A Citizen-Editors Model of News Media

Sobbrio, Francesco

IMT Lucca

21 May 2011

A Citizen-Editors Model of News Media*

Francesco Sobbrio†

February 21, 2012

Abstract

This paper provides a model of the market for news where profit-maximizing media outlets choose their editors from a population of rational citizens. The analysis identifies a key novel mechanism of media bias: the bias in a media outlet's news reports may be the result of the slanted endogenous information acquisition strategy of its editor. Accordingly, the results show that citizens find it optimal to acquire information from a media outlet whose editor has similar ideological preferences. At the same time, there is always an upper bound on the possible "extremism" of an editor above which the citizens' demand for news is strictly decreasing. Depending on the distribution of citizens' ideological preferences, a media outlet may choose an ideological editor even in a monopolistic market. Moreover, ideological editors are more likely to be present in the market for news: *i)* the higher the number of media outlets competing in the market for news; *ii)* the lower the opportunity cost that citizens have to incur to acquire information.

JEL Classification: D72, D81, D83, L82

Key Words: Media Bias, Slant, Information Acquisition, Valence, Competition

*I am very grateful to Juan Carrillo, Micael Castanheira, Francesco De Sinopoli, Mark Dincecco, Matthew Ellman, Helios Herrera, Francois Maniquet, Andrea Mattozzi, Paolo Pin, Guofu Tan, Edilio Valentini, Simon Wilkie, Kenneth Wilburn for useful suggestions. I would also like to thank seminar partecipants at the IAE-CSIC, Universitat de Barcelona-IEB, SAEe 2011, UCL Blackboard Workshop in Political Economics, 2010 Congress of the European Economic Association, 7th Workshop in Media Economics, 2009 European Meeting of the Econometrics Society, the 2009 Meeting of the Association for Public Economic Theory, the 8th Journées Louis-André Gérard-Varet, the 2009 Meeting of the European Public Choice Society, University of Bologna, University of Namur, University of Padova and IMT Lucca. All remaining errors are mine.

†IMT Lucca, Piazza San Ponziano 6, 55100, Lucca, Italy. Email: f.sobbrio@imtlucca.it

1 Introduction

The importance of news media on the overall functioning of democracies is well documented by the extensive empirical evidence showing the significant influence of media on political outcomes.[1] At the same time, journalists and communications scholars have provided substantial anecdotal evidence suggesting that the information supplied by news media to their viewers is often far from being "fair and balanced" (e.g., Goldberg, 2002; Alterman, 2003; Bagdikian, 2004; Davies, 2008). Significant deviations from the standard of unbiased news seem to be present even in fairly competitive media markets as, for example, the US. Indeed, a recent empirical literature in economics and political science has shown the presence of a systematic bias in the market for news using a variety of instruments to measure such bias (e.g., Groseclose and Milyo, 2005; Ho and Quinn, 2008; Gentzkow and Shapiro, 2010, Larcinese et al., 2011; Puglisi, 2011).[2] In parallel, a fast growing theoretical literature has tried to rationalize the presence of such systematic bias in the media by focusing on various incentives to bias the information supplied to media viewers.[3] However, all theoretical contributions that have so far attempted to explain the existence of bias in media reports assume that the information available to media outlets is exogenously given. Hence, all the existing theoretical literature considers, implicitly or explicitly, the same underlying mechanism of media bias: media outlets are assumed to bias their news reports by *selectively omitting* a subset of their (exogenously given) information.

This paper provides several novel contributions to the understanding of the market for news by identifying a key mechanism of media bias that has so far being neglected by the literature. In particular, the paper analyzes the endogenous acquisition of information by media editors and shows that the bias in media reports may arise from the way media editors gather information in the first place, rather than from the selective omission of exogenously given information. Specifically, the paper points out that the bias in a media outlet's news reports may be the result of the slanted optimal information acquisition strategy of its editor. In turn, while rational citizens always want any media editor to never omit any available information, they may still prefer a like-minded editor (i.e., an editor with similar ideological preferences) to a moderate one. That is, a rational citizen may prefer to watch the news reports supplied by a like-minded editor simply because the set of information acquired by such an editor provide her with a higher expected utility with respect to the one acquired by a moderate editor. Consequently, competitive profit-maximizing media outlets may find optimal to choose ideological editors in order to capture the demand of news coming from citizens with similar ideological preferences. Moreover, since the more

[1] See, among the others, Strömberg, 2004a; Gentzkow, 2006; Eisensee and Strömberg, 2007; Oberholzer-Gee and Waldfogel, 2009; Snyder and Strömberg, 2010.

[2] For evidence on the empirical effects of media bias see DellaVigna and Kaplan (2007), Gerber et al. (2009), DellaVigna and Gentzkow (2010) and Enikolopov et al. (2011).

[3] See Prat and Strömberg (2011) for an extensive survey of the literature on the political economy of mass media.

competitive the market for news is, the more media outlets seek to differentiate their news products, competition tends to *increase* the probably of media outlets choosing ideological editors. In particular, this paper is the first to show the presence of a direct link between competition and ideological diversity in a market for news where consumers are rational (i.e., they do not derive any exogenous utility from receiving biased information), they share the same prior beliefs and media outlets are just profit-maximizers.[4]

The model analyses a market for news driven by the citizens' demand for information. Citizens have to choose between two alternative candidates (or policies). Citizens differ in their idiosyncratic (i.e., ideological) preferences, but all equally value the *valence* (i.e., quality) of alternative candidates (or public benefit of alternative policies). Citizens may acquire some information about the quality of different candidates by watching news reports. News reports are produced by editors chosen by media outlets from the population of citizens. That is, once chosen by a media outlet, a citizen-editor can gather (costly) information about the candidates' quality and then report it to the viewers.

The results show that editors with different idiosyncratic preferences have different optimal information acquisition strategies. A moderate editor (i.e., one who is *ex-ante* indifferent between the two candidates) uses a balanced information acquisition strategy. The amount of evidence in support of the leftist candidate that she requires in order to stop collecting information and produce a report in favor of such candidate is the same as the one she requires to produce a report in favor of the rightist candidate. Instead, an ideological editor (i.e., one who, *ex-ante,* always prefers either the leftist or the rightist candidate) acquires information in a slanted way. A small amount of evidence in support of the leftist candidate is sufficient to induce a leftist editor to stop investing in information acquisition and produce a report in favor of that candidate. On the other hand, such an editor would produce a report in favor of the rightist candidate only after having collected a large amount of evidence in support of that candidate. Moreover, the results shed light on the relationship between ideology and informativeness of news reports: the more extreme the idiosyncratic preferences of an editor are, the lower the expected accuracy of her news reports (i.e., higher probability of endorsing the low-valence candidate).

In order to access news reports, citizens have to pay an opportunity cost. When choosing among different media outlets, rational citizens anticipate that the news reports coming from media editors with different ideological preferences will be different simply because the information acquired by each of these editors are different. Specifically, in choosing whether or not to watch a media outlet report, and if so, which of them to watch, a citizen will take into account two different components. She will consider how much information the editor of a media outlet may have collected before producing a news report. At the same time, she will also take into account how *valuable* the information gathered by an editor could be for her

[4]Competition and diversity represent two strategic policy goals of the Federal Communication Commission in the US (Source: http://www.fcc.gov/mediagoals)

final choice. In turn, this implies that different citizens have different rationales for acquiring information from a like-minded source. Specifically, the model points out the presence of two rationales explaining why citizens find optimal to watch a media outlet whose editor has similar idiosyncratic preferences. From the perspective of very liberal or very conservative citizens, a like-minded source of information is the only source of information that could be *pivotal* for their choice. Indeed, these citizens would never change their *ex-ante* ranking of preferences over candidates upon observing a report coming from a moderate editor. Only a report of a like-minded editor in favor of the ideologically-farther candidate would contain enough evidence to convince these citizens to choose such a candidate. On the other hand, when choosing between a media outlet with a moderate editor and one with an ideologically closer editor, moderate-liberal and moderate-conservative citizens will trade-off the *expected accuracy* and the *value* of information provided by these different types of editors. Citizens know that a moderate editor is the one who, in expectation, will produce the most accurate news report. However, an ideologically-closer editor has a lower probability of endorsing the ideologically-farther candidate by mistake. Thus, moderate-liberal and moderate-conservative citizens prefer to acquire information from a like minded editor since they care more about not choosing a low-valence ideologically-farther candidate than not choosing a low-valence ideologically-closer one. Therefore, the model shows that citizens find it optimal to acquire information from a media outlet having an editor with similar idiosyncratic preferences even though they do not have any exogenous preferences for like-minded sources of information. At the same time, since the more extreme the idiosyncratic preferences of an editor are, the lower the accuracy of its news reports, there is always an upper bound on the possible "extremism" of an editor above which the demand for news of citizens is strictly decreasing.

Media outlets anticipate this behavior by citizens and hence they choose their editors taking into account the expected demand for news reports produced by editors with different idiosyncratic preferences. That is, by choosing a more leftist, moderate or rightist editor, media outlets implicitly choose their product location in the political space. When the distribution of citizens is such that the number of leftist and rightist citizens is higher than the number of moderate ones, a media outlet may choose an ideological editor even in a monopolistic market. Hence, even though citizens do not derive any exogenous utility from acquiring biased information and the media outlet is just maximizing profits, the endogenous acquisition of costly information may induce the media outlet to choose an editor whose optimal information acquisition strategy is slanted in favor of the alternative *ex-ante* preferred by a subset of citizens. This is true even in the case where all citizens share the same *ex-post* ranking of preferences over candidates.

It is also shown that, even in the case where citizens are uniformly distributed in the policy space, there is a threshold in the number of media outlets present in the market for news above which media outlets may find optimal to choose ideological editors. Moreover, the lower the opportunity cost of watching news, the more likely it is that media outlets would choose ideological editors for a given number of media outlets present in the market for news.

Overall, the results suggest that ideological editors are more likely to be present in the market for news: *i)* the higher the number of media outlets competing in the market for news; *ii)* the lower the opportunity cost that citizens have to incur to acquire information.

The first result is driven by the incentives of profit-maximizing media outlets to differentiate their news products. As a consequence, markets for news characterized by a higher degree of competition are likely to have a higher degree of polarization of news media. This result is consistent with the different degrees of ideological polarization of news sources observed in online and offline media markets (e.g., online newspapers and blogs with respect to traditional newspapers and TV). As argued by Sunstein (2007), the dramatic expansion in online media outlets seems to have increased the degree of polarization in the market for news. Indeed, Gentzkow and Shapiro (2011) show that the "most extreme Internet sites are far more polarized than any source offline" (Gentzkow and Shapiro, 2011, page 15).[5]

The second result is driven by the demand for news coming from "extremist" citizens. When the opportunity cost of acquiring information is high, the expected benefit of watching news reports for "extremist" citizens is lower than the cost. Hence, in this case, media outlets are likely to choose moderate editors since the bulk of the demand for news comes from moderate citizens. Instead, when the opportunity cost is low, even "extremist" citizens may find convenient to watch news reports when such news reports come from an editor with similar idiosyncratic preferences. Hence, a media outlet may find it optimal to choose an ideological editor to capture this demand for news by ideological citizens. A clear application of such a result is represented by the market for news in the broadcast media sector with respect to the press. The opportunity cost of watching a broadcast media report is arguably lower than the one of reading a newspaper. The analysis thus suggests that, all other things equal, the share of moderate editors present in the press sector should be higher than the one of the broadcast media sector. At the same time, "extremist" citizens should be more likely to acquire information from broadcast media than from newspapers and broadcast media should face a higher overall demand with respect to the one faced by the press.

1.1 Related Literature

The literature has identified, so far, two different forces creating a bias in media reports. The first one is a supply-driven bias: media bias may arise from the idiosyncratic preferences of journalists (Baron, 2006), owners (Djankov et al., 2003; Anderson and McLaren, 2010), governments (Besley and Prat, 2006), lobbies (Petrova, 2011; Sobbrio, 2011) or advertisers

[5]While both Sunstein (2007) and Gentzkow and Shapiro (2011) point out the higher degree of polarization of online media sources with respect to the offline ones, Gentzkow and Shapiro (2011) show that the polarization of online media viewers may not necessarily be significatively higher than the one of viewers in offline media markets.

(Ellman and Germano, 2009; Germano and Meier, 2010; Blasco et al., 2011).[6] The second one is a demand-driven bias. Part of this literature assumes that consumers like to receive information confirming their bias and thus media just reflect and confirm the bias of their audience (Mullainathan and Shleifer, 2005). On the other hand, Gentzkow and Shapiro (2006) show that even when consumers do not like biased information, if media outlets have reputation concerns and there is uncertainty on the quality of media outlets, in presence of heterogeneous prior beliefs different media outlets may find it optimal to slant their reports according to the prior beliefs of different segments of consumers. Finally, Chan and Suen (2008) show that media slant emerges when media outlets observe the state of the world but are exogenously constrained to report coarse information.[7]

The present paper contributes to this literature along four main dimensions. First, the model identifies a novel mechanism of bias in media reports (i.e., the slanted endogenous information acquisition of media editors) which is alternative and complementary to the one considered, so far, by the literature (i.e., the selective omission of exogenously given information).[8] Second, the model provides a demand-driven rationale for the presence of different ideological biases in the market for news, without relying on any exogenous preferences for biased news confirming individuals' beliefs (as in Mullainathan and Shleifer, 2005) and without assuming heterogeneous prior beliefs (as in Gentzkow and Shapiro, 2006). In my model, the individual's willingness to acquire information from a like-minded source is the result of the endogenous acquisition of costly information by citizen-editors. Third, in Chan and Suen (2008), competition does not lead to product differentiation. Instead, my results point out that competing media outlets may find optimal to choose editors with different ideological preferences. Hence, I show that competition may increase the ideological polarization of news media. Moreover, while in Chan and Suen (2008) any media outlet is implicitly assumed to exogenously commit to a signal-threshold above which it endorses a candidate, in my model an editor has a (credible) endogenous commitment to her optimal information acquisition strategy. That is, as in the literature on citizen-candidates voters know that a candidate can only credibly commit to her preferred policy (Osborne and Slivinsky, 1996; Besley and Coate, 1997), in the present paper viewers know that a media outlet's editor can only credibly commit to her optimal stopping thresholds.[9]

Finally, as pointed out by Prat and Strömberg (2011), the relationship between the ide-

[6] See also Duggan and Martinelli (2010) for a model where ideological media strategically select which issues to cover.

[7] Chan and Suen (2008) also endogenize the platform of political parties in their model and provide several interesting insights on the role of media on partisan policies.

[8] Section 6.5 describes a setting where both mechanism of media bias are present.

[9] In addition, differently from Chan and Suen (2008) where viewers can only learn coarse information from a media outlet (i.e., they are just able to infer in which interval lies the signal observed by the media outlet), in the present framework viewers always learn the underlying (difference of) signals collected by an editor. Specifically, from the viewers' perspective, it is equivalent whether the editor produces a coarse news report on one of the candidates (e.g., endorsement) or she produces a news report showing all the signals (e.g., evidence) collected. Indeed, upon observing a coarse news report, viewers are able to infer which stopping threshold has been reached by the editor since they know the editor's idiosyncratic preferences.

ological positions of media outlets and the informativeness of their news reports is still theoretically unclear. By micro-founding the endogenous information acquisition process of citizen-editors, the model is able to provide novel insights on this issue. Specifically, the results show that the expected accuracy of news reports (i.e., expected probability of an editor endorsing the high-valence candidate) is decreasing moving away from moderate editors. In turn, this implies that there is always an upper bound on the possible "extremism" of an editor above which the demand for news by citizens is strictly decreasing.

The results are consistent with the empirical results of Gentzkow and Shapiro (2010). Using zip-code level data on newspaper circulation in the US, they show that the demand for right-wing newspaper is higher in markets with a higher proportion of Republicans. Moreover, they find that ownership has little or no role in media slant.[10] Similarly, Puglisi and Snyder (2011) find that, on average, the ideological location of US newspapers corresponds to the one of the median voter in their states. The present paper suggests that such findings may not be the result of behavioral preferences for biased news but they may rather be the result of the demand for costly information by rational individuals and the consequent optimal ideological location of news by profit maximizing media outlets.[11] The theoretical framework of the paper is also closely related to the empirical analysis of newspaper endorsements and media influence in the US by Chiang and Knight (2011). In line with the predictions of my model, Chiang and Knight find that the degree of influence of a newspaper on voters depends on the credibility of the endorsement.[12]

Formally, the structure of information acquisition by citizen-editors is related to the model of Brocas and Carrillo (2009) on systematic errors in decision-making. In their setting for any exogenous amount of information, all individuals choose the same action while in presence of endogenous information acquisition different individuals have different probabilities of choosing a given action. Specifically, they show that individuals favor actions with large payoff-variance. My setting differs because it is assumed that all actions have the same variance in payoffs for any citizen-editor and such variance is equal across citizen-editors. Moreover, in my model citizen-editors differ in their *ex-ante* ranking of actions even when they share the same *ex-post* ordinal preferences over actions.[13]

The paper is organized as follows. Section 2 describes the model and the structure of the game. Section 3 derives the optimal information acquisition strategy by citizen-editors. Section 4 discusses the demand for news. Section 5 contains the results on the optimal choice

[10]More specifically, they find that "the slant of co-owned papers is only weakly (and statistically insignificantly) correlated to a newspaper's political alignment" (Gentzkow and Shapiro, 2010, page 38).

[11]Calvert (1985) was the first to point out the positive value of a biased source of information for a rational decision-maker. See also Cukierman and Tommasi (1998) and Li and Suen (2004).

[12]Specifically, "endorsements for the Democratic candidate from left-leaning newspapers are less influential than are endorsements from neutral or right-leaning newspapers and likewise for endorsements for the Republican candidate" (Chiang and Knight, 2011, page 817).

[13]Notice also that in their model the cost of acquiring information is embedded in the discount factor. Their results do not apply in presence of a per unit cost of sampling since individuals differ only in the variance of their payoffs but not in their *ex-ante* ranking between actions.

of editors by media outlets. Section 6 provides a discussion on the scope, implications and the robustness of the results. Section 7 concludes. All the proofs are provided in the appendix.

2 The Model

2.1 Citizens

There are two alternative candidates/policies L and R where $L = 0$ and $R = 1$, i.e., the policy space is $\Psi = \{0; 1\}$. A continuum of *citizens* of measure one have to decide which candidate $P \in \{L; R\}$ to choose. There are two possible states of the world $s \in \{l, r\}$. To preserve symmetry, the common prior belief that the state of the world is r is assumed to be $\Pr(s = r) = 1/2$. Citizens care about the ideological distance between their idiosyncratic preferences and the candidates' policy platforms. Hence, citizens want to minimize the euclidean distance between their policy preferences and the ones of the chosen candidate. At the same time, citizens also care about the *valence* (i.e., quality) of the candidates. The valence component is captured by an additive constant in the citizen's utility function. That is, regardless of her idiosyncratic policy preferences, each citizen gets an extra positive payoff when she chooses the high-valence candidate and a negative one when the low-valence candidate is chosen.[14] Hence, citizen i's utility function is:

$$u_i(P, x_i) = \delta I_s I_p - |P - x_i| \tag{1}$$

where x_i represents the idiosyncratic (i.e., ideological) policy preference of citizen i and δ represents the *valence* parameter. Moreover, without loss of generality $\delta \in (0, \frac{1}{2}]$ and:

$$I_s = \begin{cases} 1 \text{ if } s = l \\ -1 \text{ if } s = r \end{cases} \quad \text{and} \quad I_p = \begin{cases} 1 \text{ if } P = L \\ -1 \text{ if } P = R \end{cases} \tag{2}$$

As a consequence, candidate L gives a higher utility to citizens when the state of the world is l than when the state is r (*viceversa* for candidate R).[15] In other words, L and R represent the alternative political platforms of the two candidates and 2δ represents the difference in the *valence* of the two candidates in each state of the world.[16] The idiosyncratic preferences of citizens are distributed with a common knowledge c.d.f. $F(x)$ with density function $f(x)$

[14] As usual in the literature on the demand for news (e.g., Strömberg, 2004b; Mullainathan and Shleifer, 2005; Baron, 2006; Gentzkow and Shapiro, 2006; Chan and Suen, 2008; Anderson and McLaren, 2010) it is assumed that citizens receive utility from choosing a given candidate/alternative *per se*. Section 6.2 provides a discussion on this assumption.

[15] For a similar specification of the voters' utility function see, for example, Aragones and Palfrey (2002).

[16] As an alternative interpretation of the model, L and R can be seen as two alternative policies (e.g. implementing Kyoto's protocol or not). Hence, if the state of the world is l then the public benefits/cost ratio of policy L is higher than the one of R (*viceversa* if $s = r$). That is, if the state of the world is l policy L is the most efficient one.

where $supp\,[f(x)] = [0,1]$. To avoid the presence of exogenous asymmetries, the analysis focuses on distributions that are symmetric and monotone in the sub-intervals $x \in [0, \frac{1}{2}]$ and $x \in [\frac{1}{2}, 1]$.[17] The state contingent utilities of citizen i are, thus, as follows:

$$u_i(L|s) = \begin{cases} \delta - x_i & \text{if } s = l \\ -\delta - x_i & \text{if } s = r \end{cases} \quad \text{and} \quad u_i(R|s) = \begin{cases} -\delta + x_i - 1 & \text{if } s = l \\ \delta + x_i - 1 & \text{if } s = r \end{cases} \tag{3}$$

Notice also that for any citizen i the two candidates have the same variance in payoffs and such variance is equal across citizens since:

$$u_i(L|s=l) - u_i(L|s=r) = u_i(R|s=r) - u_i(R|s=l) = 2\delta \quad \forall i$$

Let $\Sigma = \{\sigma_l, \sigma_r\}$ be the signal space. The signal likelihood function is as follows:

$$\Pr(\sigma_l|s=l) = \Pr(\sigma_r|s=r) = \theta \tag{4}$$

where $\theta \in \left(\frac{1}{2}, 1\right)$ represents the precision of the signal. Suppose now that citizens receive n_l signals σ_l and n_r signals σ_r on the state of the world. Then the citizens' posterior beliefs are:

$$\Pr(s=r|n_l,n_r) = \frac{\theta^{n_r-n_l}}{\theta^{n_r-n_l} + (1-\theta)^{n_r-n_l}}$$

Therefore, denoting $n = n_r - n_l$, the citizens' posterior beliefs can be denoted as follows:

$$\mu(n) = \frac{1}{1 + \left(\frac{1-\theta}{\theta}\right)^n} \tag{5}$$

Hence, citizen i prefers candidate R to candidate L whenever:

$$\mu(n) > \frac{1}{4\delta}(2\delta - 2x_i + 1) = \mu(\hat{n}_i) = \hat{\mu}_i \tag{6}$$

That is $\hat{n}_i$ is the difference in the number of signals in favor of state r which makes citizen i being indifferent between candidates R and L. Notice that for $\delta = \frac{1}{2}$, then $\hat{\mu}_i \geq 0, \forall i$. Hence, for $\delta = \frac{1}{2}$ all citizens would prefer candidate L when $s = l$ and candidate R when $s = r$. That is, when $\delta = \frac{1}{2}$, *ex-post* all citizens have the same ranking of preferences over candidates. Instead, for $0 < \delta < \frac{1}{2}$ there will be some "stubborn" citizens who will always vote for the same candidate regardless of the state of the world. Moreover:

$$\frac{\partial u_i(R|\mu(n))}{\partial \mu(n)} = -\frac{\partial u_i(L|\mu(n))}{\partial \mu(n)} = 2\delta, \quad \forall i$$

hence, the utility functions of citizens i and j are always parallel. For any exogenously given $\mu(n) \in (0,1)$, different citizens may have different ranking of preferences regarding

[17] For example, the families of Uniform, Normal, and Cauchy distribution functions satisfy such property.

candidates L and R. Specifically:

$$\hat{\mu}_{\frac{1}{2}} = \frac{1}{2} \quad \text{and} \quad \frac{\partial \hat{\mu}_i}{\partial x_i} < 0 \tag{7}$$

Thus, citizens with more "rightist" preferences require less evidence in favor of R in order to choose that candidate with respect to moderate citizens. Moreover, when a citizen cares more about the true state of the world (i.e., when the *valence* component is larger), her indifference threshold is closer to the one of a moderate citizen:

$$\frac{\partial \hat{\mu}_i}{\partial \delta} = \frac{(2x_i - 1)}{4\delta^2} \begin{cases} < 0 & \text{if} \quad x_i < \frac{1}{2} \\ > 0 & \text{if} \quad x_i > \frac{1}{2} \end{cases} \tag{8}$$

Hence, the more citizens care about the quality of different candidates, the less evidence in favor of the ideologically-farther candidate they require in order to vote for her. The utilities of citizens can then be represented as a function of their idiosyncratic preferences x_i and their posterior beliefs:

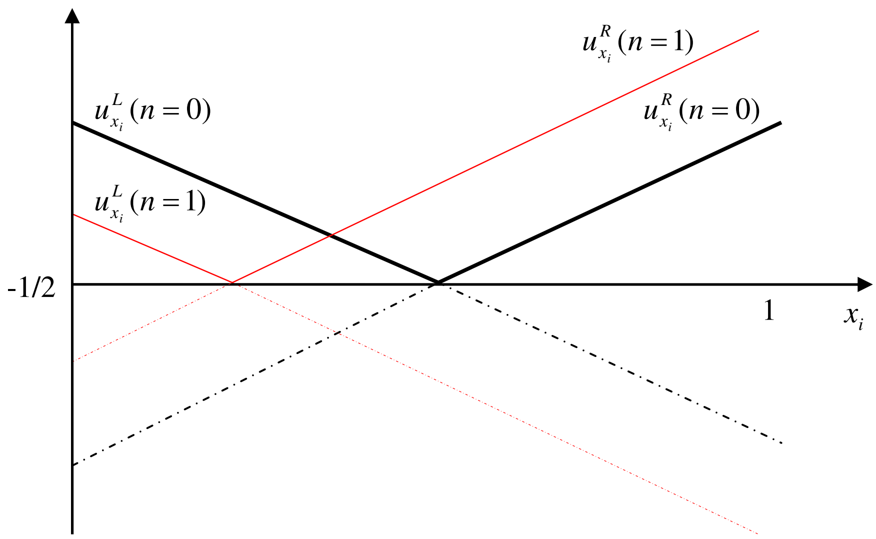

Fig. 1. Expected Utility of citizens for $n = 0$ and $n = 1$

where $u^L_{x_i}(u^R_{x_i})$ represents the expected utility of citizen i when choosing candidate L (R). Clearly, the expected utility of choosing the leftist (rightist) candidate is lower (higher) the more rightist a citizen is. The thick line represents the expected utility of citizens given their prior beliefs (i.e., for $\mu(n = 0) = 1/2$). The thin line instead represents the expected utility of citizens when they have observed an extra signal in favor of R (i.e., for $\mu(n = 1) > 1/2$). Any extra signal in favor of R shifts upward the expected utility of choosing R while it shifts downward the expected utility from choosing L. *Viceversa*, as shown by the following graph, any extra signal in favor if L shifts upward the expected utility of choosing L while it leads to a downward shift in the expected utility of choosing R.

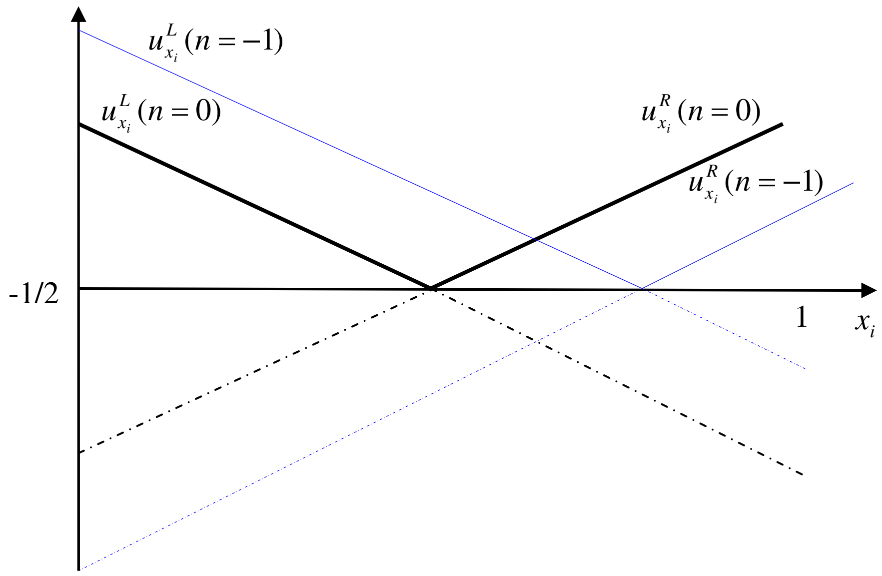

Fig. 2. Expected Utility of citizens for $n = 0$ and $n = -1$

For clarity of exposition, in what follows I will refer to citizens and editors with idiosyncratic preferences $x_i = 1/2$ as **moderate citizens/editors**. Hence, a citizen/editor is labeled as moderate if she only cares about the *valence* of the candidates (i.e., *ex-ante* she is indifferent between the two candidates). Instead, I will refer to citizens and editors with idiosyncratic preferences $x_e \neq 1/2$ as **ideological citizens/editors**. Hence, a citizen/editor is labeled as ideological if, *ex-ante,* she always prefers one of the two candidates. Finally, a citizen/editor i is labeled as **more ideological** than j if her idiosyncratic preferences are closer to either 0 or 1 with respect to the idiosyncratic preferences of j.

2.2 The Game

There is a media industry composed by $K \geq 1$ media outlets. Each media outlet is assumed to be maximizing its viewership in order to maximize its advertising revenues. In order to produce news reports, each media outlet has to choose an editor from the population of citizens. Once chosen, a citizen-editor is endowed with a (costly) technology that allows her to collect evidence on the state of the world. Specifically, an editor has to incur a cost c any time she decides to draw a signal on the state of the world (e.g., effort she has to exert to acquire information, opportunity cost of sending reporters to investigate an issue, etc.).[18] The citizen-editor will then produce a news report based on the evidence collected. Citizens will then decide whether to access a media outlet's report by paying an opportunity cost C or not. If they decide to watch a media outlet's report they update their beliefs using Bayes' rule. Hence, the demand for news reports that a media outlet faces is a function of the type of editor that it has chosen. That is, given an editor with idiosyncratic preferences x_e, the profit function of media outlet k is $\Pi_k(x_e) = D_k(x_e)$, where $D_k(x_e)$ is the demand

[18]By "editor" I refer to what is usually called "Editor-in-Chief" for a newspaper and "Managing Editor" in the broadcast media sector. More in general, the model applies to the choice of a profit maximizing media outlet regarding the type of journalists to be hired.

for the news report produced by the media outlet.[19] To summarize, the timing of the game is as follows:

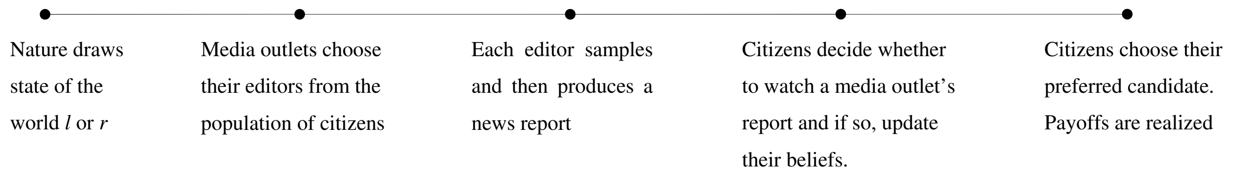

Fig. 3. Timing of the Game

Next section provides the analysis of the optimal strategy of a citizen-editor (i.e., her optimal sampling strategy). Then, I characterize the demand for news reports by citizens (i.e., $D_k(x_e)$) as a function of an editor's optimal sampling strategy. Finally, I analyze the profit-maximizing strategy of media outlets within different structures of the market for news (i.e., which type of editor maximizes the profits of media outlets in a monopoly, duopoly and in presence of an arbitrary number of media outlets) and then discuss the results.

3 Optimal Information Acquisition by Citizen-Editors

Suppose that a media outlet has chosen a citizen with idiosyncratic preferences x_e to work as its editor (i.e., x_e denotes the idiosyncratic preferences of a citizen-editor). Let $\tau_{e,m}(n)$ be the decision of such a citizen-editor given that she has already drawn $m = \{0, 1, ...\infty\}$ signals and given a current difference of signals in favor of r equal to n. Given any m and n, the choice set of citizen-editor e is $\Gamma_m(n) = \{L, R, d\}$. Thus she can choose candidate L or R or she can pay c and draw another signal on the state of the world (i.e., choose $\tau_{e,m}(n) = d$, where d stands for "draw").

An editor faces a trade-off between the cost of acquiring a signal and the utility she gets from the informative content of each signal.[20] Thus, her problem is to find an optimal stopping rule. Specifically, the value function that editor e maximizes after m draws, given a current difference of signals in favor of state r equal to n, is the following:

$$V_e(n) = \begin{cases} \max \begin{Bmatrix} \delta(1 - 2\mu(n)) - x_e; \\ \nu(n)V_e(n+1) + (1 - \nu(n))\, V_e(n-1) - c \end{Bmatrix} & \text{if } \mu(n) < \hat{\mu}_e \\ \max \begin{Bmatrix} \delta(2\mu(n) - 1) - (1 - x_e); \\ \nu(n)V_e(n+1) + (1 - \nu(n))\, V_e(n-1) - c \end{Bmatrix} & \text{if } \mu(n) \geq \hat{\mu}_e \end{cases} \tag{9}$$

where $\nu(n) = \mu(n)\theta + (1 - \mu(n))(1 - \theta)$. In other words, if after m draws editor e has a posterior $\mu(n) < \hat{\mu}_e$ she will decide either to stop acquiring signals and choose candidate

[19] See section 6.3 for a discussion on the structure of media outlets' profits.

[20] Section 6.3 provides a discussion on the robustness of the optimal infomation acquisition strategy by citizen-editors to the presence of incentive mechanisms.

L with an expected payoff of $(1-\mu(n))(\delta - x_e) + \mu(n)(-\delta - x_e)$ or paying c and getting another signal. In this case, with probability ν the editor will get signal σ_r in which case the value function becomes $V_e(n+1)$ and with probability $(1-\nu)$ she will get signal σ_l in which case the value function becomes $V_e(n-1)$. Instead, if after m draws editor e has a posterior $\mu(n) \geq \hat{\mu}_e$ she will decide either to stop acquiring information and choose candidate R with an expected payoff of $(1-\mu(n))(x_e - \delta - 1) + \mu(n)(x_e + \delta - 1)$ or paying c and getting another signal. In this case, with probability ν the editor will get signal σ_r in which case the value function becomes $V_e(n+1)$ and with probability $(1-\nu)$ she will get signal σ_l in which case the value function becomes $V_e(n-1)$.[21]

The following proposition characterizes the properties of the optimal information acquisition strategy by an editor.

Proposition 1 *For all $c > 0$, there exist $(\underline{n}_e^*, \bar{n}_e^*)$ such that for $\forall m, \forall x_e$:*

1. $\tau_{e,m}(n) = L$ *if* $n \leq \underline{n}_e^*$, $\tau_{e,m}(n) = R$ *if* $n \geq \bar{n}_e^*$ *and* $\tau_{e,m}(n) = d$ *if* $n \in (\underline{n}_e^*, \bar{n}_e^*)$.
2. $\frac{d\underline{n}_e^*}{dx_e} < 0$, $\frac{d\underline{n}_e^*}{d\delta} < 0$ *and* $\frac{d\underline{n}_e^*}{dc} > 0$
3. $\frac{d\bar{n}_e^*}{dx_e} < 0$, $\frac{d\bar{n}_e^*}{d\delta} > 0$ *and* $\frac{d\bar{n}_e^*}{dc} < 0$

Moreover

$$\left|\frac{d\bar{n}_e^*}{dx_e}\right| \begin{cases} < \left|\frac{d\underline{n}_e^*}{dx_e}\right| & \text{for } x_e < \frac{1}{2} \\ = \left|\frac{d\underline{n}_e^*}{dx_e}\right| & \text{for } x_e = \frac{1}{2} \\ > \left|\frac{d\underline{n}_e^*}{dx_e}\right| & \text{for } x_e > \frac{1}{2} \end{cases} \quad \text{and} \quad \left|\frac{d\bar{n}_e^*}{d\delta}\right| \begin{cases} < \left|\frac{d\underline{n}_e^*}{d\delta}\right| & \text{for } x_e < \frac{1}{2} \\ = \left|\frac{d\underline{n}_e^*}{d\delta}\right| & \text{for } x_e = \frac{1}{2} \\ > \left|\frac{d\underline{n}_e^*}{d\delta}\right| & \text{for } x_e > \frac{1}{2} \end{cases}$$

The following graph illustrates the optimal strategy of editor e after m draws, given a current difference of signals in favor of r equal to n:

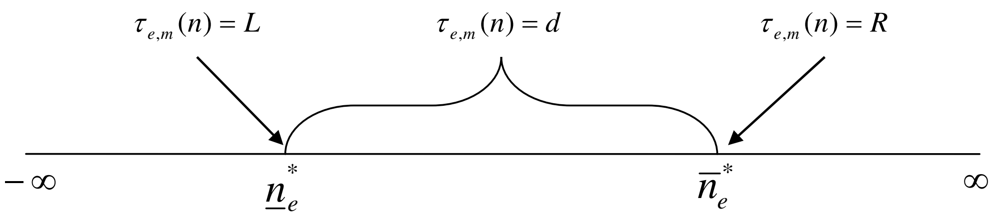

Fig. 4. Optimal Strategy of editor e

In other words, $\underline{n}_e^*$ is the threshold below which editor e does not sample anymore and reports $|\underline{n}_e^*|$ more signals in favor of candidate L. Similarly, $\bar{n}_e^*$ is the threshold above which editor e does not sample anymore and reports $\bar{n}_e^*$ more signals in favor of candidate R.

[21]Notice that the value function of editor e does not depend on how many draws she has already done (i.e., m), since the only relevant variable for her decision is the current difference of signals in favor of r (i.e., the state variable is n).

For any given n a more "rightist" editor is always more likely to produce a report in favor of candidate R than in favor of L, with respect to a more "leftist" editor. That is, $x_{e'} > x_e$ implies that $\underline{n}^*_{e'} < \underline{n}^*_e$ and $\bar{n}^*_{e'} < \bar{n}^*_e$. Moreover, given editors e and e' with $x_{e'} < x_e \leq \frac{1}{2}$, then $\bar{n}^*_{e'} - \underline{n}^*_{e'} < \bar{n}^*_e - \underline{n}^*_e$. Hence, a more leftist editor requires even less signal in favor of L than more in favor of R to stop sampling, with respect to a more moderate editor. Similarly, given editors e and e' with $x_{e'} > x_e \geq \frac{1}{2}$, then $\bar{n}^*_{e'} - \underline{n}^*_{e'} < \bar{n}^*_e - \underline{n}^*_e$. Hence, a more rightist editor requires even less signals in favor of R than more in favor of L with respect to a more moderate editor. Therefore, the more moderate an editor is, the larger is her "information acquisition set" $N_e = \{n | \tau_{e,m}(n) = d\}$ (i.e., the set of the difference in the number of signals in favor of r (or in favor of l) such that editor e will keep sampling).[22] At the same time, an increase in the importance of the valence component of the editor's utility function (δ) makes an editor sample more in both directions (i.e., N_e becomes larger). Moreover, an increase in δ induces a leftist editor to increase her "leftist" stopping rule more than her "rightist" stopping rule (i.e., $|\underline{n}^*_e|$ increases more than $\bar{n}^*_e$). The opposite is true for a rightist editor. A higher δ is associated with more sampling in both directions *and* more symmetric stopping rules for all types of editors. Therefore, Proposition 1 suggests that when δ is higher any type of editor: *i)* acquires more information; *ii)* behaves *as if* she were more moderate (i.e., has more symmetric stopping rules).

Notice that, for $x_e = \frac{1}{2}$, $\bar{n}^*_e - \hat{n}_e = \hat{n}_e - \underline{n}^*_e$ and thus $\mu(\bar{n}^*_e) = 1 - \mu(\underline{n}^*_e)$. Moreover for $x_{e'} > x_e$:

$$\mu(\underline{n}^*_{e'}) < \mu(\underline{n}^*_e) < 1/2 < \mu(\bar{n}^*_{e'}) < \mu(\bar{n}^*_e) \tag{10}$$

Moreover, given the comparative statics results of Proposition 1, it is possible to derive some comparative statics results on the probability of an editor choosing the low-valence candidate.

Corollary 1 *The expected probability of an editor choosing the high-valence candidate P is decreasing in the cost c of gathering information and increasing in the valence parameter δ and in her ideological distance to the candidate's platform $|x_e - P|$. Moreover, the less ideological an editor is, the higher this probability.*

As expected, when the cost of sampling is higher, editors will make more "errors" in the sense that they would be less likely to choose the high-valence candidate. Instead, when editors care more about the quality of candidates their probability of choosing the low-valence candidate decreases (since as shown by Proposition 1, when δ is higher editors acquire more information). Moreover, this probability is decreasing in the "ideological distance" between an editor and the candidate, e.g., more "rightist" editors are less likely to choose candidate L when the high quality one is R and are instead more likely to choose candidate R when the high quality one is L. More generally, from an *ex-ante* perspective, moderate

[22]Notice that it is always the case that either $N_e \equiv \varnothing$ or $N_e \equiv \{\underline{n}^*_e, \underline{n}^*_e + 1, ..., \bar{n}^*_e - 1, \bar{n}^*_e\} \supseteq \{0\}$.

editors are less likely to make a report in favor of the low quality candidate. This is due to the fact that, as shown by Proposition 1, the more moderate an editor is, the more symmetric her sampling strategy is and also the more information she acquires before making a decision. Therefore, by taking on average a "more informed" decision, moderate editors are less likely to choose the low quality candidate. Hence, the less moderate an editor is, the lower the expected accuracy of her news reports (i.e., lower probability of endorsing the high-valence candidate)

At this point, it is important to remark that I am not implying in any way that moderate editors have any higher intrinsic value *per se* with respect to ideological editors. Moderate editors simply provide a useful benchmark since their perfectly symmetric stopping thresholds correspond to what is usually considered as a "fair and balanced" news report.[23] Indeed, a moderate editor requires the exact same amount of evidence in favor of either candidate to stop acquiring information and choose that candidate. Hence, moderate editors are used as the benchmark for the discussion throughout the paper simply because the idea of "fair and balanced" news reports may implicitly suggests that rational citizens should always demand this type of news (i.e., there should not be any media slant). Nevertheless, as indeed shown in the next section, these "fair and balanced" news reports are not necessarily the optimal ones from the perspective of every single citizen.

4 The Demand for News

This section analyzes the demand by citizens for the news reports of a media outlet as a function of the optimal stopping rules of its editor. Given the idiosyncratic preferences of a media outlet's editor, each citizen i can infer the set of possible reports of a media outlet (i.e., citizen i knows that the editor will either stop acquiring information after having collected $\underline{n}_e^*$ signals in favor of L or $\bar{n}_e^*$ in favor of R). Hence, analogously to the literature on citizen-candidates where citizens know that a candidate has a personal commitment to implement a given policy, in the model citizens know that an editor has a personal commitment to implement a given information acquisition strategy.[24] From the citizens' perspective, it is equivalent whether the editor produces a coarse news report (e.g., endorsement) or she produces a news report showing all the signals (e.g., evidence) collected. Indeed, upon observing a coarse news report, citizens are able to infer which stopping threshold has been reached by the editor since they know the editor's idiosyncratic preferences. Moreover, this stopping threshold contains all the information needed by citizens to update their beliefs (i.e., the net difference of signals in favor of a candidate).

Let the citizens' action space be $A = \{W, NW\}$ where W stands for watching the news

[23]For example, the idea of "fair and balanced" news reports was at the foundation of the FCC Fairness Doctrine in the US. Similarly, as stated by the BBC in the UK, "Impartiality lies at the heart of public service and is the core of the BBC's commitment to its audiences" (www.bbc.co.uk/guidelines/editorialguidelines)

[24]See sections 6.3 and 6.5 for a discussion on this issue.

reports and NW for not watching the news reports. Then, the expected utility of citizen i from not getting any news report from the media outlet is:

$$U_i(NW) = \begin{cases} U_i\left(L|\frac{1}{2}\right) & \text{for } x_i < \frac{1}{2} \\ U_i\left(R|\frac{1}{2}\right) & \text{for } x_i > \frac{1}{2} \end{cases}$$

If instead citizen i decides to pay a cost C to access the news report of an editor with idiosyncratic preferences x_e, her expected utility will be:

$$\begin{aligned} U_i(W, x_e) = \Pr(n = \underline{n}_e^*) \max\left\{U_i\left(L|\mu(\underline{n}_e^*)\right); U_i\left(R|\mu(\underline{n}_e^*)\right)\right\} \\ + \Pr(n = \bar{n}_e^*) \max\left\{U_i\left(L|\mu(\bar{n}_e^*)\right); U_i\left(R|\mu(\bar{n}_e^*)\right)\right\} - C \end{aligned} \tag{11}$$

Where the probabilities of reaching the two stopping threshold $\underline{n}_e^*$ and $\bar{n}_e^*$ are:[25]

$$\Pr(n = \underline{n}_e^*) = \frac{2\mu(\bar{n}_e^*) - 1}{2\left[\mu(\bar{n}_e^*) - \mu(\underline{n}_e^*)\right]} \tag{12}$$

and

$$\Pr(n = \bar{n}_e^*) = \frac{1 - 2\mu(\underline{n}_e^*)}{2\left[\mu(\bar{n}_e^*) - \mu(\underline{n}_e^*)\right]} \tag{13}$$

Let's now focus on the marginal viewer. That is, the viewer who is indifferent between watching and not watching the media outlet's reports. Specifically, there will be two marginal viewers. One representing the most rightist citizen willing to watch news reports from a media outlet having an editor with idiosyncratic preferences x_e. The other one representing the most leftist citizen willing to watch such news reports. Hence, there will be a $\hat{x}_e = \hat{x}_e(x_e)$ and a $\tilde{x}_e = \tilde{x}_e(x_e)$ with $\hat{x}_e < \tilde{x}_e$ such that only citizens with $x_i \in [\hat{x}_e, \tilde{x}_e]$ will watch the news reports.[26]

Let's start analyzing the marginal viewer for $x_i < \frac{1}{2}$. Then $U_i(NW) = U_i\left(L|\frac{1}{2}\right)$ and since by (10) $\underline{n}_e^* < 0 < \bar{n}_e^*$, it must be the case that:

$$U_i\left(L|\mu(\underline{n}_e^*)\right) > U_i\left(R|\mu(\underline{n}_e^*)\right)$$

Moreover, the following individual rationality constraint must be satisfied for leftist citizens:

$$U_i\left(L|\mu(\bar{n}_e^*)\right) < U_i\left(R|\mu(\bar{n}_e^*)\right) \tag{IR_L}$$

otherwise, if $U_i\left(L|\mu(\bar{n}_e^*)\right) > U_i\left(R|\mu(\bar{n}_e^*)\right)$ (i.e., if citizen i would always prefer alternative L regardless of watching or not the news reports) then watching the news reports would never be *ex-post* rational given the cost C. Thus the marginal leftist viewer will be the one having

[25]These are simply the probabilities of hitting the two stopping thresholds in a stochastic process with two absorbing states (see Brocas and Carrillo, 2007). The online appendix provides a formal derivation of these probabilities.

[26]Notice that it could also be the case that $\hat{x}_e > \frac{1}{2}$ or $\tilde{x}_e < \frac{1}{2}$ but, clearly, not both.

idiosyncratic preferences $\hat{x}_e$ such that:

$$U_i\left(L\left|\frac{1}{2}\right.\right) = \frac{2\mu(\bar{n}_e^*)-1}{2\left[\mu(\bar{n}_e^*)-\mu(\underline{n}_e^*)\right]}U_i\left(L|\mu(\underline{n}_e^*)\right) + \frac{1-2\mu(\underline{n}_e^*)}{2\left[\mu(\bar{n}_e^*)-\mu(\underline{n}_e^*)\right]}U_i\left(R|\mu(\bar{n}_e^*)\right) - C$$

hence:

$$\hat{x}_e = \frac{1}{2} - \delta(2\mu(\bar{n}_e^*)-1) + \frac{C}{2\Pr(n=\bar{n}_e^*)} \tag{14}$$

Notice also that the *ex-post* rationality constraint (IR_L) is satisfied as long as $x_i > \frac{1}{2} - \delta(2\mu(\bar{n}_e^*)-1) = x^{\min}$. Hence, since $\hat{x}_e > x^{\min}$, such constraint is automatically satisfied for any citizen willing to watch the news reports.

Let's now focus on the marginal viewer for $x_i > \frac{1}{2}$. Then $U_i(NW) = U_i\left(R|\frac{1}{2}\right)$ and since by (10) $\underline{n}_e^* < 0 < \bar{n}_e^*$, it must be the case that:

$$U_i\left(R|\mu(\bar{n}_e^*)\right) > U_i\left(L|\mu(\bar{n}_e^*)\right)$$

Moreover, the following individual rationality constraint must be satisfied for rightist citizens:

$$U_i\left(L|\mu(\underline{n}_e^*)\right) > U_i\left(R|\mu(\underline{n}_e^*)\right) \tag{IR_R}$$

otherwise, if $U_i\left(L|\mu(\underline{n}_e^*)\right) < U_i\left(R|\mu(\underline{n}_e^*)\right)$ (i.e., if citizen i would always prefer alternative R regardless of watching or not the news reports) then watching the news reports would not be *ex-post* rational given the cost C. Thus the marginal rightist viewer will be the one having idiosyncratic preferences $\tilde{x}_e$ such that:

$$U_i\left(R\left|\frac{1}{2}\right.\right) = \frac{2\mu(\bar{n}_e^*)-1}{2\left[\mu(\bar{n}_e^*)-\mu(\underline{n}_e^*)\right]}U_i\left(L|\mu(\underline{n}_e^*)\right) + \frac{1-2\mu(\underline{n}_e^*)}{2\left[\mu(\bar{n}_e^*)-\mu(\underline{n}_e^*)\right]}U_i\left(R|\mu(\bar{n}_e^*)\right) - C$$

hence:

$$\tilde{x}_e = \frac{1}{2} + \delta(1-2\mu(\underline{n}_e^*)) - \frac{C}{2\Pr(n=\underline{n}_e^*)} \tag{15}$$

Notice also that the *ex-post* rationality constraint (IR_R) is satisfied as long as $x_i < \frac{1}{2} + \delta(1 - 2\mu(\underline{n}_e^*)) = x^{\max}$. Hence, since $\tilde{x}_e < x^{\max}$, such constraint is automatically satisfied for any citizen willing to watch the news reports. The following condition is assumed:

Assumption 1

$$C < C^{\max} = \delta\left(\frac{1-\lambda^{\bar{n}_e^*|_{x_e=\frac{1}{2}}}}{1+\lambda^{\bar{n}_e^*|_{x_e=\frac{1}{2}}}}\right)$$

where $\lambda = \frac{1-\theta}{\theta}$. It is easy to prove that when this assumption does not hold, there will never be any leftist or rightist citizen willing to watch any news report. The following lemma contains the main properties of the demand for news.

Lemma 1 *Let $(\bar{n}_e^*, \underline{n}_e^*)$ be the optimal stopping rules of an editor with idiosyncratic preferences x_e. Then, $(\tilde{x}_e - \hat{x}_e)$ is decreasing in C and increasing in δ, $\bar{n}_e^*$ and $|\underline{n}_e^*|$. Moreover, there* *is always an upper bound on the "extremism" of an editor above which* $(\tilde{x}_e - \hat{x}_e)$ *is strictly decreasing. Specifically,* $\tilde{x}_e$ *is increasing in* x_e *if and only if* $x_e < x_{e_R}^{\max}$ *where* $x_{e_R}^{\max} \in \left(\frac{1}{2}, 1\right)$ *is such that:*

$$\tilde{C}(\bar{n}_e^*(x_{e_R}^{\max}), \underline{n}_e^*(x_{e_R}^{\max})) = C \tag{16}$$

where $d\tilde{C}(\bar{n}_e^*, \underline{n}_e^*)/dx_e < 0$ *and* $\tilde{C}(\bar{n}_e^*, \underline{n}_e^*) \in (0, C^{\max})$*. Similarly,* $\hat{x}_e$ *is increasing in* x_e *if and only if* $x_e > x_{e_L}^{\min}$ *where* $x_{e_L}^{\min} \in (0, \frac{1}{2})$ *is such that:*

$$\hat{C}(\bar{n}_e^*(x_{e_L}^{\min}), \underline{n}_e^*(x_{e_L}^{\min})) = C \tag{17}$$

where $d\hat{C}(\bar{n}_e^*, \underline{n}_e^*)/dx_e > 0$ *and* $\hat{C}(\bar{n}_e^*, \underline{n}_e^*) \in (0, C^{\max})$*.*

The above lemma summarizes the main features of the demand for news media by citizens. Hence, it represents the main building-block for all the results that will be obtained in the next section when discussing the optimal choice of editors by profit-maximizing media outlets within a given market structure (i.e., monopoly, duopoly or an arbitrary number of competing media outlets).

Obviously, a higher opportunity cost of watching news reports decreases the number of leftist and rightist citizens willing to watch such reports. Instead, the higher the valence component in the citizens utility function, the more leftist and rightist citizens will want to watch news. Hence, the more citizens care about knowing the state of the world, the more citizens will get informed. At the same time, all citizens care about receiving the most accurate information, i.e., the lower is $\underline{n}_e^*$ and the higher is $\bar{n}_e^*$, the more citizens will want to get informed. Indeed, all citizens who value information (i.e., the ones whose *ex-post* ranking of candidates is not always the same as their *ex-ante* one) would like to watch a media outlet having an editor who samples in both directions until infinity, since the more information she gets, the higher the citizens' expected utility. However, given the editor's cost of acquiring information and the opportunity cost that each citizen faces when accessing this information, when a citizen is choosing whether to watch a media outlet and/or choosing among alternative news media outlets, she takes into account two different components. Specifically, she considers how similar an editor's idiosyncratic preferences are to hers (i.e., how "valuable" the information provided by an editor could be to her) but she also values the expected accuracy of information acquisition by an editor (i.e., how much information an editor is acquiring and thus providing, on average).

Hence, the model points out the presence of two rationales explaining why citizens find optimal to watch a media outlet whose editor has similar idiosyncratic preferences. For citizens with preferences $x_i < \hat{x}_e|_{x_e=\frac{1}{2}}$ and $x_i > \tilde{x}_e|_{x_e=\frac{1}{2}}$ only a media outlet with an editor with similar idiosyncratic preferences can be pivotal for their choice (i.e., they never find valuable the information coming from a moderate editor). Hence, either they will watch a media outlet with an editor with (sufficiently) similar preferences or they will not watch any media outlet at all.

On the other hand, citizens with preferences $x_i \in \left[\hat{x}_e|_{x_e=\frac{1}{2}}, \frac{1}{2}\right) \cup \left(\frac{1}{2}, \tilde{x}_e|_{x_e=\frac{1}{2}}\right]$ find the information coming from a moderate editor valuable, but they may find the information coming from an editor with similar idiosyncratic preferences even more valuable. That is, these citizens face a basic trade-off between the "objective" difference in the expected accuracy of news reports coming from different types of editors and their "subjective" value. A citizen could make two specular errors. She may choose L when L is the low quality candidate. Similarly, she may choose R when R is the low quality candidate. A moderate citizen (i.e., $x_i = \frac{1}{2}$) cares about these two errors equally. Hence, she always prefers to watch a media outlet having a moderate editor since such an editor minimizes the overall probability of making errors (see Corollary 1).[27] On the other hand, for example, a liberal-moderate citizen cares more about not making the error of choosing R when $s = l$. As shown by Corollary 1, a liberal editor has a lower probability of making such error but a higher probability of making a report in favor of L when $s = r$ and a higher overall probability of making errors. Hence, when choosing between a media outlet with a moderate editor and one with an ideologically-closer editor, any citizen will trade-off the *expected accuracy* and the *value* of information provided by these different types of editors.[28] Therefore, rational citizens may prefer a media outlet with a like-minded editor simply because they derive a higher utility from the set of information acquired by such an editor with respect to the one acquired by a moderate editor.

At the same time, as shown by the above lemma, the presence of a trade-off between the *expected accuracy* and the *value* of information implies that there will always be an upper bound on the "extremism" of an editor above which the demand for news by rational citizens will be strictly decreasing. Thus, depending on the opportunity cost of acquiring information, rational liberal (conservative) citizens may prefer a slightly more moderate-liberal (conservative) editor to a less moderate one.

Therefore, since $\tilde{x}_e$ is always increasing in x_e for $x_e \leq 1/2$ and $\hat{x}_e$ is always increasing in x_e for $x_e \geq 1/2$, this rational framework is able to explain the presence of preferences for like-minded sources of information. That is, the above lemma provides a rationale for the presence of a demand for news coming from ideological editors. At the same time, it also points out that rational citizens would never find optimal to demand news coming from editors having very extreme ideological preferences since the expected accuracy of such editors is very low. Hence, behavioral models (as the one of Mullainathan and Shleifer, 2005) remain probably better suited to explain the presence of a demand for news coming from extremist editors.

The following section analyzes the implications of such demand for news for the optimal

[27]Therefore, as a side result, the model also provides a rationale for why citizens with non-ideological preferences over candidates (i.e., moderate citizens) also prefer to watch news coming from a like-minded editor (i.e., a moderate editor).

[28]Durante and Knight (2010) analyze the demand for news in Italy. They show that, indeed, when the ideological position of a media outlet changes, viewers change their choice of news programs accordingly.

choice of editors by profit maximizing media outlets.

5 Optimal Choice of Editors by Media

5.1 Monopoly

This section analyzes the implications of the citizen-editors model in a monopolistic market. The media outlet's owner wants to choose x_e to maximize viewership. Choosing an editor from the population of citizens is analogous to choosing a "product" location on the $[0, 1]$ line. Suppose the media outlet's owner chooses an editor with idiosyncratic preferences x_e. Then, the profit function is:

$$\Pi(x_e, \hat{x}_e, \tilde{x}_e) = D(x_e, \hat{x}_e, \tilde{x}_e) = F(\tilde{x}_e) - F(\hat{x}_e)$$

where $F(\tilde{x}_e)$ and $F(\hat{x}_e)$ are increasing functions of x_e. Hence, the media outlet owner will choose an editor with preferences x_e^{mon} such that:

$$\left.\frac{d\Pi(x_e)}{dx_e}\right|_{x_e = x_e^{mon}} = 0$$

The following proposition characterizes under which conditions a profit-maximizing media outlet will choose a moderate editor and under which conditions it will choose an ideological one.

Proposition 2 *Suppose there is just a monopolist profit-maximizing media outlet in the market for news. For any symmetric $f(x)$, then:*

1. *If*

$$\frac{\partial f(x)}{\partial x} \begin{cases} \geq 0 \text{ for } x \leq \frac{1}{2} \\ \leq 0 \text{ for } x > \frac{1}{2} \end{cases} \qquad \text{(Condition A)}$$

   then the media outlet will always choose a moderate editor (i.e., $x_e^{mon} = \frac{1}{2}$).

2. *If*

$$\frac{\partial f(x)}{\partial x} \begin{cases} < 0 \text{ for } x < \frac{1}{2} \\ > 0 \text{ for } x \geq \frac{1}{2} \end{cases} \qquad \text{(Condition B)}$$

   then the media outlet will always choose an ideological editor with preferences $x_e^{mon} \in \left[x_{e_L}^{\min}, \frac{1}{2}\right) \cup \left(\frac{1}{2}, x_{e_R}^{\max}\right]$

The above proposition shows that a monopolist media outlet will always choose a moderate editor when citizens are distributed uniformly or when the mass of moderate citizens is higher than the one of ideological ones (i.e., when Condition A applies). Instead, if the number of moderate citizens is lower than the one of ideological ones, the media outlet will prefer to choose an ideological editor (i.e., when Condition B applies). Indeed, in such a case the media outlet may increase its demand since many ideological citizens are willing to watch its news reports. At the same time, most moderate citizens will still want to acquire information from such a source rather than not acquiring any information at all.

Hence, when the media outlet is just maximizing profits, even though citizens do not derive any exogenous utility from biased information, the endogenous acquisition of costly information may induce a media outlet to choose an editor whose optimal information acquisition strategy is slanted in favor of the alternative *ex-ante* preferred by a subset of citizens (e.g., the rightists one).

However, even in this case the optimal editor will not be "too extremist". Ideological citizens will indeed trade-off the benefit of having an editor with similar preferences and the cost of having an editor who will sample relatively less, i.e., whose news reports have a lower expected accuracy. Hence, as shown by Lemma 1, after some point, choosing a more rightist (leftist) editor will decrease even the number of rightist (leftist) citizens willing to watch the media outlet, i.e., for $x_e > x_{e_R}^{\max}$ ($x_e < x_{e_L}^{\min}$).

5.2 Duopoly

Suppose now that $K = 2$. That is, the market for news is composed of two profit maximizing media outlets. The following proposition summarizes the possible Nash equilibria that can arise in this case depending on the distribution of citizens' preferences.[29]

Proposition 3 *Suppose there are two media outlets in the market for news. For any symmetric $f(x)$, then:*

1. *If Condition A is satisfied, then both media outlets will choose moderate editors (i.e., $x_{e_1} = x_{e_2} = \frac{1}{2}$).*
2. *If Condition B is satisfied then $\exists C^{Dev} < C^{\max}$ such that:*
   - *(a) If $C > C^{Dev}$,then both media outlets will choose moderate editors (i.e., $x_{e_1} = x_{e_2} = \frac{1}{2}$)*
   - *(b) If $C < C^{Dev}$, then the two media outlets will choose ideological editors having symmetric idiosyncratic preferences, i.e., $x_{e_1} = 1 - x_{e_2}$ where $x_{e_1}, x_{e_2} \in \left[x_{e_L}^{\min}, \frac{1}{2}\right) \cup \left(\frac{1}{2}, x_{e_R}^{\max}\right]$. Moreover, the lower is C the higher is $|x_{e_1} - x_{e_2}|$.*

[29]Each citizen is implicitly assumed to watch at most one media outlet (which is, for example, the case when two television news programs broadcast at the same time or when there is an upper bound on the opportunity cost of watching news, e.g., time constraint). Nevertheless, as discussed in section 6.4, this assumption is without loss of generality. If citizens were to acquire information from multiple sources, the incentives of media outlets to choose ideological editors would only be reinforced.

When Condition A holds, despite the fact that by choosing, for example, a rightist editor a media outlet would increase the number of rightist citizens willing to watch its news (i.e., higher marginal rightist viewer), the net effect on the demand of choosing this editor rather than a moderate one would be always negative. Since choosing a less moderate editor also implies choosing an editor who will sample relatively less with respect to a more moderate one, the negative effect on moderate citizens' viewership would be higher than the positive effect on rightist citizens' viewership.

Moreover, even when Condition B holds, if the opportunity cost of acquiring information is high, the two media outlets will both choose moderate editors. This is the only case where a media outlet may not find it convenient to choose an ideological editor in a duopoly while it would in a monopoly. The reason behind this difference is that in the monopoly case choosing, for example, a rightist editor instead of a moderate one will decrease the demand for news by leftist citizens. However, moderate citizens will still be willing to watch such media outlet rather than not acquire any information at all. Instead, in the duopoly case, when the opportunity cost of acquiring information is high, by choosing a rightist editor, a media outlet may face a reduction in the demand for its news by *moderate* citizens larger than the increase in the demand by rightist citizens.

On the other hand, when the opportunity cost is low, the demand for news by extremist citizens will be high enough to induce media outlets to choose ideological editors. Thus, the two media outlets will end up choosing specular types of ideological editors. That is, while in the monopolistic case there was only a rightist (or leftist) editor, in presence of two media outlets there will be also a leftist (or rightist) editor. Moreover, the lower is the opportunity cost, the higher will be the difference between the idiosyncratic preferences of the editors chosen by the two media outlets. Finally, given the results of Lemma 1, even in this case optimal editors could never be "too extremist".

5.3 Multiple Media Outlets

This section analyzes the case where there are multiple media outlets in the market for news, i.e., $K > 2$. The above analysis has shown that when moderate citizens are uniformly distributed in the policy space, or when the mass of moderate citizens is higher than the one of ideological citizens, media outlets will choose moderate editors both in a monopoly and in a duopoly. The following proposition shows that when there are multiple media outlets in the market for news, this is not always the case. Specifically, when $x_i \sim U[0,1]$, as the number of media outlets present in the market increases, the equilibrium where every media outlet chooses a moderate editor is not sustainable anymore. Indeed, any media outlet would have an incentive to differentiate its "news product" by choosing an ideological editor.

Proposition 4 *Suppose that citizen's idiosyncratic preferences are distributed uniformly in* $[0,1]$. *Then,* $\exists K^* \in (2,\infty)$ *such that for* $K > K^*$ *the set* $\left\{x_{e_j} = \frac{1}{2}, \forall j = 1, ..., K\right\}$ *is* *not anymore an equilibrium. In such case, it still exists a symmetric mixed-strategy Nash equilibrium. Moreover, K^* is increasing in C.*

The above proposition shows that when the market for "moderate news" gets crowded, media outlets will prefer to choose a different location for their news product. That is, the higher the degree of competition in the market for news, the more likely it is that media outlets will choose ideological editors. This result is consistent with the emerging empirical evidence comparing the degree of ideological polarization of news sources in the online market for news with respect to the offline media market, e.g., online newspapers and blogs with respect to traditional newspapers and TV. Indeed, the higher number of competing media outlets present in the online market for news seems to be associated with a higher degree of ideological polarization with respect to the offline market for news (Sunstein, 2007; Gentzkow and Shapiro, 2011).

At the same time, even though more competition brings more slant in news reports, it still has a positive effect on citizens' welfare since it allows a fraction of the population (i.e., very liberal and very conservative citizens) to access a valuable source of information and another one (i.e., liberal-moderates and conservative-moderates citizens) to choose a source of information yielding a higher expected utility. Hence, more competition brings more viewpoint diversity which has indeed a positive effect on citizens' welfare. Nevertheless, it is important to point out that, in a more general framework, the effects of competition on citizens' welfare could be more subtle. Specifically, in a repeated game, the short run polarization of beliefs is going to reinforce the demand for news coming from like-minded sources (see Gentzkow and Shapiro 2006). Hence, this may result in a long run polarization of beliefs and, thus, of choices by different citizens.[30]

Moreover, since the higher the opportunity cost of acquiring information, the less extremists citizens will find it optimal to acquire information, as such cost increases the likelihood of media outlets choosing ideological editors decreases.[31] That is, it is possible to reinterpret the above proposition with respect to C. For a given $K > 2$, there will exist a $C^*(K)$ such that for $C > C^*(K)$, all media outlets will choose a moderate editor from the population of citizens. Instead, for $C < C^*(K)$, media outlets will choose ideological editors. This result, along with the ones of Propositions 2 and 3, suggests that more moderate editors should be expected to prevail in a news market where the opportunity cost is high. A clear application of this result is represented by the differences between the broadcast media sector with respect to the press. The opportunity cost of watching a report from a broadcast media is arguably lower than the one of reading a newspaper. The analysis thus suggests that, all other things equal, more moderate editors should be present in the press sector than in the

[30]See also Suen (2004) for a model with heterogeneous priors and coarse information leading to a "short-run" polarization of beliefs. On the other hand, when media bias originates from the supply-side, a higher degree of competition typically decreases media bias and increases citizens' welfare (Besley and Prat 2006, Ellman and Germano 2009, Anderson and McLaren 2010, Germano and Meier 2010).

[31]Indeed $\lim_{C \to C^{\max}} K^* \to \infty$.

broadcast media sector. At the same time, there should be more extremist citizens watching broadcast media and a higher overall demand for broadcast media with respect to the one faced by the press.

6 Discussion

6.1 Scope of the model

While the main application of the paper focuses on the citizens' choice between alternative candidates, the framework easily extends to a broader set of applications beyond the political environment. Specifically, the model provides a general economic rationale for endogenous preferences for like-minded sources of information. Suppose, for example, that a consumer is interested in buying a car and she is undecided between a domestic and a foreign car. Her decision is likely to depend both on her idiosyncratic taste (e.g., esthetic idiosyncratic valuation of the car) and on the quality of these two types of cars (i.e., the "valence" of the car). What is the best source of information for a consumer facing this choice? (i.e., which kind of car magazine would she find optimal to read?). The model suggests that a consumer whose idiosyncratic preferences are more in favor of the domestic car would like to read a car magazine whose editor share similar idiosyncratic preferences in favor of domestic cars. A similar intuition applies to a situation where an individual has to decide whether to invest in a risky or in a safe asset. The model predicts that individuals who are very risk adverse should acquire information from a media outlet with a very risk adverse editor and *viceversa*. In turn, this implies that different media outlets will find optimal to choose editors with different idiosyncratic preferences (i.e., different optimal information acquisition strategies) who will cater to different audiences.

6.2 Private Value of Information and Utility

As usual in the literature on the demand for news (e.g., Strömberg, 2004b; Mullainathan and Shleifer, 2005; Gentzkow and Shapiro, 2006; Chan and Suen, 2008; Anderson and McLaren, 2010) I have assumed that citizens receive utility from choosing a given candidate/alternative *per se*.[32] Since news has a public-good nature and the probability of being pivotal is close to zero, the expected benefit of acquiring information is likely to be negligible. That is, acquiring information is a typical free-riding problem. Hence, in my model, as in the rest of this literature, it is necessary to explain why citizens bother spending the opportunity cost of watching TV news or reading newspapers.

A straightforward rationale for the demand for news is the one proposed by Strömberg (2004b) and Anderson and McLaren (2010). That is, citizens may be using news reports

[32] Similarly, the model shares with this literature the implicit assumption that a citizen must watch the news report in order to learn its information content.

to decide on a private action whose value depends on the public policy implemented (or candidate elected). For example, the news could cover the quality and virtues of the public school system and the private decision is the choice between enrolling in a public or in a private school. That is, the willingness to acquire information on the state of the world "in order to make a more informed private decision generates a market demand for news, and through the voting system affects the direction of the public decision" (Anderson and McLaren 2010, page 9).[33]

6.3 Media Outlets' Profits and Information Acquisition

Since the main focus of the paper is on the demand for slanted news, the model provides a stylized representation of media outlets' profits. Considering a more general compensation mechanism for the editor would affect both the revenues and the costs of a media outlet. Once on the job, editors (and journalists) are the ones who will spend time and exert effort to collect evidence on any given issue. That is, media outlets do not directly bear this day to day cost of information acquisition. Nevertheless, in order to increase its profits, a media outlet may try to induce its editor to change her optimal information acquisition strategy by designing an incentive mechanism. As shown by Lemma 1, ideally all citizens would like to watch a media outlet whose editor keeps acquiring information until she learns the true state of the world (i.e., $\underline{n}_e^* = -\infty, \bar{n}_e^* = \infty$). However, it is not feasible for the media outlet to induce the editor to adopt such a sampling strategy. This is true for two simple reasons: *i*) information acquisition is costly for the editor and hence it is also costly for the media outlet to compensate the editor for acquiring extra pieces of information; *ii*) the media outlet cannot monitor the information gathered by the editor (i.e., the media outlet cannot observe the draws sampled by the editor). Nevertheless, a media outlet may induce an editor to choose stopping rules which are higher (in absolute value) with respect to the ones she would choose in the absence of any incentive mechanism. In this perspective, a simple incentive mechanism that the media outlet could implement is to offer to the editor a share α of the media outlet's profits. This would induce the editor to choose higher (in absolute value) stopping rules. Indeed, in the absence of perfect monitoring, an incentive scheme rewarding the editor for each extra piece of evidence collected would produce the same results of a decrease in the marginal cost of sampling c (i.e., any signal acquired is more valuable or, equivalently, less costly). That is, as shown by Proposition 1, a lower c induces an editor to acquire more information.[34] Similarly, the media outlet (or, more generally, the market for news) may provide an editor with a "reputation premium" when her news reports turn out to be accurate (i.e., when endorsing the high-valence candidate). That is, the editor may receive an extra positive payoff when her choice over candidates match the

[33]See also Piolatto and Schuett (2011) for a model of the demand for news by ethical voters.

[34]Notice that a media outlet may also decrease c by giving the editor more resources to produce the news reports (e.g., more correspondents, better technology, more resources to investigate an issue, etc.).

true state of the world. It is immediate to see how such an incentive mechanism is equivalent to increasing the value of the valence parameter δ in the editor's utility function. Hence, as shown by Proposition 1, the presence of a "reputation premium" would induce editors to acquire more information before producing a news report.

Therefore, incentive mechanisms aimed at decreasing the (net) marginal cost of sampling or at increasing the editor's valence parameter would, indeed, increase the informativeness of the editor's news reports. Nevertheless, such incentive mechanisms would not change the main results of the model since the stopping rules of ideological editors would still be asymmetric. Indeed, as shown by Proposition 1, the presence of a private value component in the editor's utility function always results in an ideological editor adopting a slanted information acquisition strategy.[35]

Moreover, it would be extremely costly for a media outlet to induce a moderate editor to gather an amount of information such that even extremists citizens would consider this media outlet a valuable source of information.[36] In addition, as discussed in section 4, while all citizens with preferences $\hat{x}_e|_{x_e=\frac{1}{2}} < x_i < \tilde{x}_e|_{x_e=\frac{1}{2}}$ find the information coming from a moderate editor valuable, some of them would find the information coming from an editor with similar idiosyncratic preferences even *more* valuable. Hence, there will always be a demand for "slanted" news by ideological citizens that a media outlet may capture by hiring an ideological editor.[37]

6.4 Multiple Sources of Information

Throughout the analysis, it was assumed that citizens watch at most one media outlet. Nevertheless, while such assumption greatly simplifies the analysis, the intuition and the main results of the model do not rely on it. Indeed, if citizens were to acquire information from multiple sources, the incentives of media outlets to choose ideological editors would only be *reinforced*. For any citizen, watching two media outlets with a moderate editor has the same value of watching only one. Specifically, after having observed the news report of a moderate editor, watching an additional media outlet with another moderate editor would either not change the citizen's ranking of preferences, or it would lead citizen's posterior beliefs to be equal to the prior (i.e., the two reports would just "cancel" each other). Hence, if citizens could access multiple sources of information, the incentives of media outlets to differentiate their products by hiring ideological editors would, indeed, be higher.

[35]Moreover, the cost of acquiring information by editors may be also reinterpreted as a discount factor (see Brocas and Carrillo 2009). In such case, each editor has to decide *when* to stop gathering information. Hence, by inducing an editor to sample more, a media outlet would also delay the release of the news report which may have a negative effect on the demand for it and, hence, on the profits.

[36]Indeed, $\hat{x}_e \to 0$ and $\tilde{x}_e \to 1$ if and only if $\underline{n}_e^* \to -\infty, \bar{n}_e^* \to \infty$, $\delta \to 1/2$ and $C \to 0$.

[37]Moreover, it would be cheaper for a media outlet to capture such demand for "slanted" news of non-moderate citizens by hiring an editor with similar idiosyncratic preferences, rather than hiring a moderate one and provide her with incentives to acquire a large amount of information in both directions.

6.5 Editor's Influence on Citizens

In the model the utility of the editor depends on her own choice. Nevertheless, even if the editor's utility were to depend on the *citizens'* choice, the information acquisition strategy of the editor would not change. Indeed, the only credible strategy by an editor with idiosyncratic preferences x_e is to report $\underline{n}_e^*$ upon reaching $\underline{n}_e^*$ and to report $\bar{n}_e^*$ upon reaching $\bar{n}_e^*$. Since citizens know the idiosyncratic preferences of the editor, even if she were to try to influence citizens' choice by over-reporting the number of signals in favor of a given candidate, citizens would still be able to perfectly discount her "bias" and infer the actual stopping threshold (i.e., any $n > \bar{n}_e^*$ would be interpreted as $\bar{n}_e^*$ and any $n < \underline{n}_e^*$ as $\underline{n}_e^*$).

Notice that the model could indeed be seen as a special case of a commitment-free mechanism of Bayesian persuasion, as defined by Kamenica and Gentzkow (2011), where the Sender (the editor) can influence the choice of a rational Bayesian Receiver (the citizens) by influencing her beliefs. Specifically, in my setting the fact that the Sender's preferences depend on the state of the world and acquiring signals is costly, mitigates the incentive compatibility constraints. That is, there is an endogenous commitment mechanism arising from the editor's idiosyncratic preferences **and** the cost of drawing a signal. The Receiver knows that the only credible signal realization is the one implicitly defined by the two stopping thresholds of the Sender (i.e., the editor can only credibly commit to such signal acquisition strategy).[38] Hence, since there is an alignment of preferences between the Sender and the Receiver (i.e., all citizens willing to acquire information from a given editor will have the same *ex-post* ranking of preferences as the one of the editor), the Sender will truthfully reveal the signal realization.

Obviously, in the presence of uncertainty on the editor's idiosyncratic preferences there would also be uncertainty on the editor's optimal stopping thresholds. That is, if citizens only knew that $x_e \sim g(x)$ with $supp(x) = \left[x_e^A, x_e^B\right]$ and $x_e^A < x_e^B$, then they would also know that $\underline{n}_e^* \sim g(\underline{n}_e^*(x_e))$ with $supp\left[g(\underline{n}_e^*(x_e))\right] = \left[\underline{n}_e^B, \underline{n}_e^A\right]$ where $\underline{n}_e^B = \underline{n}_e^*(x_e^B) < \underline{n}_e^A = \underline{n}_e^*(x_e^A)$, since there is a one-to-one mapping between preferences and optimal stopping thresholds. Similarly, $\bar{n}_e^*(x_e) \sim g(\bar{n}_e^*(x_e))$ with $supp\left[g(\bar{n}_e^*(x_e))\right] = \left[\bar{n}_e^B, \bar{n}_e^A\right]$ where $\bar{n}_e^B = \bar{n}_e^*(x_e^B) < \bar{n}_e^A = \bar{n}_e^*(x_e^A)$. In presence of such additional source of uncertainty, the editor will have an incentive to over-report signals in favor of the preferred candidate once she has reached one of the two stopping thresholds. That is, such uncertainty would introduce in the model a "supply-driven" bias in news reports since the editor would have an incentive to bias its news reports by *selectively omitting* a subset of her information. Nevertheless, if the editor had to report $\bar{n}_e^A$, citizens' posterior beliefs would be $\mu(\bar{n}_e^A) = \mu(E(\bar{n}_e^*(x_e)|\bar{n}_e^A))$.[39] That is, citizens will still be able to infer the interval in which the optimal editor's stopping threshold lies and discount their posterior beliefs accordingly. Hence, the main mechanism and intuition of the model

[38] Any other mechanism would, simply, not be credible. The stopping thresholds represent the **net** difference in the number of signals in favor of one candidate. Hence, once the editor has reached one of the two thresholds, she has always an incentive to hide signals against the endorsed candidate.

[39] Similarly, upon reporting $\bar{n}_e^B$, citizens' posterior beliefs would be $\mu(\bar{n}_e^B) = \mu(E(\bar{n}_e^*(x_e)|\bar{n}_e^B))$.

would not change. Obviously, the more ideologically distant from the endorsed candidate the editor is believed to be, the more influential her reports will be. In other words, the editor's endorsement will be stronger: *i*) the more moderate the editor is believed to be, upon endorsing the ideologically closer candidate; *ii*) the less moderate the editor is believed to be, upon endorsing the ideologically least preferred candidate. Hence, in most of the cases (i.e., when endorsing the ideologically closer candidate), an editor would like to be believed to be as "unbiased" (i.e., moderate) as possible.[40]

7 Conclusions

The paper has analyzed a market for news in which profit maximizing media outlets choose their editors from the population of citizens. The results identify a novel mechanism of media bias: the bias in a media outlet's news reports may be the result of the slanted optimal information acquisition strategy of its editor.

The analysis has shown that the editors' endogenous information acquisition results in rational citizens finding it optimal to choose a like-minded source of information (i.e., watch a media outlet having an editor with similar idiosyncratic preferences). Indeed, citizens may obtain a higher expected utility from the set of information acquired by a like-minded editor with respect to the one acquired by a moderate editor. Consequently, profit maximizing media outlets may choose ideological editors in order to capture the demand for news of ideological citizens. Hence, even though citizens do not derive any exogenous utility from biased information, they all share the same prior beliefs and media outlets are just maximizing profits, the endogenous acquisition of costly information may induce a media outlet to choose an editor whose optimal information acquisition strategy is "slanted" in favor of the alternative *ex-ante* preferred by a subset of citizens. Therefore, my model provides a novel rationale for the presence of slant in the market for news purely based on the citizens' demand for the most valuable source of information. At the same time, the results also show that there is always an upper bound on the possible "extremism" of an editor above which the demand for news by rational citizens is strictly decreasing.

In a market for news where the opportunity cost of acquiring information for citizens is low, there will be a higher demand by ideological citizens. Thus, ideological editors are more likely to be chosen by media outlets in such market with respect to a market where the opportunity cost of acquiring information is high. A straightforward application of this result lies in the differences between the broadcast media and the press. The model predicts that more moderate editors should be present in the press sector than in the broadcast media sector. Moreover, broadcast media outlets should face a higher demand from extremist citizens (and a higher demand overall) with respect to the one faced by the press.

[40]Indeed, consistent with the theoretical predictions of the model, the empirical analysis of Chiang and Knight (2011) shows that the degree of influence of a newspaper on voters depends on the "credibility" of the endorsement.

The results also show that the higher the degree of competition in the market for news, the more likely that media outlets will choose ideological editors. That is, when the market for news gets crowded, a media outlet may prefer to differentiate its news product by choosing a different location in the policy space (i.e., choose an editor with different idiosyncratic characteristics), rather than sharing the demand for news of moderate citizens with the other media outlets. Thus, this result provides an economic rationale for the higher degree of ideological polarization of news media observed in the online market for news with respect to the offline market for news (Sunstein, 2007; Gentzkow and Shapiro, 2011).

Even though more competition brings more slant in news reports, it still has a positive effect on citizens' welfare since it allows a fraction of the population to access a valuable source of information and another one to choose a source of information yielding a higher expected utility. Nevertheless, it is important to point out that in a more general framework the effects of competition on citizens' welfare may not be so straightforward. In a repeated game, the short run polarization of beliefs would reinforce the demand for news coming from like-minded sources which, in turn, may lead to a long run polarization of beliefs and, thus, of choices by different citizens. More generally, this paper has focused only on the demand for slanted news. In order to carefully assess the effects of competition on citizens' welfare, policy regulators should take into account the possible presence of both demand-driven and supply-driven sources of media bias in the market for news.

References

[1] Alterman, E. 2003. *What liberal media? The truth about bias and the news.* New York: Basic Books.

[2] Anderson, S., P., and McLaren, J. 2010. "Media Mergers and Media Bias with Rational Consumers." *Journal of the European Economic Association,* forthcoming.

[3] Aragones E., and Palfrey T., R. 2002. "Mixed Equilibrium in a Downsian Model with a Favored Candidate." *Journal of Economic Theory,* 103: 131-161.

[4] Bagdikian, B. H. 2004. *The new media monopoly.* Boston: Beacon Press.

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

[6] Besley, T., and Coate, S. 1997. "An Economic Model of Representative Democracy." *The Quarterly Journal of Economics*, 112(1): 85-114.

[7] Besley T., and Prat A. 2006. "Handcuffs for the grabbing hand? Media capture and government accountability." *American Economic Review*, 96(3): 720-736.

[8] Blasco, A., Pin, P., and Sobbrio, F. 2011. "Paying Positive to Go Negative: Advertisers' Competition and Media Reports." *Working Paper DSE 772*, University of Bologna.

[9] Brocas, I. and Carrillo, J., D. 2007. "Influence through Ignorance." *RAND Journal of Economics,* 38(4): 931–947.

[10] Brocas, I. and Carrillo, J., D. 2009. "Information acquisition and choice under uncertainty." *Journal of Economics and Management Strategy,* 18(2): 423-455.

[11] Brocas, I., Carrillo, J., D. and Palfrey, T., R. 2011. "Information Gatekeepers: Theory and Experimental Evidence." *Economic Theory,* forthcoming.

[12] Calvert, R. L. 1985. “The Value of Information: A Rational Choice Model of Political Advice.” *Journal of Politics,* 47: 530–55.

[13] Chan, J., and Suen, W. 2008. “A Spatial Theory of News Consumption and Electoral Competition.” *The Review of Economic Studies,* 75(3): 699-728.

[14] Chiang, C., F., and Knight, B., G. 2011. “Media Bias and Influence: Evidence from Newspaper Endorsements.” *The Review of Economic Studies*, 78(3): 795-820.

[15] Cukierman, A., and Tommasi, M. 1998. “When Does it Take a Nixon to Go to China?” *American Economic Review,* 88(1): 180-197.

[16] Dasgupta, P. and Maskin, E. 1986. “The Existence of Equilibrium in Discontinuous Economic Games II: Applications.” *The Review of Economic Studies*, 53(1): 27-41.

[17] Davies, N. 2008. *Flat Earth News.* London: Vintage.

[18] DellaVigna, S. and Gentzkow, G. 2010. “Persuasion: Empirical Evidence.” *Annual Review of Economics*, 2: 643–69.

[19] DellaVigna, S. and Kaplan, E. 2007. “The Fox News Effect: Media Bias and Voting.” *The Quarterly Journal of Economics,* 122(3): 1187-1234.

[20] Djankov S., McLiesh C., Nenova T., and Shleifer A. 2003. “Who Owns The Media?” *Journal of Law and Economics*, 46: 341-382.

[21] Duggan, J., and Martinelli, C. 2010. “A Spatial Theory of Media Slant and Voter Choice.” *The Review of Economic Studies*, 78(2): 640-666.

[22] Durante R. and Knight B. 2010. “Partisan Control, Media Bias, and Viewer Responses: Evidence from Berlusconi’s Italy.” *Journal of European Economic Association*, forthcoming.

[23] Ellman, M. and Germano, F. 2009. “What do the Papers Sell? A Model of Advertising and Media Bias.” *Economic Journal,* 119: 680-704.

[24] Eisensee, T., and Strömberg, D. 2007. “News Floods, News Droughts, and U.S. Disaster Relief.” *Quarterly Journal of Economics,* 122(2).

[25] Enikolopov, R., Petrova, M., and Zhuravskaya, E. 2011. “Media and Political Persuasion: Evidence from Russia.” *American Economic Review*, 101(7): 3253–85.

[26] Gentzkow, M. 2006. Television and voter turnout. *Quarterly Journal of Economics* 121(3), 931-972.

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

[28] Gentzkow M., and Shapiro J. 2010., “What Drives Media Slant? Evidence from U.S. Daily Newspapers.”, *Econometrica*, 78(1): 35-71.

[29] Gentzkow M., and Shapiro J. 2011., “Ideological Segregation Online and Offline.” *The Quarterly Journal of Economics*, 126 (4): 1799-1839.

[30] Gerber, A., Karlan, D., S. and Bergan, D. 2009. “Does the Media Matter? A Field Experiment Measuring the Effect of Newspapers on Voting Behavior and Political Opinions.” *American Economic Journal: Applied Economics,* 1(2): 35-52.

[31] Germano, F., and Meier, M. 2010. “Concentration and self-censorship in commercial media.” *Working Paper 1256*, Universitat Pompeu Fabra.

[32] Goldberg, B. 2002. *Bias: A CBS insider exposes how the media distort the news.* Washington, DC: Regency Publishing, Inc.

[33] Groseclose, T. and Milyo, J. 2005. "A Measure of Media Bias." *The Quarterly Journal of Economics,* 120(4): 1191-1237.

[34] Ho, D. E., and Quinn, K. M. 2008. "Measuring Explicit Political Positions of Media." *Quarterly Journal of Political Science,* 3: 353–377.

[35] Kamenica, E., and Gentzkow, M. 2011. "Bayesian Persuasion." *American Economic Review,* 101: 2590–2615.

[36] Larcinese, V., Puglisi, R., and Snyder, Jr., J. M. 2011. "Partisan bias in economic news: Evidence on the agenda-setting behavior of U.S. newspapers." *Journal of Public Economics*, 95(9-10): 1178-1189.

[37] Li, H., and Suen, W. 2004. "Delegating Decisions to Experts." *Journal of Political Economy,* 112(1): 311-335.

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

[39] Oberholzer-Gee, F. and Waldfogel, J. 2009. "Media markets and localism: Does local news en Español boost Hispanic voter turnout?" *American Economic Review*, 99(5): 2120–28.

[40] Osborne M., J., and Slivinsky A. 1996. "A Model of Political Competition with Citizen-Candidates." *The Quarterly Journal of Economics*, 111(1): 65-96.

[41] Petrova, M. 2011. "Mass Media and Special Interest Groups." Working paper, New Economic School.

[42] Piolatto, A., and Schuett, F. 2011. "Ethical voters and the demand for political news." Working paper, Barcelona Institute of Economics (IEB) and Tilburg University.

[43] Prat, A., and Strömberg, D. 2011. "The Political Economy of Mass Media." Working paper, LSE and IIES.

[44] Puglisi, R. 2011. "Being The New York Times: the Political Behaviour of a Newspaper." *The B.E. Journal of Economic Analysis & Policy*, 11(1): Article 20.

[45] Puglisi, R. and Snyder, Jr., J. M. 2011. "The Balanced U.S. Press." *NBER Working Papers 17263*, National Bureau of Economic Research.

[46] Shiryaev, A., N. 2007. *Optimal Stopping Rules*, Springer, Berlin.

[47] Snyder, J., and Strömberg, D. 2010. "Press Coverage and Political Accountability." *Journal of Political Economy*, 118 (2).

[48] Sobbrio, F. 2011. "Indirect Lobbying and Media Bias." *Quarterly Journal of Political Science,* 6(3-4): 235-274.

[49] Strömberg, D. 2004a. "Radio's Impact on Public Spending." *Quarterly Journal of Economics*, 119(1): 189—221.

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

[51] Suen, W. 2004. "The Self-Perpetuation of Biased Beliefs." *The Economic Journal,* 114: 337-396.

[52] Sunstein, C., R. 2007. *Republic.com 2.0.* Princeton (NJ): Princeton University Press.

Appendix

Proof of Proposition 1

The problem involves analyzing a stochastic process with two absorbing states. Specifically, the equations characterizing these two absorbing states (i.e., $\underline{n}_e^*$ and $\bar{n}_e^*$) must be determined. After m draws, given that a current difference in signals in favor of r equal to n, the value function of editor e is given by (9). This is a standard problem of sequential testing of two simple hypotheses (see Chapter 4 in Shiryaev, 2007). Hence, it can be proven that $\bar{n}_e^*$ and $\underline{n}_e^*$ are defined implicitly by the following two first order conditions:[41]

$$\frac{\partial V_e}{\partial \bar{n}_e^*}|_{\bar{n}_e^*} = \frac{(\ln \lambda)\,\lambda^{\bar{n}_e^*}}{\lambda^{\underline{n}_e^*} - \lambda^{\bar{n}_e^*}}\left[(2x-1)\left(\lambda^{\underline{n}_e^*}+1\right) - \left(\lambda^{\underline{n}_e^*}-1\right)(2\delta - H(\bar{n}_e^* - \underline{n}_e^*))\right] - H\left(1-\lambda^{\bar{n}_e^*}\right) = 0$$

$$\frac{\partial V_e}{\partial \underline{n}_e^*}|_{n=\underline{n}_e^*} = \frac{(\ln \lambda)\,\lambda^{\underline{n}_e^*}}{\lambda^{\underline{n}_e^*} - \lambda^{\bar{n}_e^*}}\left[(2x-1)\left(\lambda^{\bar{n}_e^*}+1\right) + \left(1-\lambda^{\bar{n}_e^*}\right)(2\delta - H\left(\bar{n}_e^* - \underline{n}_e^*\right))\right] + H\left(\lambda^{\underline{n}_e^*}-1\right) = 0$$

where $H = \frac{c}{2\theta-1}$ and $\lambda = \frac{1-\theta}{\theta} < 1$. Where it must be always the case that $\underline{n}_e^* < 0$ and $\bar{n}_e^* > 0$.[42] It is also immediate to verify that for $x_e = \frac{1}{2}$ it must be the case that $\bar{n}_e^* = |\underline{n}_e^*|$. Notice that the optimal stopping rule $\bar{n}_e^*$ and $\underline{n}_e^*$ *do not* depend on n. That is the optimal stopping rule do not change depending on the realization of the signals.[43] Let's consider the two first order conditions and let's denote them as f and g. That is:

$$f = \frac{\partial V_e}{\partial \bar{n}_e^*}|_{\bar{n}_e^*} = 0 \tag{18}$$

$$g = \frac{\partial V_e}{\partial \underline{n}_e^*}|_{n=\underline{n}_e^*} = 0 \tag{19}$$

that is $\bar{n}_e^*$ and $\underline{n}_e^*$ are the solution of the following system of equations:

$$\begin{cases} f(\bar{n}_e^*(x_e,\delta,c), \underline{n}_e^*(x_e,\delta,c), x_e,\delta,c) = 0 \\ g(\bar{n}_e^*(x_e,\delta,c), \underline{n}_e^*(x_e,\delta,c), x_e,\delta,c) = 0 \end{cases}$$

In order to obtain the comparative statics, it is necessary to derive the differential of these functions.[44] That is:

$$\begin{cases} \frac{\partial f}{\partial \bar{n}_e^*} d\bar{n}_e^* + \frac{\partial f}{\partial \underline{n}_e^*} d\underline{n}_e^* + \frac{\partial f}{\partial x_e} dx_e + \frac{\partial f}{\partial \delta} d\delta + \frac{\partial f}{\partial c} dc = 0 \\ \frac{\partial g}{\partial \bar{n}_e^*} d\bar{n}_e^* + \frac{\partial g}{\partial \underline{n}_e^*} d\underline{n}_e^* + \frac{\partial g}{\partial x_e} dx_e + \frac{\partial g}{\partial \delta} d\delta + \frac{\partial g}{\partial c} dc = 0 \end{cases}$$

Let's focus on the comparative statics with respect to x_e. That is, $\frac{d\underline{n}_e^*}{dx_e}$ and $\frac{d\bar{n}_e^*}{dx_e}$ must be determined,

[41] The online appendix contains an extended proof where these first order conditions are formally derived.

[42] Suppose not. That is $\underline{n}_e^* > 0$. Thus $\mu(\underline{n}_e^*) > \mu(n=0) = p$. If $x_e > \frac{1}{2}$, this would imply that $\mu(\underline{n}_e^*) > \hat{\mu}_e$ and thus $\tau_{e,m}(\underline{n}_e^*) = R$ which contradicts the definition of $\underline{n}_e^*$. If $x_e < \frac{1}{2}$, then since $n = 0 < \underline{n}_e^*$, this implies that $\tau_e(n=0) = L$ and thus the voter would never start sampling. A similar proof applies to show that $\bar{n}_e^* > 0$.

[43] A detailed formal derivation of the second order conditions, ensuring that $(\bar{n}_e^*, \underline{n}_e^*)$ is a global maximum, is available upon request to the author.

[44] These comparative statics are determined by treating n as a real number. This mathematical abuse is made for technical convenience (for an analogous treatment see Brocas and Carrillo 2009 and Brocas, Carrillo and Palfrey 2011). At the same time, a marginal change in $\bar{n}_e^*$ and/or $\underline{n}_e^*$ has a straightforward interpretation. For example, a marginal increase in the threshold required by a citizen-editor to endorse candidate j simply represents a marginal increase in the probability of such a citizen-editor requiring one more signal in favor of j to endorse her.

holding the other parameter constants. Hence, $d\delta = 0$ and $dc = 0$. Thus:

$$\frac{d\underline{n}_e^*}{dx_e} = \frac{\left(\frac{\partial g}{\partial \bar{n}_e^*}\frac{\partial f}{\partial x_e} - \frac{\partial g}{\partial x_e}\frac{\partial f}{\partial \bar{n}_e^*}\right)}{\left(\frac{\partial g}{\partial \underline{n}_e^*}\frac{\partial f}{\partial \bar{n}_e^*} - \frac{\partial g}{\partial \bar{n}_e^*}\frac{\partial f}{\partial \underline{n}_e^*}\right)}$$

similarly

$$\frac{d\bar{n}_e^*}{dx_e} = \frac{\left(\frac{\partial g}{\partial \underline{n}_e^*}\frac{\partial f}{\partial x_e} - \frac{\partial f}{\partial \underline{n}_e^*}\frac{\partial g}{\partial x_e}\right)}{\left(\frac{\partial g}{\partial \bar{n}_e^*}\frac{\partial f}{\partial \underline{n}_e^*} - \frac{\partial f}{\partial \bar{n}_e^*}\frac{\partial g}{\partial \underline{n}_e^*}\right)}$$

Then, simple calculations yields:

$$\frac{d\underline{n}_e^*}{dx_e} = -\frac{2\lambda^{\underline{n}_e^*}\left(\lambda^{\bar{n}_e^*}+1\right)}{H\left(\lambda^{\underline{n}_e^*}-\lambda^{\bar{n}_e^*}\right)\left(\lambda^{\underline{n}_e^*}+1\right)} < 0 \tag{20}$$

and

$$\frac{d\bar{n}_e^*}{dx_e} = -\frac{2\lambda^{\bar{n}_e^*}\left(\lambda^{\underline{n}_e^*}+1\right)}{H\left(\lambda^{\bar{n}_e^*}+1\right)\left(\lambda^{\underline{n}_e^*}-\lambda^{\bar{n}_e^*}\right)} < 0 \tag{21}$$

Moreover, $\left|\frac{d\bar{n}_e^*}{dx_e}\right| > \left|\frac{d\underline{n}_e^*}{dx_e}\right|$ if and only if:

$$\left(\lambda^{\underline{n}_e^*}-\lambda^{\bar{n}_e^*}\right)\left(1-\lambda^{\underline{n}_e^*}\lambda^{\bar{n}_e^*}\right) < 0$$

thus since

$$\left(1-\lambda^{\underline{n}_e^*}\lambda^{\bar{n}_e^*}\right)\begin{cases} > 0 \text{ for } x_e < 1/2 \\ = 0 \text{ for } x_e = 1/2 \\ < 0 \text{ for } x_e > 1/2 \end{cases} \tag{22}$$

the result follows. Let's now focus on the comparative statics with respect to δ. Using the same methodology as the one described above:

$$\frac{d\underline{n}_e^*}{d\delta} = -\frac{2\lambda^{\underline{n}_e^*}\left(1-\lambda^{\bar{n}_e^*}\right)}{H\left(\lambda^{\underline{n}_e^*}+1\right)\left(\lambda^{\underline{n}_e^*}-\lambda^{\bar{n}_e^*}\right)} < 0$$

and

$$\frac{d\bar{n}_e^*}{d\delta} = \frac{2\lambda^{\bar{n}_e^*}\left(\lambda^{\underline{n}_e^*}-1\right)}{H\left(\lambda^{\bar{n}_e^*}+1\right)\left(\lambda^{\underline{n}_e^*}-\lambda^{\bar{n}_e^*}\right)} > 0$$

Moreover, $\left|\frac{d\bar{n}_e^*}{d\delta}\right| > \left|\frac{d\underline{n}_e^*}{d\delta}\right|$ if and only if:

$$\left(\lambda^{\bar{n}_e^*}+\lambda^{\underline{n}_e^*}\right)\left(\lambda^{\underline{n}_e^*}\lambda^{\bar{n}_e^*}-1\right) > 0$$

hence given (22) the results follow. Finally, the comparative statics with respect to c are:

$$\frac{d\underline{n}_e^*}{dc} = \frac{(2\theta-1)\,\lambda^{\underline{n}_e^*}\left((2x-1)\left(\lambda^{\bar{n}_e^*}+1\right)+2\delta\left(1-\lambda^{\bar{n}_e^*}\right)\right)}{c^2\left(\lambda^{\underline{n}_e^*}+1\right)\left(\lambda^{\underline{n}_e^*}-\lambda^{\bar{n}_e^*}\right)} > 0$$

hence

$$\frac{d\bar{n}_e^*}{dc} = \frac{\lambda^{\bar{n}_e^*}(2\theta-1)\left((2x-1)\left(1+\lambda^{\underline{n}_e^*}\right)-2\delta(\lambda^{\underline{n}_e^*}-1)\right)}{\left(\lambda^{\underline{n}_e^*}-\lambda^{\bar{n}_e^*}\right)c^2\left(\lambda^{\bar{n}_e^*}+1\right)} < 0 \qquad \textbf{Q.E.D.}$$

Proof of Corollary 1
Since

$$\Pr(\tau_e = L|s = r) = \frac{2\mu(\bar{n}_e^*) - 1}{\mu(\bar{n}_e^*) - \mu(\underline{n}_e^*)}\mu(\underline{n}_e^*)$$

and

$$\Pr(\tau_e = R|s = l) = \frac{1 - 2\mu(\underline{n}_e^*)}{\mu(\bar{n}_e^*) - \mu(\underline{n}_e^*)}\left[1 - \mu(\bar{n}_e^*)\right]$$

Thus it is easy to verify that $\Pr(\tau_e = L|s = r)$ is decreasing in x_e and $\Pr(\tau_e = R|s = l)$ is increasing in x_e. Moreover, the *ex-ante* probability of making a wrong choice is:

$$\Pr(error) = \Pr(s = r)\Pr(\tau_e = L|s = r) + \Pr(s = l)\Pr(\tau_e = R|s = l)$$

hence:

$$\Pr(error) = \frac{\lambda^{\bar{n}_e^*}(\lambda^{\underline{n}_e^*} - 1) + (1 - \lambda^{\bar{n}_e^*})}{2\left(\lambda^{\underline{n}_e^*} - \lambda^{\bar{n}_e^*}\right)}$$

It is now possible to perform the comparative statics upon this probability. First of all:

$$\frac{\partial \Pr(error)}{\partial \bar{n}_e^*} = \frac{1}{2}(\ln\lambda)\,\lambda^{\bar{n}_e^*}\frac{\left(\lambda^{\underline{n}_e^*} - 1\right)^2}{\left(\lambda^{\underline{n}_e^*} - \lambda^{\bar{n}_e^*}\right)^2} < 0$$

$$\frac{\partial \Pr(error)}{\partial \underline{n}_e^*} = -\frac{1}{2}(\ln\lambda)\,\lambda^{\underline{n}_e^*}\frac{\left(1 - \lambda^{\bar{n}_e^*}\right)^2}{\left(\lambda^{\underline{n}_e^*} - \lambda^{\bar{n}_e^*}\right)^2} > 0$$

Hence, since $\frac{d\bar{n}_e^*}{dc} < 0$ and $\frac{d\underline{n}_e^*}{dc} > 0$, then $\frac{d\Pr(error)}{dc} > 0$. Similarly, since $\frac{d\bar{n}_e^*}{d\delta} > 0$ and $\frac{d\underline{n}_e^*}{d\delta} < 0$, then $\frac{d\Pr(error)}{d\delta} < 0$.
Finally given (20) and (21) derived in the proof of Proposition 1, $\frac{d\Pr(error)}{dx_e} > 0$ if and only if:

$$\frac{\left(\lambda^{2\underline{n}_e^*} - \lambda^{2\bar{n}_e^*}\right)\left(1 + \lambda^{\underline{n}_e^*}\lambda^{\bar{n}_e^*}\right)\left(1 - \lambda^{\underline{n}_e^*}\lambda^{\bar{n}_e^*}\right)}{\left(\lambda^{\underline{n}_e^*} + 1\right)\left(\lambda^{\bar{n}_e^*} + 1\right)} < 0$$

Thus, given (22):

$$\frac{d\Pr(error)}{dx_e}\begin{cases} < 0 \text{ for } x < \frac{1}{2} \\ = 0 \text{ for } x = \frac{1}{2} \\ > 0 \text{ for } x > \frac{1}{2} \end{cases} \qquad \textbf{Q.E.D.}$$

Proof of Lemma 1
It is immediate to verify that $(\tilde{x}_e - \hat{x}_e)$ is decreasing in C. Let's now focus on $\tilde{x}_e$. Then:

$$\frac{d\tilde{x}_e(\bar{n}_e^*, \underline{n}_e^*)}{d\bar{n}_e^*} = -C(\ln\lambda)\frac{\lambda^{\bar{n}_e^*}\left(\lambda^{\underline{n}_e^*} - 1\right)}{\left(\lambda^{\underline{n}_e^*} + 1\right)\left(1 - \lambda^{\bar{n}_e^*}\right)^2} > 0$$

$$\frac{d\tilde{x}_e(\bar{n}_e^*, \underline{n}_e^*)}{d\underline{n}_e^*} = (\ln\lambda)\frac{\lambda^{\underline{n}_e^*}}{\left(\lambda^{\underline{n}_e^*} + 1\right)^2}\left(2\delta - C\frac{\left(\lambda^{\bar{n}_e^*} + 1\right)}{\left(1 - \lambda^{\bar{n}_e^*}\right)}\right) < 0$$

The it is immediate to verify that $\tilde{x}_e$ is increasing in δ. Let's now analyze how $\tilde{x}_e$ changes as x_e increases. First, I want to prove that for any $x_e < 1/2$ it is always the case that $d\tilde{x}_e/dx_e > 0$. From the proof of Proposition 1 we know that for $x_e < 1/2$, $\left|\frac{d\underline{n}_e^*}{dx_e}\right| > \left|\frac{d\bar{n}_e^*}{dx_e}\right|$. Hence, a sufficient condition to ensure that $d\tilde{x}_e/dx_e > 0$ is simply:

$$\left|\frac{d\tilde{x}_e(\bar{n}_e^*, \underline{n}_e^*)}{d\underline{n}_e^*}\right| > \left|\frac{d\tilde{x}_e(\bar{n}_e^*, \underline{n}_e^*)}{d\bar{n}_e^*}\right|$$

which is true if and only if:

$$C\left(\frac{\lambda^{\bar{n}_e^*}\left(\lambda^{2\underline{n}_e^*}-1\right)}{\lambda^{\underline{n}_e^*}\left(1-\lambda^{\bar{n}_e^*}\right)^2}+\frac{\left(\lambda^{\bar{n}_e^*}+1\right)}{\left(1-\lambda^{\bar{n}_e^*}\right)}\right)<2\delta$$

Since $\frac{\partial}{\partial\bar{n}_e^*}\left(\frac{1-\lambda^{\bar{n}_e^*}}{1+\lambda^{\bar{n}_e^*}}\right)>0$ and $\frac{d\bar{n}_e^*}{dx_e}<0$, then $\delta\left(\frac{1-\lambda^{\bar{n}_e^*}}{1+\lambda^{\bar{n}_e^*}}\right)\geq C^{\max}$. Hence, a sufficient condition for the above condition to be always true is:

$$\left(\lambda^{\bar{n}_e^*}\lambda^{\underline{n}_e^*}-1\right)\left(\lambda^{\bar{n}_e^*}+\lambda^{\underline{n}_e^*}\right)<0$$

which it is always the case for $x_e<1/2$. Moreover, for $x_e=1/2$, $\underline{n}_e^*=-\bar{n}_e^*$ and thus:

$$\left.\frac{d\tilde{x}_e}{dx_e}\right|_{x_e=1/2}=-\frac{4}{H}(\ln\lambda)\frac{\lambda^{2\bar{n}_e^*}\left(\delta(1-\lambda^{\bar{n}_e^*})-C(\lambda^{\bar{n}_e^*}+1)\right)}{(1-\lambda^{2\bar{n}_e^*})\left((1-\lambda^{3\bar{n}_e^*})+\lambda^{\bar{n}_e^*}(1-\lambda^{\bar{n}_e^*})\right)}>0$$

Hence, for any $x_e\leq 1/2$, it is always the case that $d\tilde{x}_e/dx_e>0$. Let's analyze now the case where $x_e>1/2$. Then, $d\tilde{x}_e/dx_e>0$ if and only if:

$$C<\tilde{C}\equiv 2\delta\frac{\lambda^{2\underline{n}_e^*}\left(1-\lambda^{2\bar{n}_e^*}\right)^2}{\lambda^{2\bar{n}_e^*}\left(\lambda^{2\underline{n}_e^*}-1\right)\left(\lambda^{\underline{n}_e^*}+1\right)^2+\lambda^{2\underline{n}_e^*}\left(\lambda^{\bar{n}_e^*}+1\right)^2\left(1-\lambda^{2\bar{n}_e^*}\right)} \tag{23}$$

hence $\tilde{C}>0$. Let's now analyze how $\tilde{C}$ changes when x_e increases:

$$\frac{\partial\tilde{C}}{\partial\bar{n}_e^*}=-\frac{4\delta(\ln\lambda)\left(1-\lambda^{2\bar{n}_e^*}\right)\lambda^{2\underline{n}_e^*+\bar{n}_e^*}}{\lambda^{2\bar{n}_e^*}\left(\lambda^{\underline{n}_e^*}+1\right)^2\left(\lambda^{2\underline{n}_e^*}-1\right)+\lambda^{2\underline{n}_e^*}\left(\lambda^{\bar{n}_e^*}+1\right)^2\left(1-\lambda^{2\bar{n}_e^*}\right)}Y>0$$

where

$$Y=\left(2\lambda^m+\frac{\left(1-\lambda^{2\bar{n}_e^*}\right)\left[\left(\lambda^{2\underline{n}_e^*}\left(\lambda^{\bar{n}_e^*}+1\right)\left(1-\lambda^{2\bar{n}_e^*}\right)-\left(\lambda^{\bar{n}_e^*}+1\right)^2\lambda^{2\underline{n}_e^*+\bar{n}_e^*}+\lambda^{\bar{n}_e^*}\left(\lambda^{\underline{n}_e^*}+1\right)^2\left(\lambda^{2k}-1\right)\right)\right]}{\left(\lambda^{2\bar{n}_e^*}\left(\lambda^{\underline{n}_e^*}+1\right)^2\left(\lambda^{2\underline{n}_e^*}-1\right)+\lambda^{2k}\left(\lambda^{\bar{n}_e^*}+1\right)^2\left(1-\lambda^{2\bar{n}_e^*}\right)\right)}\right)>0$$

since $\lambda^{\bar{n}_e^*}\left(\lambda^{\underline{n}_e^*}+1\right)^2\left(\lambda^{2\underline{n}_e^*}-1\right)>\left(\lambda^{\bar{n}_e^*}+1\right)^2\lambda^{2\underline{n}_e^*+\bar{n}_e^*}>0$. Moreover:

$$\frac{\partial\tilde{C}}{\partial\underline{n}_e^*}=-\frac{4\delta(\ln\lambda)\lambda^{2\underline{n}_e^*}\left(\lambda^{\bar{n}_e^*}-1\right)^2\left(\lambda^{\bar{n}_e^*}+1\right)^2\left(\lambda^{\underline{n}_e^*}+\lambda^{4\underline{n}_e^*}+\lambda^{3\underline{n}_e^*}+1\right)\left(\lambda^{2\bar{n}_e^*}\right)}{\left(\lambda^{2\bar{n}_e^*}\left(\lambda^{\underline{n}_e^*}+1\right)^2\left(\lambda^{2\underline{n}_e^*}-1\right)+\lambda^{2\underline{n}_e^*}\left(\lambda^{\bar{n}_e^*}+1\right)^2\left(1-\lambda^{2\bar{n}_e^*}\right)\right)^2}>0$$

hence since $\frac{d\bar{n}_e^*}{dx_e}<0$ and $\frac{d\underline{n}_e^*}{dx_e}<0$:

$$\frac{d\tilde{C}}{dx_e}=\frac{\partial\tilde{C}}{\partial\bar{n}_e^*}\frac{d\bar{n}_e^*}{dx_e}+\frac{\partial\tilde{C}}{\partial\underline{n}_e^*}\frac{d\underline{n}_e^*}{dx_e}<0$$

Hence, $\tilde{x}_e$ will be increasing in x_e for $x_e>1/2$ if and only if $C<\tilde{C}$. That is, since $\frac{d\tilde{C}}{dx_e}<0$, $\tilde{x}_e$ will be increasing in x_e only as long as $x_e<x_{e_R}^{\max}$, where:

$$\tilde{C}\left(\bar{n}_e^*(x_{e_R}^{\max}),\underline{n}_e^*(x_{e_R}^{\max})\right)=C$$

Moreover, since $\frac{d\tilde{C}}{dx_e}<0$, $\tilde{C}^{\max}<\lim_{x_e\to 1/2}\tilde{C}=C^{\max}$. Finally, since $\delta\in\left(0,\frac{1}{2}\right]$, $x_{e_R}^{\max}<1$. Specifically, for $\delta<1/2$ an editor with preferences $x_{e_R}=1$ would never endorse a leftist candidate since, trivially, $\hat{\mu}_{(x_{e_R}=1)}=0$ (i.e., $\bar{n}_e^*(x_{e_R}=1)=0$) which implies that $\tilde{C}(x_{e_R}=1)=0$. For $\delta=1/2$, an editor with preferences $x_{e_R}=1$ will endorse a leftist candidate if and only if $\mu(n)=0$. That is, if and only if $n = -\infty$. Hence, necessary conditions for this to be verified are $\underline{n}_e(x_{e_R} = 1) \to -\infty$ and $\bar{n}_e(x_{e_R} = 1) \to 0$. As shown by Proposition 1, for $x_e > \frac{1}{2}$ it is the case that $\left|\frac{d\bar{n}_e^*}{dx_e}\right| > \left|\frac{d\underline{n}_e^*}{dx_e}\right|$. That is, when $x_{e_R} \to 1$ it must be the case that $\bar{n}_{e_R}^* \to 0$ but $\bar{n}_{e_R}^* - \left|\underline{n}_{e_R}^*\right| \nrightarrow -\infty$. In turn, this implies that $\tilde{C} \to 0$ when $x_{e_R} \to 1$.

Let's now focus on $\hat{x}_e$. Then:

$$\frac{d\hat{x}_e}{d\bar{n}_e^*} = (\ln\lambda)\,\frac{\lambda^{\bar{n}_e^*}\left(2\delta(\lambda^{\underline{n}_e^*}-1) - C(\lambda^{\underline{n}_e^*}+1)\right)}{(\lambda^{\underline{n}_e^*}-1)\left(\lambda^{\bar{n}_e^*}+1\right)^2} < 0$$

$$\frac{d\hat{x}_e}{d\underline{n}_e^*} = -C\,(\ln\lambda)\,\lambda^{\underline{n}_e^*}\frac{1-\lambda^{\bar{n}_e^*}}{(\lambda^{\bar{n}_e^*}+1)\left(\lambda^{\underline{n}_e^*}-1\right)^2} > 0$$

Thus it is immediate to verify that $\hat{x}_e$ is decreasing in δ. Let's now analyze how $\hat{x}_e$ changes as x_e increases. First, I want to prove that for any $x_e > 1/2$ it is always the case that $d\hat{x}_e/dx_e > 0$. As shown in the proof of Proposition 1, for $x_e > 1/2$, then $\left|\frac{d\underline{n}_e^*}{dx_e}\right| < \left|\frac{d\bar{n}_e^*}{dx_e}\right|$. Hence, a sufficient condition to ensure that $d\hat{x}_e/dx_e > 0$ is simply:

$$\left|\frac{d\hat{x}_e(\bar{n}_e^*, \underline{n}_e^*)}{d\underline{n}_e^*}\right| < \left|\frac{d\hat{x}_e(\bar{n}_e^*, \underline{n}_e^*)}{d\bar{n}_e^*}\right|$$

that is

$$C\left(\frac{\lambda^{\underline{n}_e^*}\left(1-\lambda^{2\bar{n}_e^*}\right)}{\lambda^{\bar{n}_e^*}\left(\lambda^{\underline{n}_e^*}-1\right)^2} + \frac{(\lambda^{\underline{n}_e^*}+1)}{(\lambda^{\underline{n}_e^*}-1)}\right) < 2\delta$$

moreover since $C^{\max} \leq \frac{1-\lambda^{\bar{n}_e^*}}{(\lambda^{\bar{n}_e^*}+1)}\delta < \delta\frac{\lambda^{\underline{n}_e^*}-1}{(\lambda^{\underline{n}_e^*}+1)}$, a sufficient condition for the above to be verified becomes:

$$\frac{(1-\lambda^{\bar{n}_e^*}\lambda^{\underline{n}_e^*})\left(\lambda^{\bar{n}_e^*}+\lambda^{\underline{n}_e^*}\right)}{\lambda^{\bar{n}_e^*}\left(\lambda^{2\underline{n}_e^*}-1\right)} < 0$$

hence since $(1-\lambda^{\bar{n}_e^*}\lambda^{\underline{n}_e^*}) < 0$ for $x_e > 1/2$, we have proved that for $x_e > 1/2$ it is always the case that $d\hat{x}_e/dx_e > 0$. Moreover, for $x_e = 1/2$, $\underline{n}_e^* = -\bar{n}_e^*$ and thus:

$$\left.\frac{d\hat{x}_e}{dx_e}\right|_{x_e=1/2} = -\frac{4}{H}(\ln\lambda)\,\frac{\lambda^{2\bar{n}_e^*}\left(\delta(1-\lambda^{\bar{n}_e^*}) - C(\lambda^{\bar{n}_e^*}+1)\right)}{(1-\lambda^{2\bar{n}_e^*})\left((1-\lambda^{3\bar{n}_e^*}) + \lambda^{\bar{n}_e^*}(1-\lambda^{\bar{n}_e^*})\right)} > 0$$

Hence, for any $x_e \geq 1/2$, it is always the case that $d\hat{x}_e/dx_e > 0$. Let's now analyze the case where $x_e < 1/2$. In this case, $d\hat{x}_e/dx_e > 0$ if and only if:

$$C < \hat{C} \equiv 2\delta\frac{\lambda^{2\bar{n}_e^*}\left(\lambda^{2\underline{n}_e^*}-1\right)^2}{\lambda^{2\underline{n}_e^*}(1-\lambda^{2\bar{n}_e^*})\left(\lambda^{\bar{n}_e^*}+1\right)^2 + \lambda^{2\bar{n}_e^*}\left(\lambda^{2\underline{n}_e^*}-1\right)\left(\lambda^{\underline{n}_e^*}+1\right)^2} \tag{24}$$

hence $\hat{C} > 0$. Let's now analyze how $\hat{C}$ changes when x_e increases. First of all:

$$\frac{\partial\hat{C}}{\partial\bar{n}_e^*} = 4\delta\,(\ln\lambda)\,\lambda^{2\bar{n}_e^*}\frac{\left(\lambda^{2\underline{n}_e^*}-1\right)^2\left(\lambda^{\bar{n}_e^*}+\lambda^{4\bar{n}_e^*}+\lambda^{3\bar{n}_e^*}+1\right)\left(\lambda^{2\underline{n}_e^*}\right)}{\left(\lambda^{2\bar{n}_e^*}\left(\lambda^{\underline{n}_e^*}+1\right)^2\left(\lambda^{2\underline{n}_e^*}-1\right) + \lambda^{2\underline{n}_e^*}\left(\lambda^{\bar{n}_e^*}+1\right)^2\left(1-\lambda^{2\bar{n}_e^*}\right)\right)^2} < 0$$

and

$$\frac{\partial\hat{C}}{\partial\underline{n}_e^*} = \frac{4\delta\,(\ln\lambda)\left(\lambda^{2\underline{n}_e^*}-1\right)\lambda^{\underline{n}_e^*+2\bar{n}_e^*}}{\left(\lambda^{2\bar{n}_e^*}\left(\lambda^{\underline{n}_e^*}+1\right)^2\left(\lambda^{2\underline{n}_e^*}-1\right) + \lambda^{2\underline{n}_e^*}\left(\lambda^{\bar{n}_e^*}+1\right)^2\left(1-\lambda^{2\bar{n}_e^*}\right)\right)^2}W < 0$$

where

$$W = 2\lambda^{\bar{n}_e^*}\lambda^{\underline{n}_e^*}\left((\lambda^{2\underline{n}_e^*}-\lambda^{2\bar{n}_e^*}) + \left(1+\lambda^{2\underline{n}_e^*}\lambda^{\bar{n}_e^*}\right)\left(1-\lambda^{\bar{n}_e^*}\right)\right) + \left(\lambda^{\underline{n}_e^*}-\lambda^{2\bar{n}_e^*}\right)\left(\lambda^{2\underline{n}_e^*}+\lambda^{\underline{n}_e^*}\lambda^{2\bar{n}_e^*}+\lambda^{3\underline{n}_e^*}\lambda^{2\bar{n}_e^*}+1\right)$$

hence since $\frac{d\bar{n}_e^*}{dx_e} < 0$ and $\frac{d\underline{n}_e^*}{dx_e} < 0$:

$$\frac{d\hat{C}}{dx_e} = \frac{\partial \hat{C}}{\partial \bar{n}_e^*}\frac{d\bar{n}_e^*}{dx_e} + \frac{\partial \hat{C}}{\partial \underline{n}_e^*}\frac{d\underline{n}_e^*}{dx_e} > 0$$

Hence, $\hat{x}_e$ will be increasing in x_e for $x_e < 1/2$ if and only if $C < \hat{C}$. That is, since $\frac{d\hat{C}}{dx_e} > 0$, $\tilde{x}_e$ will be increasing in x_e only as long as $x_e > x_{e_L}^{\min}$, where $x_{e_L}^{\min}$ is such that:

$$\hat{C}\left(\bar{n}_e^*(x_{e_L}^{\min}), \underline{n}_e^*(x_{e_L}^{\min})\right) = C$$

Moreover, since $\frac{d\hat{C}}{dx_e} > 0$, $\hat{C}^{\max} < \lim_{x_e \to 1/2} \hat{C} = C^{\max}$. Finally, by using an analogous proof to the one employed above to show that $x_{e_R}^{\max} < 1$, it is immediate to see that since $\delta \in \left(0, \frac{1}{2}\right]$, it is always the case that $x_{e_L}^{\min} > 0$ and that $\hat{C} \to 0$ when $x_{e_L} \to 0$. **Q.E.D.**

Proof of Proposition 2

The optimal strategy for a profit maximizing monopolist media outlet is to choose an editor with idiosyncratic preference x_e such that its profits are maximized. That is x_e^{mon} must be such that:

$$\frac{d\Pi}{dx_e} = \frac{d\Pi}{d\bar{n}_e^*}\frac{d\bar{n}_e^*}{dx_e} + \frac{d\Pi}{d\underline{n}_e^*}\frac{d\underline{n}_e^*}{dx_e} = 0$$

Where:

$$\frac{d\Pi}{d\bar{n}_e^*} = \frac{dF(\tilde{x}_e)}{d\bar{n}_e^*} - \frac{dF(\hat{x}_e)}{d\bar{n}_e^*}$$

$$\frac{d\Pi}{d\underline{n}_e^*} = \frac{dF(\tilde{x}_e)}{d\underline{n}_e^*} - \frac{dF(\hat{x}_e)}{d\underline{n}_e^*}$$

where $\frac{dF(\tilde{x}_e)}{d\bar{n}_e^*} = \frac{d}{d\bar{n}_e^*}\int_\delta^{\tilde{x}_e(\bar{n}_e^*)} f(x)dx$. Hence applying Leibniz's rule:

$$\frac{dF(\tilde{x}_e)}{d\bar{n}_e^*} = \frac{d}{d\bar{n}_e^*}\int_\delta^{\tilde{x}_e(\bar{n}_e^*,\underline{n}_e^*)} f(x)dx = f(\tilde{x}_e(\bar{n}_e^*,\underline{n}_e^*))\frac{d\tilde{x}_e(\bar{n}_e^*,\underline{n}_e^*)}{d\bar{n}_e^*}$$

thus,

$$\frac{d\Pi}{d\bar{n}_e^*} = f(\tilde{x}_e(\bar{n}_e^*,\underline{n}_e^*))\frac{d\tilde{x}_e(\bar{n}_e^*,\underline{n}_e^*)}{d\bar{n}_e^*} - f(\hat{x}_e(\bar{n}_e^*,\underline{n}_e^*))\frac{d\hat{x}_e(\bar{n}_e^*)}{d\bar{n}_e^*}$$

similarly

$$\frac{d\Pi}{d\underline{n}_e^*} = f(\tilde{x}_e(\bar{n}_e^*,\underline{n}_e^*))\frac{d\tilde{x}_e(\bar{n}_e^*,\underline{n}_e^*)}{d\underline{n}_e^*} - f(\hat{x}_e(\bar{n}_e^*,\underline{n}_e^*))\frac{d\hat{x}_e(\bar{n}_e^*,\underline{n}_e^*)}{d\underline{n}_e^*}$$

Hence the first order condition becomes:

$$\frac{d\tilde{x}_e/dx_e}{d\hat{x}_e/dx_e} = \frac{f(\hat{x}_e(\bar{n}_e^*,\underline{n}_e^*))}{f(\tilde{x}_e(\bar{n}_e^*,\underline{n}_e^*))} \tag{25}$$

where:

$$\frac{d\tilde{x}_e}{dx_e} = \frac{-2(\ln\lambda)}{H(\lambda^{\underline{n}_e^*} - \lambda^{\bar{n}_e^*})}\left(2\delta\frac{\lambda^{2\underline{n}_e^*}\left(\lambda^{\bar{n}_e^*}+1\right)}{\left(\lambda^{\underline{n}_e^*}+1\right)^3} - C\left(\frac{\lambda^{2\bar{n}_e^*}\left(\lambda^{\underline{n}_e^*}-1\right)}{\left(\lambda^{\bar{n}_e^*}+1\right)\left(1-\lambda^{\bar{n}_e^*}\right)^2} + \frac{\lambda^{2\underline{n}_e^*}\left(\lambda^{\bar{n}_e^*}+1\right)^2}{\left(1-\lambda^{\bar{n}_e^*}\right)\left(\lambda^{\underline{n}_e^*}+1\right)^3}\right)\right)$$

$$\frac{d\hat{x}_e}{dx_e} = \frac{-2(\ln\lambda)}{H(\lambda^{\underline{n}_e^*} - \lambda^{\bar{n}_e^*})}\left(2\delta\frac{\lambda^{2\bar{n}_e^*}\left(\lambda^{\underline{n}_e^*}+1\right)}{\left(\lambda^{\bar{n}_e^*}+1\right)^3} - C\left(\frac{\lambda^{2\underline{n}_e^*}\left(1-\lambda^{\bar{n}_e^*}\right)}{\left(\lambda^{\underline{n}_e^*}+1\right)\left(\lambda^{\underline{n}_e^*}-1\right)^2} + \frac{\lambda^{2\bar{n}_e^*}\left(\lambda^{\underline{n}_e^*}+1\right)^2}{\left(\lambda^{\underline{n}_e^*}-1\right)\left(\lambda^{\bar{n}_e^*}+1\right)^3}\right)\right)$$

From the proof of Lemma 1, we know that for $x_e = 1/2$, $d\tilde{x}_e/dx_e = d\hat{x}_e/dx_e > 0$. Hence, for

$x_e = 1/2$, $\frac{d\tilde{x}_e/dx_e}{d\hat{x}_e/dx_e} = 1$. More generally, for any x_e :

$$\frac{d\tilde{x}_e}{dx_e} - \frac{d\hat{x}_e}{dx_e} = (1 - \lambda^{\underline{n}_e^*}\lambda^{\bar{n}_e^*})(\lambda^{\underline{n}_e^*} - \lambda^{\bar{n}_e^*}) \cdot \alpha \cdot \beta$$

where

$$\alpha = 2\delta \frac{\left(4\lambda^{\bar{n}_e^*}\lambda^{\underline{n}_e^*} + \left(\lambda^{\underline{n}_e^*} + \lambda^{\bar{n}_e^*}\right)\left(1 + \lambda^{\underline{n}_e^*}\lambda^{\bar{n}_e^*}\right)\right)}{\left(\lambda^{\underline{n}_e^*} + 1\right)^3\left(\lambda^{\bar{n}_e^*} + 1\right)^3}$$

and

$$\beta = 4C \frac{\left(\frac{\lambda^{2\bar{n}_e^*}}{\left(\lambda^{\bar{n}_e^*}+1\right)^2\left(1-\lambda^{2\bar{n}_e^*}\right)} + \frac{\lambda^{2\underline{n}_e^*}}{\left(\lambda^{\underline{n}_e^*}+1\right)^2\left(\lambda^{2\underline{n}_e^*}-1\right)}\right)}{\left(\lambda^{\underline{n}_e^*} - 1\right)\left(1 - \lambda^{\bar{n}_e^*}\right)}$$

where α and β are always positive. Hence given (22):

$$\frac{d\tilde{x}_e/dx_e}{d\hat{x}_e/dx_e} \begin{cases} > 1 \text{ for } x_e < \frac{1}{2} \\ = 1 \text{ for } x_e = \frac{1}{2} \\ < 1 \text{ for } x_e > \frac{1}{2} \end{cases} \tag{26}$$

In other words, for $x_e > \frac{1}{2}$ an increase in x_e increases $\hat{x}_e$ more than $\tilde{x}_e$ (and viceversa for $x_e < \frac{1}{2}$). Then, it is immediate to verify that when the distribution of citizens' idiosyncratic preferences is such that Condition A is verified, then $x_e = \frac{1}{2}$ is the unique stationary point and the global maximum.

Now suppose $F(x)$ is such that Condition B is verified. For $x_{e_R} > \frac{1}{2}$ to be a stationary point it must be the case that $f(\hat{x}_{e_R}(\bar{n}_e^*, \underline{n}_e^*)) < f(\tilde{x}_{e_R}(\bar{n}_e^*, \underline{n}_e^*))$. Moreover, from Lemma 1 and (26) we know that for $x_{e_R} > 1/2$, then $\tilde{x}_{e_R}(\bar{n}_e^*, \underline{n}_e^*) > 1 - \hat{x}_{e_R}(\bar{n}_e^*, \underline{n}_e^*)$. Then, $x_e = \frac{1}{2}$ cannot be a global maximum since $\left.\frac{df(x)}{dx}\right|_{x=1/2} > 0$ and $\left.\frac{d\tilde{x}_e}{dx_e}\right|_{x=1/2} = \left.\frac{d\hat{x}_e}{dx_e}\right|_{x=1/2}$. Thus the stationary point $x_{e_R}^{mon} > \frac{1}{2}$ such that (25) is satisfied will be a global maximum on $\left(\frac{1}{2}, 1\right)$. Then by the symmetry of f, choosing an editor with symmetric preferences will also be profit-maximizing. That is, we have two global maxima in this case $x_{e_R}^{mon}$ and $x_{e_L}^{mon} = 1 - x_{e_R}^{mon}$. Indeed, since the distribution function f is symmetric around $\frac{1}{2}$, so it must be the demand function. To sum up, if $F(x)$ is such that Condition A holds the global maximum is always at $x_e = \frac{1}{2}$. Instead, if $F(x)$ is such that Condition B holds, there are two symmetric global maxima such that $x_{e_R} = 1 - x_{e_L} > 1/2$. The last part of the proposition follows immediately from Lemma 1 **Q.E.D.**

Proof of Proposition 3

Let's start with the case where Condition A holds. We show that in this case the unique equilibrium is such that $x_e^1 = x_e^2 = \frac{1}{2}$. Suppose that media outlet 1 deviates by choosing $x_e^1 > x_e^2 = \frac{1}{2}$. If media outlet one deviates, the indifferent viewer, i.e., the viewer who will be indifferent between watching media outlet 1 and media outlet 2 is the one having preferences x_I such that $U_I(W_1) = U_I(W_2)$. That is:

$$x_I(\bar{n}_{e_1}^*, \underline{n}_{e_1}^*, \bar{n}_{e_2}^*) = \frac{1}{2} + \frac{\delta}{\left(\lambda^{\underline{n}_{e_1}^*}\lambda^{\bar{n}_{e_1}^*} - 1\right)} \left(\frac{\left(1 - \lambda^{\bar{n}_{e_2}^*}\right)\left(\lambda^{\underline{n}_{e_1}^*} - \lambda^{\bar{n}_{e_1}^*}\right)}{\left(\lambda^{\bar{n}_{e_2}^*} + 1\right)} - \left(\lambda^{\underline{n}_{e_1}^*} - 1\right)\left(1 - \lambda^{\bar{n}_{e_1}^*}\right)\right)$$

where since $x_e^2 = \frac{1}{2}$, then $\bar{n}_{e_2}^* = -\underline{n}_{e_2}^*$. The no-deviation condition for media outlet 1 requires that $\nexists x_e > \frac{1}{2}$ such that the demand if deviating is higher than the demand if not deviating. Specifically, the demand that media outlet 1 faces when not deviating is:

$$D^{NDev}(x_e^1) = D^{NDev}\left(x_e^2\right) = \frac{1}{2}\left[F(\tilde{x}_e|_{x_e=\frac{1}{2}}) - F(\hat{x}|_{x_e=\frac{1}{2}})\right] = \left[F(\tilde{x}_e|_{x_e=\frac{1}{2}}) - F\left(\frac{1}{2}\right)\right] \tag{27}$$

Instead the demand that media outlet 1 faces if it deviates is:

$$D^{Dev}(x_e^1) = \left[F(\tilde{x}_e|_{x_e^1}) - F(\max\{\hat{x}_{e_1}; x_I(x_{e_1})\})\right] \quad (28)$$

Notice that for any non-uniform distribution satisfying Condition A the mass of citizens is strictly decreasing moving away from the mean of the distribution at 1/2. Hence it is enough to show that this no-deviation condition holds even in the case where citizens' preferences are uniformly distributed in $[0,1]$.[45] In the case of a uniform distribution, the following represents a sufficient no-deviation condition:

$$x_I(\bar{n}_{e_1}^*, \underline{n}_{e_1}^*, \bar{n}_{e_2}^*) - \frac{1}{2} > \tilde{x}_e|_{x_e^1} - \tilde{x}_e|_{x_e=\frac{1}{2}}$$

hence media outlet 1 would not deviate if and only if:

$$C > C^{THR} = \delta \frac{\left(\lambda^{2\underline{n}_{e1}^*} - 1\right)\left(1 - \lambda^{\bar{n}_{e1}^*}\right)}{\left(\lambda^{\underline{n}_{e1}^*}\lambda^{\bar{n}_{e1}^*} - 1\right)^2} \left(\frac{\left(\lambda^{\underline{n}_{e1}^*} - \lambda^{\bar{n}_{e1}^*}\right)}{\left(\lambda^{\underline{n}_{e1}^*} + 1\right)} - \frac{(1 - \lambda^{\bar{n}_{e2}^*})}{\left(\lambda^{\bar{n}_{e2}^*} + 1\right)}\left(\lambda^{\bar{n}_{e1}^*} + 1\right)\right)$$

where $C^{THR} > 0$ if and only if

$$\frac{\left(\lambda^{\underline{n}_{e1}^*} - \lambda^{\bar{n}_{e1}^*}\right)}{\left(\lambda^{\underline{n}_{e1}^*} + 1\right)\left(\lambda^{\bar{n}_{e1}^*} + 1\right)} > \frac{(1 - \lambda^{\bar{n}_{e2}^*})}{\left(\lambda^{\bar{n}_{e2}^*} + 1\right)}$$

Let $A = \frac{\left(\lambda^{\underline{n}_{e1}^*} - \lambda^{\bar{n}_{e1}^*}\right)}{\left(\lambda^{\underline{n}_{e1}^*} + 1\right)\left(\lambda^{\bar{n}_{e1}^*} + 1\right)}$. For $x_e > \frac{1}{2}$, $\frac{dA}{dx_e} < 0$ which implies that:

$$\frac{\left(\lambda^{\underline{n}_{e1}^*} - \lambda^{\bar{n}_{e1}^*}\right)}{\left(\lambda^{\underline{n}_{e1}^*} + 1\right)\left(\lambda^{\bar{n}_{e1}^*} + 1\right)} < \left.\frac{\left(\lambda^{\underline{n}_{e1}^*} - \lambda^{\bar{n}_{e1}^*}\right)}{\left(\lambda^{\underline{n}_{e1}^*} + 1\right)\left(\lambda^{\bar{n}_{e1}^*} + 1\right)}\right|_{x_e=\frac{1}{2}} = \frac{(1 - \lambda^{\bar{n}_{e2}^*})}{\left(\lambda^{\bar{n}_{e2}^*} + 1\right)} \quad (29)$$

hence $C^{THR} < 0$. Therefore, in a duopoly when the distribution of citizens' idiosyncratic preferences is such that Condition A holds (and where citizens watch at most one media report), there will never be an incentive to deviate from the equilibrium at $x_e^1 = 1 - x_e^2 = \frac{1}{2}$. Moreover, notice that this is the unique Nash equilibrium. If the two media outlets were to choose ideological editors, then each of them would clearly have an incentive to deviate by choosing a moderate one.
Let's now analyze the case where Condition B holds. First of all, in order to ensure that there is someone willing to watch media 1 the following condition must be satisfied

$$x_I(\bar{n}_{e_1}^*, \underline{n}_{e_1}^*, \bar{n}_{e_2}^*) < \tilde{x}_e(x_e^1)$$

that is:

$$C < \bar{C} = 2\delta \frac{\left(1 - \lambda^{\bar{n}_{e1}^*}\right)}{\left(\lambda^{\bar{n}_{e2}^*} + 1\right)} \quad (30)$$

where clearly $\bar{C} > 0$.[46] Let's now analyze the no-deviation condition for $C < \bar{C}$. Consider (27) and (28) and let $C^{Duop} = C^{Duop}(x_{e_1})$ be the highest opportunity cost such that for $x_{e_1} \in \left(\frac{1}{2}, 1\right)$ the following condition holds (i.e., C^{Duop} being the opportunity cost associated with the most

[45]Notice also that, as stated in section 2.2 the analysis focuses on symmetric distributions.

[46]Notice also that $x_I(\bar{n}_{e_1}^*, \underline{n}_{e_1}^*, \bar{n}_{e_2}^*) < \tilde{x}_e|_{x_e=\frac{1}{2}}$ if and only if $C < \check{C} \equiv 2\delta \frac{\left(1-\lambda^{\bar{n}_{e1}^*}\right)}{\lambda^{\bar{n}_{e2}^*}+1} \frac{\lambda^{\underline{n}_{e1}^*}\lambda^{\bar{n}_{e2}^*}-1}{\lambda^{\underline{n}_{e1}^*}\lambda^{\bar{n}_{e1}^*}-1}$ where $\check{C} > 0$ since $\left|\underline{n}_{e_1}^*\right| > \bar{n}_{e_2}^*$.

profitable deviation from $x_{e_1} = 1/2$):[47]

$$\frac{F\left(\max\left\{\hat{x}_{e_1}; x_I(x_{e_1})\right\}\right) - \frac{1}{2}}{F\left(\tilde{x}_{e_1}\right) - F(\left.\tilde{x}_e\right|_{x_e=\frac{1}{2}})} \geq 0 \tag{31}$$

now denote $C^{Dev} = \min\left\{\bar{C}, C^{Duop}\right\}$, then for $C \in \left(0, C^{Dev}\right)$ media outlet 1 will have an incentive to deviate by choosing an ideological editor.[48] Hence, in such case there is no equilibrium where both media outlets choose a moderate editor.[49] Let's now show that it can never exist an equilibrium with $x_{e_1} = x_{e_2} \neq \frac{1}{2}$. Suppose the two media outlets choose the same type of ideological editors (e.g., $x_{e_1} = x_{e_2} > \frac{1}{2}$). By doing so their demand would be

$$D^1(x_{e_1} = x_{e_2}) = D^2(x_{e_1} = x_{e_2}) = \frac{F(\tilde{x}_{e_1}) - F(\hat{x}_{e_1})}{2}$$

while if media outlet 2 chooses an editor with preferences $x_{e_2} = 1 - x_{e_1}$ its demand would be:

$$D^2(x_{e_2} = 1 - x_{e_1}) = \min\left\{F(\tilde{x}_{e_2}); \frac{1}{2}\right\} - F(\hat{x}_{e_2})$$

where by symmetry $\hat{x}_{e_2} = 1 - \tilde{x}_{e_1}$, which implies that $F\left(\hat{x}_{e_2}\right) = 1 - F\left(\tilde{x}_{e_1}\right)$. Thus, a necessary condition for media outlet 2 not be willing to deviate is $1 - F(\hat{x}_{e_1}) > F\left(\tilde{x}_{e_1}\right)$. However, since $x_{e_1} > \frac{1}{2}$, then $\tilde{x}_{e_1} > 1 - \hat{x}_{e_1}$ and given Condition B this condition cannot hold. An analogous proof applies for $x_{e_1} = x_{e_2} < \frac{1}{2}$. Hence, for $C \in \left(0, C^{Dev}\right)$ the only possible Nash Equilibrium must be such that $x_{e_1} = 1 - x_{e_2} \neq 1/2$. Let's show that this is indeed an equilibrium.[50] Suppose that $x_{e_1} = 1 - x_{e_2} > \frac{1}{2}$, then there are two possible cases. In the first one, $\forall x_{e_1} = 1 - x_{e_2} \in \left(\frac{1}{2}, x_{eR}^{\max}\right)$ it is always the case that:[51]

$$\left.\frac{dF\left(\max\left\{\hat{x}_{e_1}; x_I(x_{e_1})\right\}\right)}{dx_{e_1}}\right|_{x_{e_1}=1-x_{e_2}} < \left.\frac{dF(\tilde{x}_{e_1})}{dx_{e_1}}\right|_{x_{e_1}=1-x_{e_2}} \tag{32}$$

where for $x_{e_1} = 1 - x_{e_2}$, $x_I(x_{e_1})$ is always 1/2. Hence in this case $x_{e_1} = 1 - x_{e_2} = x_{eR}^{\max}$ is a Nash equilibrium. Indeed, by Lemma 1, $\tilde{x}_{e_1}$ is increasing in x_{e_1} if and only if $x_{e_1} < x_{eR}^{\max}$. Hence, $\left.\frac{dF(\tilde{x}_{e_1})}{dx_{e_1}}\right|_{x_{e_1}=1-x_{e_2}} > 0$ if and only if $x_{e_1} < x_{eR}^{\max}$. On the other hand, since by Lemma 1, for $x_{e_1} > 1/2$, $\hat{x}_{e_1}$ is always increasing in x_{e_1} and x_I is increasing in x_{e_1} when $x_{e_1} = 1 - x_{e_2}$ (i.e., for $x_I = 1/2$). Thus given Condition B it is always the case that $\left.\frac{dF\left(\max\left\{\hat{x}_{e_1}; x_I(x_{e_1})\right\}\right)}{dx_{e_1}}\right|_{x_{e_1}=1-x_{e_2}} > 0$. Thus, none of the two media outlet would have an incentive to deviate from $x_{e_1} = 1 - x_{e_2} = x_{eR}^{\max}$ by choosing a more leftist or more rightist editor. In the second case, $\exists x_{e_1} \in \left(\frac{1}{2}, x_{eR}^{\max}\right)$ such that (32) is not verified. Hence, since by construction of C^{Dev}, for $C < C^{Dev}$:

$$\left.\frac{dF\left(\max\left\{\hat{x}_{e_1}; x_I(x_{e_1})\right\}\right)}{dx_{e_1}}\right|_{x_{e_1}=1-x_{e_2}=1/2} < \left.\frac{dF(\tilde{x}_{e_1})}{dx_{e_1}}\right|_{x_{e_1}=1-x_{e_2}=1/2.}$$

[47]Since $f(x)$ is assumed to be symmetric with respect to 1/2, the mean and the median will always be at 1/2. Hence $F(1/2) = 1/2$.

[48]Clearly, if $C^{Dev} < 0$, firm 1 will never have an incentive to deviate. Indeed, as shown in the previous case where (Condition A) holds, when F is a uniform c.d.f. $C^{Dev} = C^{THR} < 0$.

[49]C^{Dev} is always lower than $C^{\max}$ since for $C = C^{\max}$ only citizens with $x_e = \frac{1}{2}$ watch news reports and thus firm 1 would never have an incentive to deviate.

[50]Obviously, for $C \in \left(0, C^{Dev}\right)$ there are always two symmetric Nash Equilibria, i.e., $x_{e_1} = 1 - x_{e_2} < \frac{1}{2}$ and $x_{e_1} = 1 - x_{e_2} > \frac{1}{2}$.

[51]Symmetric conditions apply for media outlet 2.

then it will always exist a $x_{e_1} \in \left(\frac{1}{2}, x_{e_R}^{\max}\right)$ such that:

$$\left.\frac{dF\left(\max\left\{\hat{x}_{e_1}; x_I(x_{e_1})\right\}\right)}{dx_{e_1}}\right|_{x_{e_1}=1-x_{e_2}} = \left.\frac{dF(\tilde{x}_{e_1})}{dx_{e_1}}\right|_{x_{e_1}=1-x_{e_2}} \tag{33}$$

that is, $x_{e_1} = 1 - x_{e_2} \in \left(\frac{1}{2}, x_{e_R}^{\max}\right)$ is a Nash equilibrium. Finally, we need to show that a lower C is associated with a Nash equilibrium where the difference between the idiosyncratic preferences of the editors chosen by each media outlet, i.e., $|x_{e_1} - x_{e_2}|$, is higher. First of all by Lemma 1, a lower C corresponds to a higher $x_{e_R}^{\max}$ and a lower $x_{e_L}^{\min}$. Moreover, since as C decreases $\frac{d\tilde{x}_e(\bar{n}_{e_1}^*, \underline{n}_{e_1}^*)}{dx_e}$ increases, hence $\left.\frac{dF(\tilde{x}_{e_1})}{dx_{e_1}}\right|_{x_{e_1}=1-x_{e_2}}$ increases as well. Thus since the RHS of (33), the LHS must increase as well, which, in turn implies that x_{e_1} must be higher (similarly, x_{e_2} will be lower). That is, a lower C is associated with an equilibrium where the two media outlets choose less moderate editors. **Q.E.D.**

Proof of Proposition 4

We have to analyze the no-deviation condition with K media outlets. Let $\bar{n}_e^* = -\underline{n}_e^*$ be the stopping thresholds chosen by a moderate editor. The demand media outlet 1 faces if it chooses a moderate editor as all the other media outlets is $\forall j \in \{2, 3, ..., K\}$:

$$D^{NDev}(x_e^1) = D^{NDev}\left(x_e^j\right) = \frac{1}{K}\left[F(\tilde{x}|_{x_e=\frac{1}{2}}) - F(\hat{x}|_{x_e=\frac{1}{2}})\right] = \frac{2}{K}\left[F(\tilde{x}|_{x_e=\frac{1}{2}}) - F(\frac{1}{2})\right]$$

Instead the demand that media outlet 1 faces if it deviates from such position is:

$$D^{Dev}(x_e^1) = \left[F(\tilde{x}|_{x_e^1}) - F(\max\left\{\hat{x}_{e_1}; x_I(x_{e_1})\right\})\right]$$

Hence given a uniform distribution, media outlet 1 will prefer not to choose a moderate editor if and only if:

$$K > K^* = \frac{2\left[\tilde{x}|_{x_e=\frac{1}{2}} - \frac{1}{2}\right]}{\tilde{x}|_{x_e^1} - \max\left\{\hat{x}_{e_1}; x_I(x_{e_1})\right\}}$$

where we know from the proof of Proposition 3, that $K^* > 2$. Moreover, the game satisfies the properties of Theorem 4 in Dasgupta and Maskin (1986) for the existence of an equilibrium in a product competition game. Hence, the K^* media outlets game possesses a symmetric mixed-strategy Nash equilibrium. Moreover it is always the case that $\frac{dK^*}{dC} > 0$ since $\hat{x}_{e_1}$ is increasing in C and $d\tilde{x}_e/dx_e$ is decreasing in C. **Q.E.D.**