Fact-Checking, Media Competition and Political Accountability *

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Abstract

We present a media market model in which a set of news outlets receive some information on whether a political scandal took place and compete to break the news. Media outlets can decide whether to break the story immediately or wait and fact-check, considering that if another outlet breaks the news, the profit opportunity disappears. We show that as competition increases, each outlet becomes more likely to publish unverified news. Finally, we embed a political agency decision into the model and we uncover a non-monotonic relationship between competition and social welfare: increasing the number of competitors is initially beneficial due to improved political accountability, but it eventually decreases welfare because of the worsening of publishing standards.

JEL Codes: D02; D4; D72; D80; L82

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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). To fulfill their role, the 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 a source's claims before reporting them. By its very nature, fact-checking takes time, and hence it delays publication: in a business crafted around the requirement of breaking news, this poses a significant trade-off. As the former New York Times editor Bill Keller put it: "The major feature of the media landscape today is the acceleration of everything. Probably the most troublesome tension is the one between the need to file immediately, because a thousand other people are filing immediately, and the time it takes to do real reporting."

With these stylized facts in mind, in this paper, we develop a simple theoretical framework to investigate how competition shapes the fact-checking behavior of media outlets and the quality of the information they provide. The main trade-off we address is, as mentioned in the Bill Keller quote above, one between speed and accuracy. Since fact-checking takes time, media outlets that decide to fact check run the risk of being preempted: if one of their competitors decides to report immediately, they end up losing the scoop. The changes in the media landscape that occurred in recent years, primarily due to the growing importance of the internet and the emergence of the so-called 24-hour news cycle, might have exacerbated this already quintessential problem of journalism.[1] What is more, the internet has dramatically decreased the entry barriers into the news media sector, and it has "leveled the playing field", making competition between traditional outlets and a vast fringe of smaller players much more symmetric than before (Zhuravskaya et al., 2020).[2,3]

[1] Another factor playing a fundamental role for the "need to file immediately" is the increasing consumption and sharing of news through social media, which increased the premium for being the first to cover a story, as shown for example by Cagé et al. (2020)

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

[3] Setting up a blog or a social media profile does not require significant capital or expertise, and it

In light of this, this paper's first contribution is to show that media competition can worsen publishing standards. The stronger media competition, the stronger the pressure for media outlets to choose speed over accuracy, leading to increasingly imprecise news. Interestingly, the driving force behind this result is the increased amount of accurate information that competition makes available. Consider a media outlet contemplating whether to fact-check a rumor or report it immediately: the larger the number of firms in the market, the greater the probability that at least one has reliable enough information leading it to report immediately. As a result, an outlet with a loose rumor also would report immediately to avoid the risk of losing the scoop.

Having studied how competition affects reporting standards, the second contribution of this paper is to analyze the overall effect of competition on the quality of the information available to citizens, and hence on social welfare. On the one hand, media competition increases the degree of monitoring to which politicians are subject and thus citizens' chances to be informed of political misbehavior. This is the celebrated *watchdog* role of media and is clearly beneficial to society. On the other hand, as we have seen, competition can also crowd out fact-checking and spark unfounded scandals that end up damaging honest politicians. The combination of these two effects is a non-monotonic relationship between media competition and political accountability.

Therefore, our results question the desirability of pluralism and competition in the media sector and propose an explanation for the consistent decrease in the level of trust in the accuracy of media observed in the last two decades.[4] In this respect, our results reflect some of the arguments presented by Shleifer (2004) about the "unethical" consequences of competition, whereas his work does not mention the media, in our model competitive pressures crowd-out a form of *ethical* behavior such as fact-checking.

allows a large number of media entrepreneurs to have access to a vast market of readers with products that sometimes are, at least at first sight, not very different from those of more established players.

[4]Gallup asks Americans for trust in media -such as newspaper, TV and radio- since 1972. Trust ranged between 68% and 72% in the 1970s and it is currently at 40%. http://news.gallup.com/poll/321116/americans-remain-distrustful-mass-media.aspx. Moreover, Park et al. (2020) show that distrust in media effect is associated with an increase in social media use.

Our paper mainly contributes to the theoretical literature on the effects of media competition.[5] One of the key channels making media competition beneficial for political accountability is presented in Besley and Prat (2006). In their model, an increase in the number of media outlets makes capture more costly: a corrupt politician or interest group would have to pay monopolist profits to each outlet to prevent the publication of a scandal. Our model, instead, shows that if the concern is not capture by interest groups but reporting accuracy, the relationship between competition and political accountability is non-monotonic.[6]

Concerning possible negative effects of media competition, a channel emphasized by the existing literature is that of slant (Mullainathan and Shleifer, 2005, Bernhardt et al., 2008, Sobbrio, 2014). Similarly, in Perego and Yuksel (2020), media informativeness decreases due to the specialization on ideological instead of valence dimensions of policy. Our paper differs from this strand of the literature since we derive the possibility of competition leading to inaccuracy in the absence of ideological considerations and without resorting to readers' heterogeneity. Moreover, whereas in models such as Mullainathan and Shleifer (2005) and Chen and Suen (2019), competition increases the overall informativeness of the media despite making each outlet less accurate, in our setup, competition can be detrimental even to an agent that had access to the reports of all media.[7]

Despite not addressing media competition, one of the key results in Kranton and McAdams (2020) has an interesting relation to ours. Namely, they show that news veracity is single-peaked in the degree of network density: this is driven by the fact that, in their model, it is readers who filter the news by deciding whether to share it through the

[5] Gentzkow and Shapiro (2008) present an excellent overview of the possible effects of media competition on the truthfulness of news, both from the supply and the demand side. However, the pressure to publish unverified news, which lies at the heart of our work, is absent from their discussion.

[6] Another model in which competition reduces the ability of governments to control the media is Gehlbach and Sonin (2014).

[7] Readers' heterogeneity is also crucial in the theoretical framework in Cagé (2020), who shows that when readers are sufficiently heterogeneous, a duopoly leads to quality differentiation in order to soften price competition. Another related paper is Long et al. (2019), who study fake news and the following debunking effort in a Hotelling model, showing that a single "public news provider" may be welfare improving.

network. Similarly, Gratton et al. (2018) model fact-checking as an exogenous process occurring after the report of a scandal. Before fact-checking occurs, receivers update their beliefs on the veracity of the report based on the timing of the report with respect to an electoral deadline. Whereas we are, to the best of our knowledge, the first to have explicitly modeled the speed-accuracy trade-off arising from the competition to break the news, meanwhile a similar trade-off has also been considered by Pant and Trombetta (2019), who focus on the reputation consequences of the timing of publishing.

Our work also speaks to the existing empirical literature studying the consequences of increasing media pluralism. Gentzkow et al. (2011) use US local newspapers data from 1869-1928 to find that newspaper entry increases turnout. Despite the result not being statistically significant, they also estimate an adverse effect of an additional newspaper on incumbency advantage, which reflects the predictions of our model.[8] Drago et al. (2014) carry out a similar exercise with data on local Italian newspapers and find a positive effect of the number of newspapers on voters' participation in elections and an increase in the reelection probability of mayors who decide to rerun. On the contrary, Cagé (2020) finds that newspaper entry decreased turnout and the number of articles, especially hard-news ones, in France. Finally, Angelucci et al. (2020) investigate the introduction of television in 1950s America and document decreases in turnout and the amount of original reporting.

2 The Model

Consider a media market composed of $N > 1$ media outlets acting across two periods. In the first period, a state of the world $\omega \in \{0, 1\}$ is drawn, with $Pr(\omega = 1) = p$. When the realization of the state is $\omega = 1$, there is a political scandal, whereas if $\omega = 0$ there is no scandal.[9] Once the state of the world is realized, each media outlet $i \in \{1, \ldots, N\}$ receives an independent signal s_i about ω. The signal is private information of each

[8] Snyder Jr and Strömberg (2010) find that increased press coverage increases the incumbency advantage, and similarly Prior (2006) finds that television increases incumbency advantage. Ansolabehere et al. (2006), on the other hand, find null effects of television on incumbency advantage.

[9] Analogously, we sometimes use the expression "the incumbent politician misbehaved" for $\omega = 1$ and "behaved honestly" for $\omega = 0$.

media outlet and can take three different values: when $s_i = f$, the media outlet receives a definitive proof of scandal (a fact), when $s_i = r$ it receives partial evidence (a rumor) and, finally, when $s_i = n$ the media receives no indication of misconduct. Let $\gamma_s^\omega \in [0,1]$ be the probability of receiving a signal $s \in \{n, r, f\}$ in each state of the world ω. We make the following restrictions on the information structure.

Assumption 1. *The probabilities* γ_s^ω *satisfy* $\gamma_f^0 = 0$, $\gamma_r^0 \leq \gamma_r^1$ *and* $\gamma_n^0 \geq \gamma_n^1$.

As a consequence of Assumption 1, the following properties hold: a fact makes the media outlet certain of the scandal, a rumor is informative of the existence of a scandal, and receiving no information of misbehavior is a signal that no scandal took place.

After observing s_i, each media outlet simultaneously decides whether to publish or fact-check. Fact-checking does not have any direct cost other than the time it takes, which forces the media outlet to delay the potential publication to the second period. If fact-checking takes place, media outlets learn the state of the world ω and all uncertainty is resolved.[10] If a media outlet reports a scandal that did not occur, it bears a cost of $c > 1$. This can be thought of as deriving from libel lawsuits, reputation losses affecting the career prospects of editors or journalists, or even "moral" costs measuring the strength of editorial standards. Notice that since $c > 1$, an outlet would never wrongfully report when knowing the truth: in other words, there is no deliberate fake news in our model.

Media outlets' objective is to maximize profits, and their source of revenue is breaking the news, that is, being the first to report about the possible scandal. We normalize the revenue from breaking the news to 1, and assume that a media outlet accrues such revenue independently of how many other outlets report, as long as the news has not been broken before. Moreover, revenues are independent of whether the scandal took place and whether reporting occurs after a rumor or a definitive proof.[11] The revenue from reporting

[10] Notice that by doing this, we are in effect stacking the deck of the model against our objective by looking at a best-case scenario in which fact-checking guarantees perfect accuracy and has no direct monetary costs, and finding that nonetheless, media do not always have the incentive to fact-check.

[11] Actually, Vosoughi et al. (2018) show that false news reach more people than the truth, but they claim that the difference may be driven by the greater average novelty of false news.

after other outlets have already broken the news is fixed at zero for exposition simplicity. We discuss and relax all these assumptions in Section 5.

The costs and revenues we just presented naturally lead to a trade-off between immediately publishing a possibly incorrect rumor and running the risk of losing the scoop if other outlets publish first. In order to focus on the behavior of media outlets observing a rumor, we assume that the firms with a fact at hand publish immediately, whereas those that received no information can neither fact-check nor publish. Regarding the first assumption, media outlets with a fact do not face any trade-off since they know that they will not incur a cost by publishing immediately. Thus, fact-checking becomes a (weakly) dominated strategy.[12] Regarding outlets that receive no information, our assumption is motivated by the fact that a story needs to be based on at least a rumor and, similarly, fact-checking requires some starting information to verify.[13]

In the next section, we present the model results using sub-game perfect Nash equilibrium in pure strategies as a solution concept. We only consider symmetric equilibria, in which all outlets with the same information behave in the same way.

3 Results

In the second period, all media outlets that decided to fact-check learn the state of the world. Given $c > 1$, media outlets do not have the incentive to report fake news deliberately, and report the scandal if and only if $\omega = 1$.

The heart of the model is the first period. Media outlets that observe a rumor ($s_i = r$) can either publish immediately of fact-check. They are uncertain on whether the scandal

[12]Notice that we could relax this assumption without changing the equilibrium behavior by adding a bonus $\beta > 0$ for outlets publishing in the first period: this could be motivated either by impatience or by the risk of the scoop losing relevance over time. Alternatively, a trembling-hand refinement would go in the same direction.

[13]Since receiving no signal is good news about the politician, the assumption that outlets without information do not report a scandal could be micro-founded.

Concerning the assumption that media without information cannot fact-check, this does not affect the equilibrium behavior but simplifies welfare analysis. We make this modeling choice to isolate the effect of fact-checking from that of the arrival of new information.

occurred or not, assigning probability $\rho = Pr[\omega = 1|r]$ to the scandal existing:

$$\rho = \frac{p\gamma_r^1}{p\gamma_r^1 + (1-p)\gamma_r^0} \tag{1}$$

At this point, it is clear that this game can have two symmetric equilibria in pure strategies, depending on the behavior of media outlets that receive a rumor. We denote as *Fact-Checking Equilibrium* the equilibrium in which the media outlets that observe a rumor fact-check and only report in the second period after learning the truth. We denote instead as *Inaccurate Equilibrium* the equilibrium where media outlets that observe a rumor report the scandal in the first period, and fact-checking does not occur.

Let us begin with the Inaccurate Equilibrium. If a media outlet believes that all other outlets will report conditional on seeing at least a rumor, the payoff for waiting until the fact-checking stage is ${\gamma_n^1}^{N-1}$. As a matter of fact, such an outlet can only break the news if the scandal exists and all other firms receive no information. Instead, the payoff from publishing immediately is $1 - c(1-\rho)$. To rule out trivial results, we focus on parameters such that this quantity is positive: this means that either the cost of misreporting is not too high or that rumors are sufficiently informative of a scandal to make reporting them profitable.

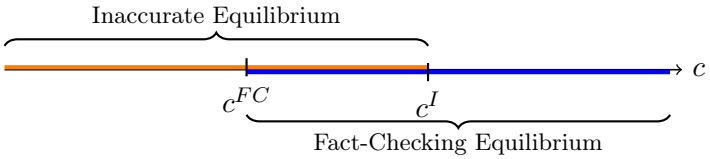
Assumption 2. *The expected profits from reporting a non-fact checked rumor are positive, that is* $1 - c(1-\rho) > 0$.

Comparing the payoffs from fact-checking and immediately publishing, we find a threshold on the cost of misreporting below which the Inaccurate Equilibrium exists:

$$c \leq c^I := 1 + \frac{\rho}{1-\rho}\left(1 - {\gamma_n^1}^{N-1}\right) \tag{2}$$

Consider now the Fact-Checking Equilibrium, in which outlets only report conditional on observing definitive proof of a scandal and fact-check otherwise. For this equilibrium to exist, a unilateral deviation by a media outlet that received a rumor must be unprofitable.

Figure 1: Existence of the Equilibria



When observing a rumor, the expected payoff of fact-checking is $\rho(1-\gamma_f^1)^{N-1}$, whereas the expected profit of immediately publishing is $1-c(1-\rho)$. Comparing these payoffs, we derive the following threshold on c, above which the Fact-Checking Equilibrium exists:

$$c \geq c^{FC} := 1 + \frac{\rho}{1-\rho}\left(1-(1-\gamma_f^1)^{N-1}\right) \tag{3}$$

The following proposition describes the equilibria of the model:

Proposition 1. *(Existence of the Fact-Checking and Innacurate equilibria)*

1. *The Fact-Checking Equilibrium exists if and only if* $c \geq c^{FC}$.

2. *The Inaccurate Equilibrium exists if and only if* $c \leq c^I$.

3. *Since* $c^{FC} < c^I$, *there always exists at least one equilibrium in pure strategies.*

As we have seen, the outcome of the game crucially depends on the value of c: for high values of the cost of misreporting, media outlets do not have the incentive to publish rumors, and the unique equilibrium is the Fact-Checking Equilibrium, whereas for low values of the cost of misreporting, fact-checking is never optimal and the unique equilibrium is the Inaccurate Equilibrium. As it is shown in Figure 1, since $c^{FC} < c^I$, there is a region of intermediate values of c in which both equilibria exist.[14]

Notice that, while the choice of characterizing the existence of the two possible equilibria based on c is intuitive, an alternative characterization is also interesting. Rearranging conditions (2) and (3) we obtain that the Fact-Checking Equilibrium exists for

[14]In addition to the two pure strategy equilibria, in this region, there is also a symmetric mixed strategy equilibrium, which we characterize in section A.1 of the Appendix.

sufficiently low values of the prior probability of a scandal p, whereas the Inaccurate Equilibrium exists for sufficiently large values of p. This has the relevant consequence that in environments where corruption is widespread, media outlets do not have the incentive to fact-check.

3.1 Market Competition and Fact-Checking

In this subsection, we study the comparative statics with respect to the number of active media outlets, which we interpret as a measure of market competitiveness.[15] The number of media outlets in the market affects the expected profits from fact-checking through the probability of preemption: in both types of equilibrium, the probability that some outlet breaks the news in the first period increases in N. Therefore, the larger is N, the stronger is the pressure to publish in the first period if a media outlet wants to enjoy the revenue from breaking the news. This leads to the following result:

Corollary 1. *There exist thresholds N^{FC} and N^{I} such that the Fact-Checking Equilibrium exists if and only if $N \leq N^{FC}$ and the Inaccurate Equilibrium exists if and only if $N \geq N^{I}$. Moreover $N^{I} < N^{FC}$.*

To summarize, as the number of media first increases, the outcome of the game switches from the Fact-Checking Equilibrium to the Inaccurate Equilibrium, with an intermediate region of values of N where both equilibria exist. The main takeaway is that an increase in competitive pressure driven by a larger number of competitors can be detrimental to publishing standards, leading media to publish unverified news instead of fact-checking. In Section 4 we analyze how this affects citizens' ability to keep the incumbent accountable. Another way to interpret the comparative statics on N is to consider how the thresholds c^{FC} and c^{I}, which characterize the existence of the Fact-Checking and the Inaccurate Equilibrium respectively, vary with N: our comparative statics result

[15] The number of media outlets can, for example, be driven by the size of the barriers to entry. The use of the number of active firms as an index of competitiveness is widespread in the media economics literature.

implies that both thresholds increase in N. Therefore, keeping the cost of misreporting fixed, the equilibrium type can switch from Fact-Checking to Inaccurate as N grows.

4 Welfare

In order to evaluate the welfare impact of media behavior, we add a representative citizen to the picture. In particular, we assume that the citizen has to take decision $d \in \{0, 1\}$ to maximize the following utility function:

$$u(\omega, d) = \begin{cases} 0 \text{ if } d = \omega \\ -e_1 \text{ if } \omega = 0 \text{ and } d = 1 \\ -e_2 \text{ if } \omega = 1 \text{ and } d = 0 \end{cases} \tag{4}$$

Although our results can have a broader interpretation, a natural way to put this decision into context is to think of an election. In this case, $d = 1$ means replacing the politician and $d = 0$ reelecting him. The parameter $e_1 > 0$ represents the cost of replacing a politician who behaved honestly (type 1 error), whereas $e_2 > 0$ represents the cost of reelecting a politician involved in a scandal (type 2 error).[16] To simplify the analysis, we normalize $e_2 = 1$, and we set $e_1 = e > 0$. Notice that in our welfare analysis, we focus entirely on the welfare of the representative citizen, disregarding the welfare of media outlets.

The citizen can only learn about the state of the world from the media outlets presented above and does so by rationally updating priors and correctly guessing media outlets' equilibrium strategies. We make the following assumptions to model how the citizen processes information from the media:

Assumption 3. *The information processing by the citizen works as follows:*

(i) As long as at least one media outlet reports the scandal, the citizen observes it.

[16] These parameters can be thought of as reduced form expressions of payoffs deriving from the future behavior of the politician in office and can depend on a wide range of environmental factors that are beyond the scope of our model.

(ii) Conditional on at least one outlet reporting the scandal, the citizen does not know how many outlets reported it.

(iii) The citizen cannot distinguish between news based on a rumor and news based on a fact.

The motivation for conditions (i) and (ii) is that once an outlet breaks the news, the information spreads quickly, for example, through social networks, so that the representative citizen always finds out. Furthermore, in this process, it is difficult to keep track of the origin of the news, and therefore the citizen is unaware of the number of outlets that have broken the news.[17]

Condition (iii) captures limited attention and the fact that newspapers often cannot reveal their sources. When this occurs, the reader can only assess the veracity of the information published guessing the "equilibrium behavior" of the media outlet. We relax this assumption in Section A.3 of the Appendix.

Our analysis focuses on environments with the natural property that absent any form of news media, the optimal decision for the citizen would be to retain the incumbent. The following restriction on prior beliefs formalizes this:

Assumption 4. *The voter would retain the politician (i.e. choose $d = 0$) under prior beliefs: that is, $p \leq (1-p)e$.*

Having established the main modeling assumptions concerning the citizen's behavior, we can now compute the expected welfare in the two pure strategy equilibria previously analyzed.

Lemma 1. *Expected welfare in the Fact-Checking Equilibrium is $W^{FC} = -p(\gamma_n^1)^N$ and expected welfare in the Inaccurate Equilibrium is $W^I = \max\{-p, -p(\gamma_n^1)^N - (1-p)(1-\gamma_n^{0N})e\}$. Moreover, when both equilibria exist, $W^I < W^{FC}$.*

[17] An alternative motivation is that, because of aggregators such as Google News, the representative citizen consults one outlet out of those that broke the news, if any of them did. Condition (ii) simplifies our analysis but does not qualitatively matter for our main welfare result.

In the Fact-Checking Equilibrium, fact-checking takes place when at least one media outlet receives some information, and media report the scandal if and only if it is verified. Therefore, the citizen is certain about the scandal's veracity when she sees that an outlet reported it: her decision is clearly to replace the incumbent. When media do not report a scandal, the citizen does not know whether some outlets received a rumor and verified that there is no scandal, or whether none of the outlets had any information. In any case, the citizen updates positively on the incumbent's honesty: following Assumption 4, a fortiori the citizen decides to retain the incumbent. In light of this, the only mistake the citizen makes when the media follow the Fact-Checking Equilibrium is when a scandal goes undetected, which requires none of the N media to receive any information.[18]

In the Inaccurate Equilibrium, the citizen always sees a scandal reported unless all media receive no information. When the citizen does not see a scandal reported, the optimal response following Assumption 1 and Assumption 4 is to retain the incumbent. On the contrary, when a scandal report is observed, the citizen can only conclude that at least one outlet received some information, but she does not know if this information was a fact or just a rumor.[19] The key question is then whether this is strong enough evidence for the citizen to replace the incumbent. If so, then the scandal-prone press characterizing the Inaccurate Equilibrium leads citizens to sometimes replace honest politicians because of fake scandals. Otherwise, the incumbent is never replaced, and we have a complete breakdown of political accountability since all scandals end up unpunished.[20]

As a result, no matter what is the optimal response of the citizen following a scandal report within the Inaccurate Equilibrium, it is clear that welfare is lower with respect to the Fact-Checking Equilibrium. The reason is that on top of the (type 2) error of an undetected scandal, the decision taken by the citizen in the Inaccurate Equilibrium features an additional source of error: either the type 1 error of replacing honest politicians

[18]Conditions (ii) and (iii) are not necessary as far as the Fact-Checking Equilibrium is concerned.

[19]This is where conditions (ii) and (iii) come into play.

[20]In this case, a legitimate question to ask is why reporting a scandal yields media outlets some revenue. One possible answer is that there is also an entertainment value to reading about a scandal, which allows media to profit but is second-order for social welfare.

following a fake rumor, or the type 2 error of not replacing a misbehaving incumbent when there is at least a rumor. Notice that the welfare ranking between the Fact-Checking and the Inaccurate Equilibrium can also be established as a consequence of the informativeness criterion introduced by Blackwell (1951).

We end this section by studying how welfare changes when competition increases. To simplify our analysis, we assume that when the welfare-dominant Fact-checking equilibrium coexists with the Inaccurate Equilibrium, the former is selected.[21]

Proposition 2. *If $N \leq N^{FC}$, welfare is always strictly increasing in N. If instead $N > N^{FC}$, there exist two thresholds $\underline{N}$ and $\bar{N}$ such that welfare is strictly increasing for $N \in (N^{FC}, \underline{N})$, strictly decreasing for $N \in (\underline{N}, \bar{N})$, and constant for $N \geq \bar{N}$.[22] Moreover, there is a discrete welfare loss at N^{FC}.*

The first part of the proposition shows that in the Fact-Checking Equilibrium, as N increases, the probability of a scandal going undetected becomes smaller, improving political accountability. This captures a fundamental rationale behind the argument that a competitive media sector is beneficial for political accountability: the larger the number of outlets, the more effective is their role as watchdogs, since it is increasingly unlikely for a scandal to go undetected. This argument is closely related to Besley and Prat (2006). In their setup, the larger the number of media, the more expensive it is for the incumbent to silence scandals.

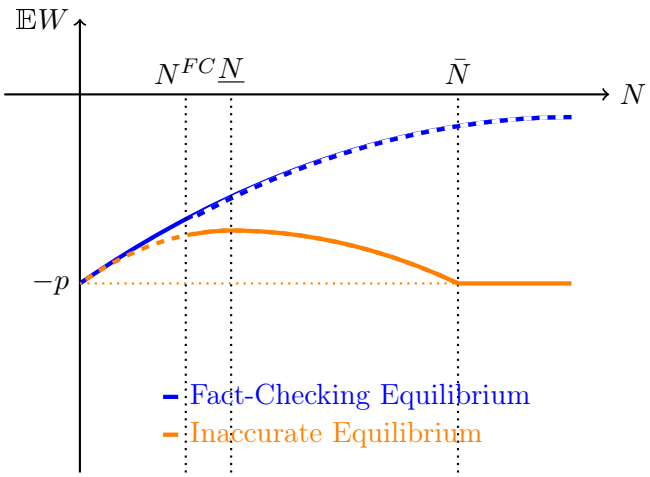
The novel contribution we add to this idea has to do with the fact that as the number of media increases, their equilibrium behavior also changes. In particular, when N hits N^{FC}, the equilibrium jumps from Fact-Checking to Inaccurate and, as we showed in Lemma 1, this jump strictly decreases welfare. Above this threshold, the effect of further increases

[21] Notice that the results would not qualitatively change if we assumed the Inaccurate Equilibrium was selected.

[22] As we explain in the proof of the proposition that can be found in Appendix B, it can be the case that $\underline{N}$ coincides with N^{FC}, making the $(N^{FC}, \underline{N})$ in which welfare in the Inaccurate Equilibrium is strictly increasing a degenerate one; similarly, it can also be the case that N^{FC} coincides with both $\underline{N}$ and $\bar{N}$, making both intervals $(N^{FC}, \underline{N})$ and $(\underline{N}, \bar{N})$, in which welfare in the Inaccurate equilibrium is respectively strictly decreasing and strictly increasing, degenerate ones. In the latter case, welfare is constant and equal to $-p$ for all $N > N^{FC}$.

in competition is ambiguous, as it depends on the trade-off between type 1 and type 2 errors within the Inaccurate Equilibrium. For example, suppose N^{FC} is sufficiently low: in that case, there can be an interval of values of N for which an increase of the number of media outlets increases welfare also within the Inaccurate Equilibrium, due to the reduction of type 2 errors: even if no fact-checking takes place, greater competition leads to an increased probability that, if a scandal exists, it reaches the news. At the same time, however, an increase in N makes the publication of a scandal less and less informative of the fact that a scandal actually took place, increasing type 1 errors and eventually decreasing expected welfare. The inverse U-shape of the Inaccurate Equilibrium welfare in Figure 2 captures this trade-off. Finally, when N is high enough, the probability of a wrongful scandal report is so high that the representative voter's optimal response is to never replace the politician, thus avoiding type 1 errors altogether.

Figure 2: Welfare and Market Competition



Note: The dashed part of each curve indicate the welfare of each strategy profile when it is not played in equilibrium.

The previous proposition also sheds light on which media markets incumbent politicians prefer. In particular, when $N < \bar{N}$, the probability of reelection of a corrupt politician is decreasing in the number of media outlets: this follows from the fact that increasing the number of media outlets makes it more likely for some of them to report

the scandal, leading to the replacement of the incumbent. However, if the number of outlets exceeds $\bar{N}$, the informativeness of their reports is not sufficient for the replacement of the incumbent. In this case, the voter always reelects the incumbent politician. Thus, a corrupt incumbent strictly prefers a media landscape with a number of outlets large enough for political accountability to break down. Notice that, while an honest incumbent politician would also be reelected in such a landscape, such an incumbent is also guaranteed reelection when $N < N^{FC}$.

5 Discussion of the Model

This model contains several assumptions that allow us to focus on the key forces driving our results and contribute to making a potentially very complex environment tractable to analyze. This section aims to convince the reader that our results can, to a good extent, be generalized.

5.1 Media Market

No revenue splitting: The assumption of no revenue splitting enables us to isolate the role of preemption in media competition. Moreover, this allows our simple two-stage model to capture the dynamics of richer setups where it is unlikely for multiple outlets to publish precisely at the same time. This is especially true in a world characterized by the 24-hour news cycle such as that of today. As a matter of fact, our model is qualitatively equivalent to a setup in which revenue is split between outlets that publish simultaneously, but in which media outlets sequentially draw signals.[23] In such a model, the probability that media report simultaneously would be zero.

Nevertheless, it is worth noting that our model is, to a good extent, robust to allowing for revenue splitting in the case of multiple outlets publishing at the same time. In particular, the characterization of the Fact-Checking and Inaccurate Equilibria does not

[23] In order for the equivalence to be exact, two further assumptions are necessary: the first is that each outlet acts as if they were the first to be called; the second is that fact-checking preserves the order of the sequence.

qualitatively change. The only caveat concerns the comparative statics with respect to N: as the number of outlets N grows large, the comparison between the fixed cost of misreporting and the smaller and smaller share of revenue captured by each outlet given market splitting makes publishing rumors less and less profitable, eventually causing fact-checking to prevail. For low values of N, however, the model predictions on the effects of competition go through.[24]

Fixed cost of misreporting: If misreporting costs represent non-monetary considerations related to the ethics of journalism, for example, the assumption of fixed costs is natural. The same is true if the cost c represents the net present value of the expected losses from libel lawsuits. Another possibility is that costs represent the risk for a journalist to be fired or demoted once the misreporting is revealed. As long as the probability of sanctioning does not depend on competition, the assumption of a fixed cost seems very reasonable also in this case. Whereas we do not directly relax the assumption of fixed misreporting costs, in Section A.2 of the Appendix, we pursue a related extension by allowing media outlets to earn extra revenue for "exposing" or debunking false news. If this revenue is sufficiently large, an increase in competition discourages media outlets from following the Inaccurate Equilibrium. Nevertheless, Henry et al. (2020) show that news debunking false stories are less likely to be shared than false news, suggesting that this revenue can be safely expected to be relatively small.

5.2 Information Processing

We will now discuss the three conditions making up Assumption 3 about the information processing of our representative voter. The motivation behind condition (i) is that information on scandals usually travels fast, especially in a world dominated by social networks. Moreover, our model concerns scandals with the potential of costing an incumbent

[24]Notice that if misreporting costs were proportional to $\frac{1}{N}$, which would be the case if, for example, they represented profits from repeated interactions of the game, then our results would completely go through even with market splitting.

their reelection, and hence likely to be known by all voters.[25]

The non-monotonicity of social welfare with respect to competition is robust to relaxing condition (ii), that is the fact that the citizen is not aware of how many outlets reported a scandal: in the extreme case of the citizen knowing whether each media outlet reported or not, welfare in the Inaccurate Equilibrium is strictly lower than in the Fact-Checking Equilibrium for a given N, but it converges back to that of the Fact-Checking Equilibrium as N goes to infinity. Whereas this does not affect the downward jump in welfare when the equilibrium switches, it affects the comparative statics with respect to N. In particular, for any given N, a sufficiently large increase in the number of media outlets is welfare improving, unlike in the baseline model.

Finally, concerning condition (iii), if the reader preferred fact-based news to rumor-based news and she could distinguish the two types of news, the equilibrium characterization is preserved but the Fact-Checking Equilibrium exists for a broader set of parameters, whereas the Inaccurate Equilibrium is only sustained in a narrower set. Similarly, the effect of competition does not change as long as the number of firms is not too large.[26]

6 Conclusion

This paper shows that an increasing competitive pressure can lead media outlets to adopt worse reporting standards and publish non-verified news. The reason why competition crowds out fact-checking is that the time required to verify a rumor or an uncertain piece of evidence exposes a media outlet to the risk of preemption, that is, the risk that other outlets break the news first.

Our results concerning the behavior of media in a competitive market tell a cautionary tale with regards to the widespread perception that competition and pluralism are beneficial for political accountability: whereas for a given media accuracy, an increase in media

[25] In the absence of condition (i), the negative impact of competition on welfare would be even more severe. In the extreme case where the voter consults a randomly drawn outlet (or a fixed number of media outlets), there would be no upside from competition, but only the loss resulting from the switch from the Fact-Checking to the Inaccurate Equilibrium.

[26] All the details can be found in section A.3 of the Appendix.

competition is socially beneficial, since it increases the probability of exposing political misbehavior, such positive effects can be more than offset by the worsening of reporting standards. In particular, our model delivers the realistic prediction that a highly competitive media sector becomes more scandal-prone, a tendency for which there is evidence in the works of media scholars such as Thompson (2013), who writes: "*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*".[27] One of the key findings of our model is that by reporting unverified scandals, a competitive media sector inefficiently damages honest politicians. What is more, the deterioration of editorial standards can be so severe as to lead to a "breakdown of accountability", in which the informativeness of the media is so low that politicians are not punished following the publication of a scandal.

An avenue for future research is to investigate the conditions necessary to restore the beneficial effect of media competition. As we already hinted in Section 5, an implicit takeaway of our analysis is that competition increases the level of readers' attention and sophistication required for media to be effective in keeping politicians accountable.

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[27] Similarly, 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 behavior dysfunctional for the liberal democracies that modern industrial capitalism tends to produce. [...] Whilst the latter requires 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.*"

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A Additional Results

A.1 Equilibrium in mixed strategies

For the symmetric equilibrium in mixed strategies to exist, media outlets need to be indifferent between reporting immediately and fact-checking. Denoting by σ the probability that each media outlet fact-checks conditional on receiving a rumor, the payoff from fact-checking can be written as:

$$p \sum_{k=0}^{N-1} \binom{N-1}{k} (\gamma_r^1)^k (\gamma_n^1)^{N-1-k} \sigma^k \tag{5}$$

Equating expression 5 with the payoff from reporting the rumor, which is $1-(1-\rho)c$, yields a polynomial expression the solution of which is the equilibrium σ.

$$1-(1-\rho)c = p \sum_{k=0}^{N-1} \binom{N-1}{k} (\gamma_r^1)^k (\gamma_n^1)^{N-1-k} \sigma^k \tag{6}$$

To see that a solution exists, consider first $\sigma = 0$: in that case, the right-hand side of condition (6) becomes $p(\gamma_n^1)^{N-1}$, which intuitively is the same payoff for fact-checking in the Inaccurate Equilibrium. Analogously, for $\sigma = 1$ we obtain the payoff from fact-checking in the Fact-Checking equilibrium, i.e. $(1-\gamma_f^1)^{N-1}$. Given that the right-hand side of condition (6) is monotonically increasing in σ, whenever $1-(1-\rho)c < p(1-\gamma_f^1)^{N-1}$ and $1-(1-\rho)c > p(\gamma_n^1)^{N-1}$, that is when both the Fact-Checking and the Inaccurate Equilibrium exist, there exists a unique σ such that condition (6) is satisfied with equality.

A.2 Debunking fake news in the second period

This section discusses how our results change if media receive an extra revenue $b > 0$ for debunking false news published in the first period.[28] Notice that the Fact-Checking Equilibrium is not affected by this change with respect to the baseline model, because false news are never published in the first stage anyway. Nevertheless, debunking can change the necessary conditions for the existence of the Inaccurate Equilibrium. In particular,

[28] A related modelling assumption would be that the cost of misreporting is contingent on the false news being debunked by another media in the second period.

when a media receives a rumor in the first stage, allowing for debunking modifies the expected payoff of fact-checking. If the outlet believes that all other firms report conditional on at least seeing the rumor, the payoff for waiting until the fact-checking stage is $\rho {\gamma_n^1}^{N-1} + (1-\rho)\left(1 - {\gamma_n^0}^{N-1}\right) b$. The condition for the existence of the Inaccurate Equilibrium becomes, therefore:

$$1 - c(1-\rho) \geq \rho {\gamma_n^1}^{N-1} + (1-\rho)\left(1 - {\gamma_n^0}^{N-1}\right) b \tag{7}$$

Rearranging the terms we get:

$$c \leq c_d^I := c^I - (1-\rho)\left(1 - {\gamma_n^0}^{N-1}\right) b \tag{8}$$

First, notice that when b is large enough, the existence of an equilibrium in pure strategies is not guaranteed, since c_d^I might fall below c^{FC}, leaving an interval of values where neither the Fact-Checking nor the Inaccurate Equilibrium exist.[29] An interesting difference with the baseline model is that, while an increase in N always increases c^I in the baseline model, the effect on c_d^I in the model with debunking is ambiguous and depends on the revenue b and the prior probability of a scandal p. The intuition is the following: on the one hand, when the scandal occurred, an increase in competition makes fact-checking less profitable since it is more likely that some other media reported immediately (this is the same force behind the comparative statics on c^I in the baseline model). On the other hand, when the scandal did not occur, a larger N increases fact-checking returns, since it increases the probability that an outlet reported a wrong scandal in the first stage. Therefore, whereas the effects of competition are unchanged with respect to our baseline model for small b and large enough p, for large enough b and small enough p an increase in competition can provide more incentives to fact-check, decreasing the threshold on costs above which the Inaccurate Equilibrium ceases to exist.[30]

[29] More precisely, existence requires $c^{FC} \leq c_d^I$, which holds if and only if $b \leq \frac{\rho}{1-\rho} \frac{\left(1-\gamma_f^1\right)^{N-1} - {\gamma_n^1}^{N-1}}{1-{\gamma_n^0}^{N-1}}$.

[30] Notice that qualitatively analogous results would arise from a "mirror" scenario in which debunking is costly for the outlets who are exposed and neutral for the outlets that carry out the debunking. These

A.3 Distinguishing Rumors from Verified News

In this section, we relax the assumption that readers are unable to distinguish whether a media outlet published a rumor or a verified piece of news. To do that, we amend the model by assuming that when both types of news are published in the first period, media outlets that published verified news receive the revenue of 1, whereas media outlets that published a rumor get a smaller revenue $r < 1$. The reason for this is that keeping the topic (i.e. the potential scandal) fixed, readers consider verified news as superior to the rumor, since it involves the same message plus an additional seal of truthfulness.[31]

Therefore, in this modified model, a media outlet publishing a rumor only gets the full revenue when no other outlet has proof of the scandal. Suppose that media outlets play the Fact-Checking Equilibrium. If the scandal exists, then an outlet publishing a rumor obtains a revenue of 1 if none of the other media outlets received (and published) the fact and receives r otherwise. Suppose instead that the scandal does not exist. In that case, Assumption 1 implies that a media outlet publishing the rumor is guaranteed the full revenue of 1: however, this gets more than offset by the cost of misreporting c. As a result, in the modified model, the Fact-Checking Equilibrium exists if the following condition is satisfied:

$$c \geq c_r^{FC} := 1 + r\frac{\rho}{1-\rho}(1-(1-\gamma_f^1)^{N-1}) = c^{FC} - (1-r)\frac{\rho}{1-\rho}(1-(1-\gamma_f^1)^{N-1})) \quad (9)$$

Notice that $c_r^{FC} < c^{FC}$: that is, when readers prefer fact-based news over rumor-based news, the Fact-Checking Equilibrium exists for a broader set of parameters than in the baseline setup with no ability to distinguish the two.[32]

Consider now the Inaccurate Equilibrium. In the modified model, the threshold for

two alternative ways to present this extension could also be combined, but for ease of exposition, we chose to present the cleaner version considering only the revenue for debunking.

[31] Implicitly, we assume that the rumor does not contain elements with higher entertainment value compared to the verified news.

[32] For completeness, notice that in the extreme case where $r = 0$, the threshold c_r^{FC} is equal to 1: in other words, the Fact-Checking Equilibrium always exists.

its existence (condition (13) in the main body of the paper) becomes the following:

$$c \leq c_r^I := 1+\frac{\rho}{1-\rho}\left(r+(1-r)(1-\gamma_f^1)^{N-1}-(\gamma_n^1)^{N-1}\right) = c^I-(1-r)\frac{\rho}{1-\rho}[1-(1-\gamma_f^1)^{N-1}] \tag{10}$$

Notice that as in the baseline model, $c_r^{FC} < c_r^I$. Moreover, analogously to the Fact-Checking Equilibrium case, $c_r^I < c^I$, meaning that the Inaccurate Equilibrium is less likely to exist in the model with readers capable of telling verified news apart from rumors.[33]

To sum up, we have shown that if readers can distinguish verified news from rumors, the Fact-Checking Equilibrium is the outcome of the game for a more extensive set of parameters. In particular, for a given cost of misreporting c, the equilibrium might switch from Inaccurate to Fact-Checking if voters become able to distinguish facts from rumors. Interestingly, notice from conditions (9) and (10) that the thresholds c^{FC} and C^I for the existence of the Fact-Checking and the Inaccurate Equilibrium are shifted to the left by the same amount.

Consider now the second part of our main result: the comparative statics with respect to competition. As far as the Fact-Checking Equilibrium is concerned, analogously to what happens in the baseline model, an increase in N leads to an increase in the threshold c_r^{FC}. The intuition is that as long as $r > 0$, an increase in N always reduces the expected revenues of fact-checking more than those of publishing immediately. However, the same cannot be said for the Inaccurate Equilibrium threshold c_r^I: unlike in the baseline model, the effect of an increase in N on c_r^I is now ambiguous, meaning that competition can eventually decrease the level of costs above which the Inaccurate Equilibrium stops existing. In particular, this happens when the number of competitors is above the

[33] Taking r to the extreme value of 0, the Inaccurate Equilibrium still exists for $c \leq 1+\frac{\rho}{1-\rho}[(1-\gamma_f^1)^{N-1}-(\gamma_n^1)^{N-1}]$. The intuition is that even if a media outlet can only profit when no other outlet has a fact, there are values of c such that it is profitable to publish a rumor: this is because by fact-checking, the outlet only profits when no outlet has either fact or a rumor, i.e. in a subset of cases with respect to when it is profitable to publish a rumor.

following threshold:

$$N_r = 1 + \frac{\ln\left((1-r)\frac{|\ln(\gamma_r^1+\gamma_n^1)|}{|\ln(\gamma_n^1)|}\right)}{\ln\left(\frac{\gamma_n^1}{\gamma_r^1+\gamma_n^1}\right)} \tag{11}$$

The intuition is that when N is low, the force that dominates following an increase in N is that it is more likely for some media outlet to report, increasing the incentives for a media outlet to publish a rumor. However, when N is large, what becomes dominating following an increase in N is the greater probability that some media outlet reports a fact, forcing the outlet publishing the rumor to the lower revenue of r. This eventually decreases the incentives for the outlet to report the rumor. To summarize, the effects of competition in this modified model are not necessarily the same as in the baseline model. Whereas an increase in competition increases the costs necessary to sustain the Fact-Checking Equilibrium, it can also discourage the Inaccurate Equilibrium's adoption.

Finally, concerning the welfare of the two equilibria, the Fact-Checking Equilibrium's welfare is unchanged. In contrast, the welfare associated with the Inaccurate Equilibrium (weakly) increases with respect to the baseline model, since the voter has perfectly accurate information when some media outlet reports a fact in the first period. Moreover, the "breakdown of accountability" occurring in the baseline model does not happen in the modified model, since the voter always replaces the politician when a fact is available. Just like in the baseline model, however, welfare is higher in the Fact-Checking Equilibrium, thanks to the fact-checking performed by media outlets that observe a rumor.

In conclusion, in this section we have shown that we can relax the assumption that readers cannot distinguish between fact-based and rumor-based news without substantially changing the main results of our model. However, this extension also shows that the ability of readers to tell apart rumors from facts could mitigate the adverse effects of competition. More generally, this hints to the fact that competition increases the cognitive and attention requirements for the good functioning of the media role as watchdogs.

B Proofs

Proof of Proposition 1

Proof. The proof follows in large part the discussion already carried out in the main body of the paper. The payoff for publishing a rumor without fact-checking it is $1 - c(1 - \rho)$, which is positive following Assumption 2. Suppose that media outlets follow the Fact-Checking equilibrium strategies. Conditional on seeing a rumour, the payoff if a media outlet fact-checks is $\rho(1 - \gamma_1^f)^{N-1}$. Comparing these two quantities yields the threshold c^{FC}, that is the level of c below which a deviation towards publishing a rumor is profitable.

Suppose instead that media outlets follow the Inaccurate Equilibrium strategies. The payoff from reporting a rumor is still $1 - c(1 - \rho)$, whereas the payoff from fact-checking is $\rho(\gamma_n^1)^{N-1}$. Comparing the payoffs from the two possible actions yields c^I, that is the threshold above which a deviation towards fact-checking is profitable. □

Proof of Corollary 1

Proof. Consider first the Fact-checking Equilibrium: a fact-checking media outlet breaks the news if no other media outlet received a fact, which happens with probability $(1 - \gamma_f^1)^{N-1}$, which is decreasing in N. In the Inaccurate Equilibrium, instead, a fact-checking media outlet breaks the news only if all other media outlets received no information, which happens with probability $(\gamma_n^1)^{N-1}$, which is again decreasing in N. Given also that the profit from publishing in the first period does not depend on N, the incentives to publish in the first period increase as N grows. Consider the Fact-Checking Equilibrium first: everything else equal, there is a maximum value of N such that this equilibrium exists. Rearranging condition (3) yields:

$$N \leq N^{FC} := 1 + \frac{\ln(1 - c(1 - \rho)) - \ln \rho}{\ln(1 - \gamma_f^1)} \tag{12}$$

Conversely, the Inaccurate Equilibrium only exists for sufficiently large values of N, as it

can be easily derived rearranging condition (2):

$$N \geq N^I := 1 + \frac{\ln(1 - c(1-\rho)) - \ln(\rho)}{\ln(\gamma_n^1)} \tag{13}$$

Finally, $N^I < N^{FC}$ follows from $|\ln(\gamma_n^1)| > |\ln(1-\gamma_f^1)| = |\ln(\gamma_n^1 + \gamma_f^1)|$. □

Proof of Lemma 1

Proof. In the Fact-Checking Equilibrium, the politician always correctly replaces the incumbent when she sees a scandal and the the only welfare loss she can experience is when none of the media received any information about an existing scandal. Expected welfare is therefore:

$$W^{FC} = -p{\gamma_n^1}^N \tag{14}$$

In the Inaccurate Equilibrium, welfare depends on what the citizen chooses conditional on seeing a scandal reported, which in turn depends on the posterior probability that a scandal took place conditional on a report. This can be written as follows:

$$\rho_I^1 = \frac{p(1-{\gamma_n^1}^N)}{p(1-{\gamma_n^1}^N) + (1-p)(1-{\gamma_n^0}^N)} \tag{15}$$

The citizen optimally chooses to replace the incumbent as long as the following condition is satisfied:

$$-(1-\rho_I^1)e \geq -\rho_I^1 \tag{16}$$

Plugging expression 15 into condition 16 we get that the citizen reelects the politician if and only if the following holds:

$$e \geq \frac{p}{1-p}\frac{1-{\gamma_n^1}^N}{1-{\gamma_n^0}^N} \equiv e_I^{news} \tag{17}$$

If the citizen reelects the politician independently of the information received, her expected welfare is $\tilde{W}^I = -p$. If she instead replaces the politician upon seeing reports

of a scandal (and reelects him when no report is published) expected welfare becomes:

$$\tilde{W}^I = -p{\gamma_n^1}^N - (1-p)(1-{\gamma_n^0}^N)e. \tag{18}$$

Since citizens maximize their utility, expected welfare in the Inaccurate Equilibrium is simply:

$$W^I = \max\{-p, -p(\gamma_n^1)^N - (1-p)(1-{\gamma_n^0}^N)e\}. \tag{19}$$

In any case, for given parameter values, welfare in the Fact-Checking Equilibrium is greater than welfare in the Inaccurate equilibrium. □

Proof of Proposition 2

Proof. Recall that when $N \leq N^{FC}$, the Fact-Checking Equilibrium exists and $W^{FC} = -p{\gamma_n^1}^N$, which increases with N. Welfare in the Inaccurate equilibrium is either flat and equal to $-p$ or inverse U-shaped in N. To see this, differentiate condition 18 with respect to N, which yields a positive derivative as long as the following condition is satisfied:

$$N \leq N_1 := \frac{\ln \frac{(1-p)e}{p} + \ln\left(\frac{|\ln \gamma_n^0|}{|\ln \gamma_n^1|}\right)}{\ln\left(\frac{\gamma_n^1}{\gamma_n^0}\right)} \tag{20}$$

Since following Assumption 4, $\frac{(1-p)e}{p} \geq 1$, we have $\ln\left(\frac{(1-p)e}{p}\right) > 0$, whereas since by Assumption 1 it holds that $\gamma_n^0 > \gamma_n^1$, it follows that $\ln\left(\frac{|\ln \gamma_n^0|}{|\ln \gamma_n^1|}\right) < 0$. Therefore, the numerator of condition (20) can be either positive or negative, whereas the numerator is negative given that $\gamma_n^0 > \gamma_n^1$. Therefore, in order for condition N_1 to be economically relevant, the necessary and sufficient condition is the following:[34]

$$\frac{(1-p)e}{p} \leq \frac{|\ln \gamma_n^0|}{|\ln \gamma_n^1|} \tag{21}$$

Whereas Assumption 4 poses a lower bound on $\frac{(1-p)e}{p}$, this gives it an upper bound.

[34]For ease of exposition, we say that N_1 is economically relevant as long as it is positive. In other words, we do not consider the fact that if N_1 lies between 0 and 1, its economic interpretation is not clear either. We do this in order to preserve the connection between our model and the scenario of no available media represented by $N = 0$.

Moreover, this condition can be rearranged to yield the following:

$$\gamma_n^1 \leq (\gamma_n^0)^{\frac{(1-p)e}{p}} \tag{22}$$

which, intuitively, is a condition stronger than $\gamma_n^1 < \gamma_n^0$. In other words, when the difference between γ_n^0 and γ_n^1 is sufficiently large (by a degree depending on the value of $\frac{(1-p)e}{p}$), the reduction of type 2 errors granted by the presence of an additional outlet is large enough that welfare is increasing within the Inaccurate Equilibrium if the number of outlets is below N_1. Moreover, notice that since $W^I = -p$ when $N = 0$, if condition (22) is not satisfied, then it has to be the case that $W^I = -p$ for all values of N: the reason is that W^I cannot go below $-p$, since in that case it would be optimal for the voter to never replace the politician. Finally, if condition (22) is satisfied, there exists a value of N above which welfare is equal to $-p$. The reason is that if the citizen follows the media, welfare is $-p(\gamma_n^1)^N - (1-p)e(1-(\gamma_n^0)^N)$, which converges to $-(1-p)e$ as N goes to infinity. Since by Assumption 4 it holds that $-(1-p)e \leq -p$ and since for $N > N_1$ the function $-p(\gamma_n^1)^N - (1-p)e(1-(\gamma_n^0)^N)$ is strictly decreasing in N, there exists a value of N beyond which $-p(\gamma_n^1)^N - (1-p)e(1-(\gamma_n^0)^N) < -p$, meaning that the beyond that point the voter will optimally stop replacing the politician even if the media report about a scandal. We denote this point as N_2, which mathematically is the value of N solving the equation $-p = -p(\gamma_n^1)^N - (1-p)(1-\gamma_n^{0N})e$.

Moving back to the welfare of the game, there are the following cases to consider:

1. If condition (22) is not satisfied, then $\underline{N} = \bar{N} = N^{FC}$ and welfare is increasing in N for $N \leq N^{FC}$ and constant and equal to $-p$ for $N > N^{FC}$.

2. If condition (22) is satisfied, there are the following subcases:

   - If $N^{FC} \geq N_2$, then $\underline{N} = \bar{N} = N^{FC}$ and welfare is increasing up to N^{FC} and then constant and equal to $-p$.
   - If $N_1 < N^{FC} < N_2$, then $\underline{N} = N^{FC}$ and $\bar{N} = N_2$. In this case, welfare

is increasing up to N^{FC}, then strictly decreasing between N^{FC} and $\bar{N}$ and constant above $\bar{N}$.

- Finally, if $N^{FC} \leq N_1$, then $\underline{\mathrm{N}} = N_1$ and $\bar{N} = N_2$: therefore, welfare is increasing following the Fact-Checking Equilibrium path up to N^{FC}. At N^{FC}, it jumps downwards but between N^{FC} and $\underline{\mathrm{N}}$ it remains increasing following the Inaccurate Equilibrium path. Further increasing N, welfare is strictly decreasing for $N \in (\underline{\mathrm{N}}, \bar{N})$ and finally constant and equal to $-p$ for $N \geq \bar{N}$.

□