)))^N}{q(1-F_j(s^*))}$$

In order to show that this expression is increasing in s^* we can use the well known formula for the summation of a geometric series to get:

$$r_j = \frac{1}{N}\sum_{k=0}^{N-1}(1-q(1-F_j(s^*)))^k$$

and it is immediate to verify that this is increasing in s^*, given that for any $k \geq 0$, $F_j(s^*)$ is increasing in s^*. Moreover, it is also decreasing in q.

□

Theorem 4. *The game has a unique symmetric equilibrium, in which all media publish the news without fact-checking if $s > s^*$ and fact-check if $s \leq s^*$.*

Proof. In a symmetric equilibrium all media use the same cut-off strategy, and the following condition has to hold:

$$\hat{p}(s^*) = \frac{c - r_0}{c - r_0 + r_1 - \frac{(1-q(1-F_1(s^*)))^{N-1}}{N}} \tag{2}$$

We know that $\hat{p}(s^*)$ is strictly increasing in s^*, approaching 0 as s^* goes to $-\infty$ and approaching 1 as s^* goes to $+\infty$.

As far as the right hand side of equation 2 is concerned, we know that as s^* goes to $+\infty$, r_j and $F_j(s^*)$ go to 1. It follows that:

$$\lim_{s^* \to +\infty} \frac{c - r_0}{c - r_0 + r_1 - \frac{(1-q(1-F_1(s^*)))^{N-1}}{N}} = \frac{c-1}{c - \frac{1}{N}} < 1$$

.

If s^* goes to $-\infty$, on the other hand, $F_j(s^*)$ go to 0 and r_j goes to $\frac{1}{N}\sum_{k=0}^{N-1}(1-q)^k = \frac{1-(1-q)^N}{qN}$. It follows that:

$$\lim_{s^* \to -\infty} \frac{c - r_0}{c - r_0 + r_1 - \frac{(1-q(1-F_1(s^*)))^{N-1}}{N}} = \frac{c - \frac{1-(1-q)^N}{qN}}{c - \frac{(1-q)^{N-1}}{N}} > 0$$

.

And we can also see that $\forall N > 1$, the limit when s^* goes to $-\infty$ is greater than the limit when s^* goes to $-\infty$. This happens if and only if:

$$\frac{c-\frac{1-(1-q)^N}{qN}}{c-\frac{(1-q)^{N-1}}{N}} > \frac{c-1}{c-\frac{1}{N}}$$

We rearrange the expression and we get.

$$c\left(1+\frac{(1-q)^{N-1}}{N}-\frac{1}{N}-\frac{1-(1-q)^N}{qN}\right) > \left(\frac{(1-q)^{N-1}}{N}\right)-\left(\frac{1-(1-q)^N}{qN^2}\right)$$

Since, $c > 1$, the previous expression holds if the following also holds:

$$\left(1+\frac{(1-q)^{N-1}}{N}-\frac{1}{N}-\frac{1-(1-q)^N}{qN}\right) \geq \left(\frac{(1-q)^{N-1}}{N}\right)-\left(\frac{1-(1-q)^N}{qN^2}\right)$$

We simplify the expression and we get:

$$(1-q)^N \geq 1-qN \tag{3}$$

But it is easy to prove by induction that the inequality 3 always holds:

Base case: If $N = 1$, then the inequality 3 becomes $(1-q)^1 \geq 1-q(1)$, which trivially holds.

Inductive hypothesis: For some $N \geq 1$, $(1-q)^N \geq 1-qN$

Inductive step: Assume the inductive hypothesis is true for N. We need to show that $(1-q)^{N+1} \geq 1-q(N+1)$ but $(1-q)^{N+1} = (1-q)(1-q)^N$ and, by the inductive hypothesis, $(1-q)(1-q)^N \geq (1-q)(1-qN) = 1-q(N+1)+q^N \geq 1-q(N+1)$.

Moreover, if we rewrite the right hand side of equation 2 as:

$$\frac{1}{1+\frac{r_1-(1-q(1-F_1(s^*)))^{N-1}/N}{c-r_0}}$$

it is immediate to verify that it is continuous. Finally, we will prove that the right hand side of equation 2 is strictly decreasing. Let's focus on the ratio

$$\frac{r_1-\left(1-q(1-F_1(s^*))\right)^{N-1}/N}{c-r_0}$$

It is immediate to verify that the denominator is decreasing in s^*, since r_0 increases in s^*. As far as the numerator is concerned, we can rewrite it as

$$\frac{1}{N}\frac{1-(1-q(1-F_1(s^*)))^N}{q(1-F_1(s^*))}-\frac{1}{N}(1-q(1-F_1(s^*))^{N-1}$$

Simplifying, we get:

$$\frac{1-(1-q(1-F_1(s^*))^{N-1}}{q(1-F_1(s^*))N}=\frac{N-1}{N}\frac{1-(1-q(1-F_1(s^*))^{N-1}}{q(1-F_1(s^*))(N-1)}=\frac{N-1}{N}r_1\,(N-1)$$

Where $r_1(N-1)$ denotes the revenue when the number of media outlets is $N-1$ instead of N. Since r_1 is increasing in s^* for all N, this is also increasing in s^*. Therefore the denominator is increasing in s^* and the right hand side of equation 2 is strictly decreasing in s^*. However, since $\hat{p}$ is strictly increasing in s^* and since $\lim_{s^*\to-\infty}\hat{p}(s^*) < \lim_{s^*\to-\infty}\frac{c-r_0}{c-r_0+r_1-\frac{(1-q(1-F_1(s^*)))^{N-1}}{N}}$ and $\lim_{s^*\to+\infty}\hat{p}(s^*) > \lim_{s^*\to+\infty}\frac{c-r_0}{c-r_0+r_1-\frac{(1-q(1-F_1(s^*)))^{N-1}}{N}}$, there exists a unique s^* solving the above equation. Hence the symmetric equilibrium exists and is unique. □

Lemma 5. *In equilibrium, if $N < (1-p)R+p$, then $\hat{p}(s^*) > p$. If $p > \frac{R-1}{R}$, then $\hat{p}(s^*) < p$.*

Proof. Consider the indifference condition $\hat{p}(s^*) = \left(\frac{c-r_0}{c-r_0+r_1-\frac{F_1(s^*)^{N-1}}{N}}\right)$. The right-hand side takes values in $(\frac{c-1}{c-\frac{1}{N}}, \frac{c-1/N}{c})$ A sufficient condition for $\hat{p}(s^*) > p$ is therefore that $p < \frac{c-1}{c-\frac{1}{N}}$.

We can rewrite this as $c > \frac{1-\frac{p}{N}}{1-p}$. On the other hand, a sufficient condition for $\hat{p}(s^*) < p$ is that $p > \frac{c-1/N}{c}$, which can be rewritten as $p > \frac{R-1}{R}$. Since $c = \frac{R}{N}$, we can further rearrange to $N < (1-p)R + p$. Since by assumption $N < R$, the former always holds. It follows that the signal making media indifferent between publishing and fact checking is always such that $\hat{p}(s^*) > p$. □

Proposition 6. *Increasing the number of firms decreases fact-checking.*

Proof. Let s^* be the equilibrium threshold. Thus s^* solves the indifference condition:

$$\hat{p}(s^*) = \frac{c - r_0}{c - r_0 + r_1 - \frac{(1-q(1-F_1(s^*)))^{N-1}}{N}}$$

Now, let's keep s^* fixed. Notice that the left-hand-side of the indifference condition does not depend on N, which enters only on the right-hand side. The right-hand side of the expression can be rewritten as:

$$\left(1 + \frac{\frac{1}{N}\frac{1-(1-q(1-F_1(s^*)))^N}{q(1-F_1(s^*))} - \frac{(1-q(1-F_1(s^*)))^{N-1}}{N}}{\frac{R}{N} - \frac{1}{N}\frac{1-(1-q(1-F_0(s^*)))^N}{q(1-F_0(s^*))}}\right)^{-1} = \left(1 + \frac{\frac{1-(1-q(1-F_1(s^*)))^{N-1}}{1-F_1(s^*)}}{qR - \frac{1-(1-q(1-F_0(s^*)))^N}{1-F_0(s^*)}}\right)^{-1}$$

Let's focus on the ratio contained in this term. It is straightforward to check that, increasing N and fixing s^*, the numerator increases while the denominator decreases. Hence, the right hand side of the indifference condition decreases; therefore an increase in N, has to decrease $\hat{p}(s^*)$ and this happens only if s^* decreases. Thus, s^* is decreasing in N for all N. □

Proposition 7. *When the reader selects one outlet randomly, the probability of having a clean politician in office can increase or decrease with N.*

Proof. The probability of having a clean politician in office is $p((1 - F_1(s^*) + F_1(s^*)^N)(1 - p) + (1-p)(1-F_0(s^*))p + (1-p)F_0(s^*)$

This can be rearranged to yield:

$$W = (1-p)^2 + p(1-p)[1 - F_1(s^*) + F_1(s^*)^N + F_0(s^*)]$$

Taking the derivative with respect to N results in the following expression:

$$p(1-p)\left[-f_1(s^*) + f_0(s^*) + N f_1(s^*) F_1(s^*)^{N-1}\right] \frac{\partial s^*}{\partial N} + F_1(s^*)^N \ln F_1(s^*),$$

which is not unambiguously positive or negative. □

Proposition 8. *With imminent elections, increasing N increases welfare if and only if $\hat{p}(s^*) > p$.*

Proof. In this scenario, welfare can be expressed in the following way:

$$(1-p)^2 + p(1-p)(1 + F_0(s^*) - F_1(s^*))$$

Notice that since $F_0(s^*) \geq F_1(s^*)$ and $\lim_{s^* \to \infty} F_0(s^*) = \lim_{s^* \to \infty} F_1(s^*)$, in this case welfare is maximized when $f_0(s^*) = f_1(s^*)$. Notice that by definition of $\hat{p}$, $f_1(s^*) = f_0(s^*)$ implies that $\hat{p}(s^*) = p$. Therefore, we can use Lemma 5 to characterize sufficient conditions for $\hat{p}(s^*)$ to lie above or below p. □

Proposition 9. *If readers read one outlet among those (if any) which talk about the corruption scandal, then welfare decreases as N increases.*

Proposition 10. *When $N > R$, media outlets follow a cutoff strategy in the first stage, with s^* being the same as in the game with $N < R$. Conditional on fact-checking, media outlets always publish true scandals whereas they publish fake scandals with probability $1 - \sigma$.*

Proof. Let's start from the second stage, i.e. after fact-checking has taken place. If the scandal is true, all firms publish it. If the scandal is wrong and no firm publishes it, then each firm as the incentive to unilaterally deviate and publish it, since the monopolistic revenue 1 is larger than $\frac{R}{N}$. At the same time, if all firms were to publish the fake scandal, then it would be optimal to always publish the scandal in the first without fact-checking. It follows that media outlets must mix when the scandal is proved to be fake. Using an analogous formula to (1), where σ denotes the probability of not publishing the fake news after fact-checking, the expected revenue from publishing a fake news, given that all other media outlets use the same strategy, is $\frac{1}{N}\frac{1-\sigma^N}{1-\sigma}$. In equilibrium, this expected revenue has to equal the cost $\frac{R}{N}$. Notice that if $N > R$, there always exists a $\sigma < 1$ such that $\frac{1}{N}\frac{1-\sigma^N}{1-\sigma} = \frac{R}{N}$. To see this, rearrange the condition to get $\frac{1-\sigma^N}{1-\sigma} = R$. The left-hand side is a strictly increasing function of σ with image in $[1, N]$. As a result, there is a unique $\sigma \in (0, 1)$ such that the condition is satisfied. Let's now move to the analysis of the first stage, i.e. the decision to fact check. The only change compared to the case of $N < R$ is in the case of the news being fake. However, we just proved that the expected revenue from publishing conditional on fact-cehecking indicating that the scandal is fake is equal to zero. Therefore, the payoff for the media outlet conditional on fact-checking and the scandal being fake is the same as before. This means that the indifference condition determining s^* remains the same. In terms of existence of the equilibrium, since the indifference condition is the same, the only change concerns the limit of the right hand side $\frac{c-r_0}{c-r_0+r_1-\frac{F_1(s^*)N-1}{N}}$ as s^* goes to infinity, represented by $\frac{c-1}{c-\frac{1}{N}}$. Whereas with $N < R$ this limit is strictly positive, since $c > 1$, as N grows larger c becomes smaller than 1 and $\frac{c-1}{c-\frac{1}{N}}$ tends to $-\infty$. In other words, compared to the case of $N < R$, $\hat{p}$ at the equilibrium s^* is no longer bounded below, meaning that as N grows, the cutoff s^* grows smaller and smaller. □