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La Influencia de los Medios de Comunicación en el Juego Político

Ascensión Andina Díaz

Tesis dirigida por

Dr. Javier M. López Cuñat

Departamento de Fundamentos del Análisis Económico
Universidad de Alicante

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A mis padres

A mis padres

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> "Neither Gutenberg with the press, nor Watt with the steam engine, nor Ford with the automobile, were aware of the computer revolution, the industrial revolution or the transport revolution that they were causing. Just as neither of the pioneers of the broadcasting technology had any premonition of the political revolution that they were going to cause".
>
> Theodore H. White.

Voters are exposed to politics through the media. This means that so important as the platforms proposed by the political parties or the candidates' charisma, is the way the media present them to the public. In this manner, candidate images and campaign issues covered by the media, have become important determinants of voting decisions, and so, election campaigns are nowadays portrayed as a three player game involving the candidates, the media, and the voters (Covington et. al, 1993).

This thesis focuses on the so important influence of the media on the public opinion and on the election campaigns, i.e., on the political game.

The thesis is composed of three chapters, in which I focus on three related, but different, issues. In particular, in the first chapter, I am interested in the direct influence that the media have over the public opinion, and their possibility of modelling the voters' ideology. In the second chapter, I focus on the monitoring role of the media and study how the existence of this industry may help in controlling politicians' behavior. Finally, in the third chapter, I analyze how the media construct the pictures in our heads about politics, and so, how it might influence political outcomes.

More precisely, Chapter one considers a model of *spatial competition* in which two tv newscasts compete for either revenue or political influence. We consider a *continuum* of viewers who are characterized by two variables: ideological position and ideological precision. The viewers have a taste for variety, and as such, enjoy watching both media outlets. We assume, however, that their taste for variety depends on their prior ideologies. Thus, we obtain that, in equilibrium, viewers are exposed to the two media outlets in varying intensities, i.e., they channel-hop. We analyze the media competition under two different set-ups, which refer to the way media exert influence on viewers. These two set-ups correspond to two different theories we borrowed from Sociology. First, we consider the "Reinforcement Approach", which states that media can reinforce viewers' prior opinions, i.e., media can influence their ideological precision. Second, we consider the "Attitudinal Orientations Approach", which asserts that media can modify the viewers' political preferences.

Our findings show that independently of how they exert their influence, media outlets polarize their locations when they compete for influence, whereas they moderate their lines when they aim to maximize audience. Thus, whether the "Reinforcement Approach" or the "Attitudinal Orientations Approach" holds, does not make a difference. We do observe, however, that channel-hopping is indeed important. Thus, we observe that in the case of viewers doing channel hopping and media outlets competing for influence, the stations polarize their locations, whereas in the case of viewers attending to their closest located media, they do not differentiate so much. The reason for this is that when people attend to more than one tv newscast, each media outlet has to offset the negative influence that the other one might have on their viewers, and so, they have to differentiate their positions much more. However, in the case of viewers who receive all their information from just one tv station, this does not occur, and so, media outlets do not have to differentiate so much. Additionally, we also observe that in the case where viewers channel-hop and media outlets compete for audience, they do not necessarily locate themselves at the median viewer, whereas when viewers just attend to one station, they do. This is so because in the former case, the distributions of ideology and audience are not equal, so that the location of media outlets does not necessarily coincide with that of the median viewer. In contrast, in the latter case, the two distributions do coincide, and the equilibrium is therefore to be found at the median viewer location.

In Chapter two, I study a *signalling game* with three types of players: political parties, media outlets and voters. There are two political parties: a left-wing party and a right-wing one. From each of the two parties a candidate emerges, who can be either moderate or extreme. This is private information of each agent. The two candidates propose non-binding platforms, choosing either a moderate or an extreme platform. The aim of candidates is to win the election. Therefore, they may well choose a platform that does not correspond to their respective *type* if this were profitable to them. The aim of media is to maximize their profits. The aim of voters is to maximize their own utility, but as such utility is not defined on the platforms proposed by the parties but rather on the post-election policy, voters will want to know the true intentions of politicians (their *types*). Hence the role of media.

Our findings here show that the existence of a media industry is desirable, as it induces politicians to discard the use of *pooling* strategies. In particular, we show that the monitoring role of media is more likely to appear in societies with large numbers of swing voters or with great competition among the media. Nevertheless, and since revealing (their *types*) is never an equilibrium for candidates, we allow politicians and media outlets to use *mixed* strategies. We here obtain that candidates tend to a certain extend to separate their *types*. Finally, we explore the case of an ideological media industry. The findings here show that if each candidate has the support of one outlet, then no distortion appears, but that asymmetries may arise when just one politician has the loyalty of the media. These results clearly show

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that ideology is not harmful *per se*, but asymmetries in the support of different candidates may well be.

Finally, Chapter three analyzes a *spatial competition game* where two *downsian* candidates compete for votes through ideology and valence, and the media create the candidates' charisma. We consider two media outlets in the economy, with locations exogenously given. The media publish information on politicians, in particular, on their charisma. We assume that an outlet prefers the candidate with the ideology closest to its own. It therefore presents a much better picture of this candidate than of his opponent. In particular, we assume that the image of a politician that an outlet projects is a measure of the distance between the position of the outlet and that of the candidate. Given this structure, our aim is to study how politicians compete when the candidates' valences are endogenously determined in the model. More precisely, we analyze political competition under two different set-ups. The first one is the case in which voters are exposed to both outlets. The second set-up is the case in which voters are only exposed to the most affine media.

Our findings show that, depending on the way the voters attend to the media, the equilibrium location of candidates may differ. Thus, when voters are exposed to both outlets, candidates tend more to moderate their platforms, in an attempt to win the favor of both media. In contrast, when voters select among the outlets, candidates may differentiate their platforms. The lesson we draw from this is that situations in which voters attend to the outlets that suit them better may result in political polarization. On the other hand, situations in which voters make more balanced judgments should better foster political moderation.

Introducción

> "Ni Gutenberg con la imprenta, ni Watt con la máquina de vapor, ni Ford con el automóvil, tuvieron conciencia de la revolución informática, la revolución industrial o la revolución del movimiento que estaban provocando. Del mismo modo, ninguno de los pioneros de la tecnología de las ondas tuvo ninguna premonición de la revolución política que iban a provocar".
>
> Theodore H. White.

Actualmente, los votantes recibimos la mayoría de la información política a través de los medios de comunicación. Esto hace que tan importante como el programa electoral de los distintos partidos políticos, o el carisma de sus candidatos, sea el tratamiento que éstos reciben en los medios de comunicación. De este modo, la imagen de los candidatos ante el público, o los temas de campaña cubiertos por los medios, se han convertido en elementos de gran importancia a la hora de determinar el voto. Hasta tal punto, que las campañas electorales son actualmente reflejadas como un juego a tres, entre candidatos, medios, y votantes (Covington et. al, 1993).

La tesis que aquí se presenta tiene como objetivo el análisis de la influencia ejercida por los medios de comunicación sobre la opinión pública y las campañas electorales. Es decir, el objeto de estudio es el papel de los medios de comunicación en el juego político.

Esta tesis consta de tres capítulos, en los que se abordan diferentes aspectos de esta relación. Así, en el primero se estudia la influencia directa que los medios de comunicación tienen sobre la opinión pública, y su posibilidad de modelar la ideología de los votantes. El segundo, por contra, se centra en el papel controlador de los medios de comunicación. Finalmente, el tercero analiza cómo los medios de comunicación contribuyen a construir las imágenes que los votantes tenemos de los políticos, y por tanto, cómo pueden influir sobre los resultados de las elecciones.

Más concretamente, el Capítulo primero considera un modelo de *competencia espacial*, en el que dos canales de televisión compiten con la intención de maximizar bien beneficios o influencia política. Consideramos la existencia de un *continuo* de telespectadores, caracterizados por dos variables: posición ideológica y precisión ideológica. Los telespectadores gustan de la variedad, y por ello, disfrutan viendo los dos canales. Se asume, sin embargo, que este gusto por la variedad depende de la ideología inicial del individuo. Así, en equilibrio, se obtiene que los telespectadores ven los dos canales en diferentes proporciones de tiempo, es decir, hacen *zapping*. En este marco, se analiza el tipo de competencia desarrollada por los medios de comunicación en dos posibles escenarios, que tienen que ver con el tipo de influencia que los medios ejercen sobre los votantes, y que han sido tomados de la literatura en Sociología. Así, se considera en primer lugar el "Enfoque del Reforzamiento", que mantiene que los medios de comunicación pueden reforzar a los televidentes en sus opiniones previas, es decir, los medios pueden influir sobre la precisión ideológica de los votantes. A continuación, se considera el "Enfoque de la Orientación de Actitudes", que sostiene que los medios de comunicación pueden modificar las preferencias políticas de los telespectadores.

Los resultados obtenidos muestran que independientemente del tipo de influencia ejercida por los medios, éstos polarizan sus ideologías cuando buscan maximizar su influencia política, mientras que moderan sus posiciones cuando buscan maximizar beneficios. Así, el tipo de influencia ejercida por los medios no juega un papel importante en este análisis. Sin embargo, el hecho de que los individuos hagan *zapping* sí tiene importancia. En particular, observamos que en el caso en que los individuos hacen *zapping* y los medios compiten por influenciar a la población, las televisiones polarizan sus localizaciones; mientras que en el caso en que los votantes sólo ven el canal de televisión más cercano ideológicamente, los medios no se diferencian tanto. La idea que sustenta este resultado es que en el caso en que los individuos están expuestos a más de un medio de comunicación, cada medio tiene que neutralizar la influencia contrapuesta que el otro ha podido ejercer sobre su público, y para ello necesita polarizar más su ideología. Sin embargo, en el caso en que los telespectadores reciben toda la información de un solo medio, esta influencia contrapuesta no tiene lugar, y por ello, los medios no se ven obligados a polarizar tanto sus posiciones. Por otra parte, también observamos que en el caso en que los individuos hacen *zapping* y los medios de comunicación compiten por la audiencia, los medios no se localizan necesariamente en la posición del votante mediano; mientras que en el caso en que los individuos están expuestos sólamente al medio más cercano, los medios sí se localizan en tal posición. La razón que explica este resultado es que en el primer caso las distribuciones para las variables ideología y audiencia son distintas, y por ello la localización de los medios en equilibrio no tiene por qué darse en la localización del votante mediano. Por el contrario, en el último caso, las dos distribuciones coinciden, por lo cual el equilibrio sí tiene lugar en la localización de dicho votante.

En el Capítulo segundo se propone un *juego de señalización* con tres tipos de jugadores: partidos políticos, medios de comunicación, y votantes. Se consideran dos partidos políticos: uno con una ideología de derechas y el otro con una ideología de izquierdas. Cada partido político está liderado por un candidato, que puede ser bien de tendencia extrema o moderada. El *tipo* de cada agente es conocimiento privado de cada uno de ellos. El objetivo de los candidatos es ganar las elecciones. Para ello, proponen simultáneamente un programa electoral no vinculante, eligiendo entre un programa con políticas de tendencia extrema o moderada. El objetivo de los medios de comunicación es maximizar sus beneficios. Por último, el objetivo de los votantes es maximizar su utilidad, pero dado que esta utilidad no está definida sobre los programas electorales propuestos, sino sobre las políticas que finalmente serán implementadas, los votantes querrán conocer las verdaderas intenciones de los candidatos (sus *tipos*). De ahí el papel de los medios.

Los resultados que se desprenden de este modelo muestran que la existencia de una industria de medios de comunicación es deseable, ya que ésta induce a la no utilización de estrategias *agrupadoras* por parte de los candidatos. Más concretamente, en el capítulo se demuestra que los medios ejercen un mayor control sobre los políticos cuanto mayor sea el número de votantes no cautivos en la economía, o mayor sea el grado de competencia entre los medios de comunicación. Sin embargo, y debido a que en este juego los candidatos nunca encuentran beneficioso revelar su *tipo* en equilibrio, permitimos el uso de estrategias *mixtas* por parte de candidatos y medios de comunicación. Para este análisis, obtenemos que los candidatos tienden a diferenciar sus *tipos* en equilibrio. Finalmente, también analizamos el caso de una industria de medios de comunicación ideológicos, en cuyo caso obtenemos que si cada candidato cuenta con el apoyo de un medio de comunicación, ninguna ideología resulta beneficiada. Sin embargo, en el caso en que sólo un candidato cuenta con el apoyo mediático, este candidato resulta beneficiado y, por tanto, se introduce un sesgo en el juego entre partidos. Por ello, podemos concluir que la ideología en sí no es perjudicial, pero sí lo son las posibles asimetrías que pueden surgir en el apoyo a diferentes partidos políticos.

Finalmente, el Capítulo tercero analiza un *juego de localización* en el que dos candidatos compiten *à la Downs*, con el objetivo de maximizar su representación política en el parlamento. Los dos candidatos se sirven para tal fin de dos variables: ideología y carisma, estando el carisma determinado por el tratamiento que cada candidato recibe en los medios de comunicación. Consideramos la existencia de dos medios de comunicación en esta economía, con localizaciones determinadas exógenamente. Estos medios publican información sobre los políticos, en particular, sobre su valía personal. En el modelo se asume que cada medio prefiere el candidato con una ideología más cercana a la suya. De esta forma, el candidato más afín a la ideología del medio recibirá un mejor tratamiento informativo por parte del medio en cuestión. El análisis de este modelo se lleva a cabo bajo dos escenarios distintos. El primero de ellos considera el caso en el que todos los votantes están expuestos a los dos medios de comunicación de la economía. El segundo escenario es aquel en el que los votantes sólo están expuestos al medio de comunicación más cercano a su ideología.

Los resultados obtenidos muestran que la localización de equilibrio de los candidatos depende del modo en que los votantes se exponen a la información. De esta forma, cuando los votantes reciben información de los dos medios, los candidatos tienden a moderar sus programas electorales, con la intención de obtener el favor de los dos medios de comunicación. Por el contrario, cuando los votantes reciben toda su información de un único medio, los candidatos pueden proponer programas electorales distintos en equilibrio. Esto ocurre porque en este caso a los candidatos les interesa obtener el favor del medio que sus votantes siguen, más que la ayuda del otro medio, lo cual explica la posible diferenciación. La conclusión que extraemos pues de este resultado es que aquellas situaciones en las que los votantes siguen únicamente a los medios de comunicación que les son más cercanos ideológicamente, pueden dar como resultado una diferenciación política. Por el contrario, aquellas situaciones en las que los votantes reciben información de más de un medio y, por ello, hacen juicios menos sesgados, acogen de mejor modo la moderación política.

Chapter 1

Media Competition: Audience vs. Political Influence

> "In democracies worldwide, television is slowly but surely changing the nature of electioneering and perhaps even the distribution of power within parties".
>
> Gunther and Mughan.

1.1 Introduction

It is universally accepted that mass media hold great power, as they transmit information to the public and are free to highlight certain news items and ignore others, setting the agenda of public life and creating consensus or disagreement on certain issues. In other words, the news media determine, to a certain extent, the pictures in our heads of many issues, and thus, can influence our opinions.

This tremendous influence of the media on public opinion has been extensively analyzed in Social Sciences, but has so far been almost ignored in Economic literature. Sociology, however, has long focused on the mass media influence for almost a century. The first studies on this topic were published in early decades of the 20th Century and may all be characterized by their common belief in the great influence exerted by the media on public opinion. Lasswell (1927) states: "*Propaganda is one of the most powerful instrumentalities in the modern world*". This thought, which was quite predominant at the beginning of the last Century, finally lost credence over time, and from the Forties on, and right up to the Sixties, the new belief that the media acted more like reinforcing agents in their prior attitudes rather than creating new ones, attached relevance. This is the basis of the "Reinforcement Approach". Lazarsfeld et al., (1948) found that for the 1940 US Presidential Campaign, "*...the main effect of media were to reinforce people in their already existing attitudes, rather than produce new ones*". The great consensus that seems to hold today, however, is that the media do exert a certain influence over their viewers, but it is neither as significant as it was first thought to be, nor as minimal as was subsequently assumed.

There is, of course, abundant evidence of the media's influence on viewers. The data provided by McKie (1995), for the 1992 British General Election Campaign, is indeed relevant. McKie titles: "Fact is free but comment is sacred; or was it *The Sun* wot won it?", in a clear reference to the question whether John Major or *The Sun* won the election. In other words, whether the influence of *The Sun* was so strong as to decide the outcome of the 1992 British General Election. He makes in this study an analysis of the voters' tendencies and shows that the way they vote is, to a certain extent, related to the sort of newspaper they read. In particular, he finds that: "*Conservative voters are more likely to stay loyal if they read a Conservative newspaper, while uncommitted voters are more likely to choose the Conservatives if they read a Conservative newspaper*". Two different ideas underlie this statement. First, that the media tend to reinforce committed viewers in their prior opinions. Second, that uncommitted voters might modify their political opinions for those supported by the newspapers they read.

We next provide some evidence for the 1992 and 1997 British General Elections, from which we observe that McKie was right. In particular, we observe that readers of conservative (resp. liberal) newspapers tend to vote a right-wing (resp. left-wing) party. Furthermore, we also observe that the readers of *The Sun*, who are principally uncommitted or apolitical, are the most easily-influenced readers. In other words, they vote mainly in accordance with the ideology promoted by "The Sun" in each election.

Table 1.1: **Readers' tendency of voting according to newspaper preferences**

	Newspapers Circulat. 1992 ('000s)	Circul. 1997	Pref. Winner 92	Pref. Winner 97	**Readers** How they vote 92 (%)		How they vote 97	
Daily Mail	1,675	2,151	Conservative	Conservative	Cons. Lab. Lib. Dem.	65 14 18	Cons. Lab. Lib. Dem.	49 29 14
Daily Mirrow	2,903	3,084	Labour	Labour	Cons. Lab. Lib. Dem.	20 63 14	Cons. Lab. Lib. Dem.	14 72 11
Guardian	429	401	Lib. Dems	Labour	Cons. Lab. Lib. Dem.	15 55 25	Cons. Lab. Lib. Dem.	8 67 22
Sun	3,571	3,842	Conservative	Labour	Cons. Lab. Lib. Dem.	45 36 15	Cons. Lab. Lib. Dem.	30 52 12
The Times	386	719	Conservative	Eurosceptic	Cons. Lab. Lib. Dem.	64 15 19	Cons. Lab. Lib. Dem.	42 28 25

The aim of this paper is to study how media outlets compete when they are either audience or influence maximizes and have the chance to influence their viewers. The reason for a media outlet being audience maximizer is quite clear. They are firms which should be profit maximizers, and so, have reasons to appeal to the largest possible audience. In contrast, the reason for a media outlet being political-influence maximizers is not so straightforward. We here assume that media outlets are influence maximizers because the groups that control them hope to derive some sort of political benefit from their influence. A clear example of this sort of situation is the case of Italian Prime Minister Silvio Berlusconi, who is also a mass media magnate controlling the Finisvet media conglomerate. This was also the case in 19th-Century Britain, where many newspapers were directly subsidized by English political parties.

We propose a model in which two tv newscasts compete for either revenue or political influence.[1] We consider a continuum of viewers who are characterized by two variables: ideological position and ideological precision.[2] The viewers have also a taste for variety, and as such, enjoy watching both media outlets. We assume, however, that their taste for variety depends on their prior ideologies. Thus, we obtain that, in equilibrium, viewers are exposed to the two media outlets in varying intensities, i.e., they channel-hop. We analyze the media competition under two different set-ups, which refer to the way media exert influence on viewers. These two set-ups correspond to two different theories we borrowed from Sociology. First, we consider the "Reinforcement Approach", which states that media can reinforce viewers' prior opinions, i.e., media can influence their ideological precision. Second, we consider the "Attitudinal Orientations Approach", which asserts that media can modify the viewers' political preferences. Our findings show that independently of how they exert their influence, media outlets polarize their locations when they compete for influence, whereas they moderate their lines when they aim to maximize audience. Thus, whether the "Reinforcement Approach" or the "Attitudinal Orientations Approach" holds, does not make a difference. We do observe, however, that channel-hopping is indeed important. Thus, we observe that in the case of viewers doing channel hopping and media outlets competing for influence, the stations polarize their locations, whereas in the case of viewers attending to their closest located media, they do not differentiate so much. The reason for this is that when people attend to more than one tv newscast, each media outlet has to offset the negative influence that the other one might have on their viewers, and so, they have to differentiate their positions much more. However, in the case of viewers who receive all their information from just one tv station, this does not occur, and so, media outlets do not have to differentiate so much. Additionally, we also observe that in the case where viewers channel-hop and media outlets compete for audience, they do not necessarily locate themselves at the median viewer, whereas when viewers just attend to one station, they do. This is so because in the former case, the distributions of ideology and audience are not equal, so that the location of media outlets does not necessarily coincide with that of the median viewer. In contrast, in the latter case, the two distributions do coincide, and the equilibrium is therefore to

[1] We focus on tv news-casts because it has been shown that television is the best media for convincing undecided voters.

[2] By precision we mean the degree of confidence an agent has in her prior opinions.

be found at the median viewer location.

This analysis was inspired by the literature on Sociology that focuses on the influencing power of the media. This is a long-standing debate between sociologists and communication theorists, and the number of papers on this issue is therefore important. The most classical analyses of the influencing effects of the media were presented by Lazarsfeld et al., (1948), and Klapper (1960). More recent work includes the studies done by Gunther and Mughan (2000), Petty and Priester (1994), and Zaller (1992). They all focus on the determining factors and consequences of the media's influence on the viewers.

This paper is also related to the political economy literature on the media issue. Here, we find interesting papers presented by Besley and Prat (2001), and Strömberg (2001), which focus specifically on the effects of the media industry influence on the political scene. In particular, Besley and Prat (2001) present an adverse selection model which captures the possible influencing effects of a bad type government on the media industry. They establish conditions under which the media play no monitoring role at all, and show that the more numerous the media outlets in an economy, the more difficult the government finds it to silence the media. Stömberg (2001) also studies the influence of media in determining policy outcomes. In particular, he shows that due to the increasing returns to scale enjoyed by the media industry, a political bias may appear, which hurts small groups of voters while benefits larger groups. This might well offset, to a certain extent, the bias introduced by special interest groups, which are usually in favor of small groups, thus leading to more desirable policies.

Finally, our paper is also related to the industrial organization literature that focuses on the media industry. Outstanding papers in the classical literature on the topic are those of Steiner (1952), and Spence and Owen (1977), which analyze the program decision choices in a monopoly, a duopoly, etc, and the funding aspects for media outlets, respectively. There are, of course, more recent papers on the topic. Schulz and Weimann (1989), study the location decisions of newspapers and political parties. Gabszewicz et al., (2001), present a model in which two newspapers have to decide where to locate. More precisely, they must decide on the ideology they should promote, the street-price of their daily and the fees they will charge for publishing advertisements. The authors show that in many cases, newspaper editors choose moderate ideologies in an effort to increase their circulations.

This paper is organized as follows. In the next section, we present the model and some preliminary concepts. In Section 1.3, we consider the case in which the media serves to reinforce the viewers' prior opinions, and analyze the equilibrium location of media outlets. In Section 1.4, we consider the case in which the media can actually modify the ideology of their viewers, and again analyze the equilibrium location of media outlets. Finally, Section 1.5 concludes.

1.2 The model

There is an economy with two ideological media outlets, L and R. The reason for this may be that the media outlets are supported by politically active interest groups, which hope to gain political benefits through the control of the media. Media outlets maximize either profits or political influence. There is a continuum of agents of measure one, who attend to the two media, both of which can influence the voters' political preferences.

The media outlets

Each media outlet, $j \in \{\mathsf{L}, \mathsf{R}\}$, has to choose where to locate itself politically, i.e., which ideology it will project in their newscast, with the aim of maximizing either audience or political influence. We denote the location of the left-wing outlet by x_{L}, and that of the right-wing outlet by x_{R}, with $x_{\mathsf{L}}, x_{\mathsf{R}} \in [0,1]$. We identify the extreme left ideology with 0, and the extreme right with 1. We therefore present a model of spatial competition.

We focus on the competition between tv newscasts, which we assume to be equal in all other aspects (broadcast time, duration, etc) but in ideology. Thus, the media competition is set in the ideological dimension. The utility function of a media outlet does not merely depend on revenue, i.e., on audience share,[3] but also on the political influence it has on the public. Hence, the utility of media $j \in \{\mathsf{L}, \mathsf{R}\}$, $U_j(x_j, x_k) : [0,1]^2 \to \mathbb{R}$ is

$$U_j(x_j, x_k) := \Pi\left(A_j(x_j, x_k), \gamma_j(x_j, x_k)\right)$$

with $k \in \{\mathsf{L}, \mathsf{R}\}$, $k \neq j$, and $\frac{\partial \Pi(\cdot)}{\partial A_j(\cdot)} > 0$, $\frac{\partial \Pi(\cdot)}{\partial \gamma_j(\cdot)} > 0$. The function $A_j(x_j, x_k) : [0,1]^2 \to \mathbb{R}_+$, represents the audience of outlet j, whereas the function $\gamma_j(x_j, x_k) : [0,1]^2 \to \mathbb{R}$, represents the political influence exerted by media j over its viewers.

The viewers

Each viewer is characterized by two features: ideological position, θ, and ideological precision, τ. Ideological position, θ, is distributed on the interval $[0,1]$ according to some continuous generic distribution function $F(\cdot)$, with a positive density function $f(\cdot)$. Ideological precision, on the other hand, is a measure of the confidence an agent has in her prior pre-conceived opinions. That is to say, ideological precision is the inverse of the variance of an agent's ideology. Thus, if we consider the ideology of an agent as a random variable, we can identify the mean of that distribution with the ideology of the viewer, θ, and its variance with the inverse of her precision.[4] Hence, agents with high dispersions around their means are not convinced of their prior opinions and therefore have lower degrees of precision, whereas agents with small variances are more convinced in their prior opinions and, therefore, have a

[3]Empirical evidence shows that audience is usually associated with revenues. There have been, however, some cases of quite popular tv programs which were dropped out because of the profile of their audiences, rural or low income public, in whom the sponsors are not particularly interested.

[4]Blomberg and Harrington (2000) write $\tau_i = \frac{1}{Var(\theta_i)}$, where θ_i is the ideology of viewer i, which is assumed to be a random variable.

higher level of precision. In this model, we consider that all the viewers have the same value of τ, that is to say, they all have the same degree of precision.

The utility of viewer θ is defined on the time she is exposed to both media outlets. We assume that the viewers have a taste for variety, thus, we allow them to attend to both media. Let T_θ^j with $j \in \{\mathsf{L}, R\}$, be the time viewer θ attends to tv newscast j. We can therefore define the utility function of a viewer θ in attending to the media as

$$u_\theta(T^{\mathsf{L}}, T^{\mathsf{R}}) := (T^{\min})^{a(\theta; x_{\min}, x_{\max})} (T^{\max})^{1-a(\theta; x_{\min}, x_{\max})}$$

where min $= j$, max $= k$ if $x_j \leq x_k$. We assume a Cobb-Douglas utility function, which allows us to identify $a(\theta; x_{\min}, x_{\max})$ with the preference viewer θ has for the left-wing media, and $1 - a(\theta; x_{\min}, x_{\max})$ with her preference for the right-wing channel. We assume $a(\overline{x}; x_{\min}, x_{\max}) = \frac{1}{2}$ and $\frac{\partial a(\theta; x_{\min}, x_{\max})}{\partial \theta} < 0$, with $\overline{x} = \frac{x_{\mathsf{L}} + x_{\mathsf{R}}}{2}$. Thus, the specification we propose is consistent with the "Self Selection of Audience" theory, which is the name given to empirical evidence that "*Most individuals expose themselves most of the time to the kind of material with which they agree to begin with*".[5] We assume that each agent has a unit of time, which she must split between her exposures to the two different media. Thus, the time constraint is $T^{\mathsf{L}} + T^{\mathsf{R}} = 1$.

We shall now solve this maximization problem. We obtain that viewers expose themselves to more than one tv newscast in equilibrium, i.e., viewers channel-hop. However, we observe that this taste for variety depends on the prior ideological preference of the agent, i.e., on her location. Thus, not all viewers spend the same length of time watching any given station, but it may vary considerably from viewer to viewer. Specifically, we obtain that in equilibrium

$$T^{\min *} = a(\theta; x_{\min}, x_{\max}) \qquad T^{\max *} = 1 - a(\theta; x_{\min}, x_{\max}).$$

This idea of channel hopping is empirically supported, and it enriches the model considerably. Indeed, many of the main results we present here rely on it. To the best of our knowledge, however, there are no papers in the literature that consider the rather common habit of channel-hopping, except the one by Gabszewicz et al. (1999), which models it in quite a different fashion.

For tractability reasons, we specify a piecewise linear function for $a(\theta; x_{\min}, x_{\max})$. This functional form is assumed to work whenever $x_{\mathsf{L}} \neq x_{\mathsf{R}}$. On the other hand, we also assume that viewers choose any pair $(T^{\min}, T^{\max})$ such that $\sum_{j=\mathsf{L},\mathsf{R}} T^j = 1$, when $x_{\mathsf{L}} = x_{\mathsf{R}}$. For any other case, we assume

$$T^{\min}(\theta) := \begin{cases} 1 - \frac{1}{2\overline{x}}\theta & \text{if } \theta \leq \overline{x} \\ \frac{1-\theta}{2(1-\overline{x})} & \text{if } \theta \geq \overline{x} \end{cases} \qquad T^{\max}(\theta) := \begin{cases} \frac{1}{2\overline{x}}\theta & \text{if } \theta \leq \overline{x} \\ \frac{1-2\overline{x}+\theta}{2(1-\overline{x})} & \text{if } \theta \geq \overline{x} \end{cases} \tag{1.1}$$

In this specification, we consider that extreme viewers only watch the tv newscast that is most closely located to their own positions. We consider this to be a

[5] Lazarsfeld et al. (1954).

reasonable assumption, since radical agents generally tend to do this. Below, we present the graphs for $T^{\min}(\theta)$ and $T^{\max}(\theta)$.

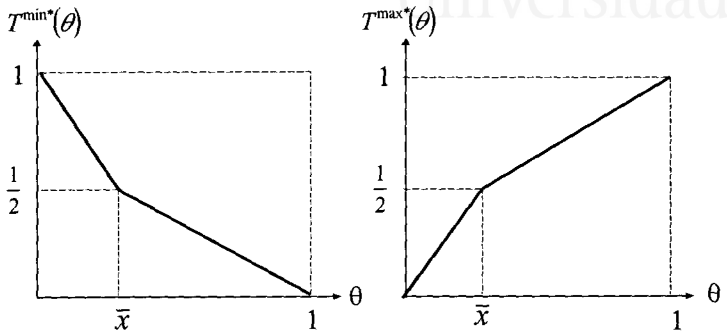

Figure 1.1: **Time viewers watch tv according to ideology, given x_L and x_R.**

The specification we propose implies that the ideology a viewer perceives from tv news is not the same for all, but rather, depends on the location of each agent. Let $m(\theta) = x_{\min}T^{\min}(\theta) + x_{\max}T^{\max}(\theta)$ be the function that represents the mean ideology viewers observe on tv newscasts, given the locations of the two media outlets. This function is

$$m(\theta) = \begin{cases} x_{\min} + \frac{\Delta x}{2\bar{x}}\theta & \text{if } \theta \leq \bar{x} \\ x_{\max} - \frac{\Delta x}{2(1-\bar{x})}(1-\theta) & \text{if } \theta \geq \bar{x} \end{cases} \qquad (1.2)$$

with $\Delta x = |x_R - x_L|$. We now display $m(\theta)$.

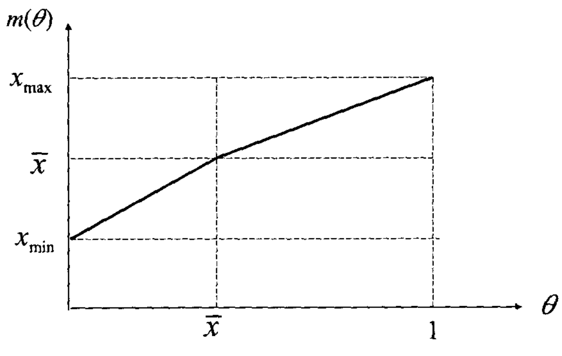

Figure 1.2: **Mean ideology viewers observe on television as a function of θ.**

In this model, viewers receive different information from the media, because they choose to expose themselves to the outlets in a different fashion. One possible reason for this could be that they are well aware of the persuasiveness of the information they receive and, therefore, choose to watch both stations in an effort to offset their persuasive effects. In other words, they consider both newscasts to be both informative and persuasive.[6] We also observe, however, that the viewers are not all equally aware of the strength of this persuasive effect. Thus, the more extreme the ideology of a viewer is, the lower her awareness of this effect will be.

1.3 Media influence: the Reinforcement Approach

> "Persuasive mass communication functions far more frequently as an agent of reinforcement than as an agent of change".
>
> Klapper.

In Communication Theory, there is a well-known premise that states that the mass media can influence their viewers in four different ways, i.e., opinion affirmation, opinion deformation, opinion conformation and opinion reformation. In this section, we focus on the opinion affirmation role of tv newscasts, assuming that the media can reinforce agents' prior opinions. This is the so-called "Reinforcement Doctrine of Political Communication Impact".

Assuming that the reinforcement approach works, it may well be of interest to the tv stations to reinforce their viewers' prior opinions for two different reasons.[7] First, because a more confident agent is usually an active citizen, i.e., an agent who is more willing to contribute money to his preferred political party.[8] If this is the case, media outlets may try to reinforce affine viewers in their prior opinions to favor the political party it supports. Secondly, because more confident agents are also more likely to turnout to vote.[9] Here also, media outlets may try to increase the precision of affine agents to favor the political party it supports. For whatever reason that holds true, we assume that media outlets are interested in reinforcing the pre-conceived ideas of their affine viewers.

To the aim of modeling this idea, we define the final precision of an agent at time one,[10] as a function $\tau^1(\theta)$, that depends negatively on a measure of the distance between the ideology of the agent and that she observes on tv news. Thus,

$$\tau^1(\theta) := g(d(\theta, m(\theta))) \tag{1.3}$$

[6] By persuasive information we mean information that is intended to bias the viewers' opinions in favor of a certain ideology.

[7] Petty and Priester (1994) states: "*A television commercial might be based on the idea that giving people information about a candidate's issue position will lead to favorable attitudes toward the candidate and ultimately to contributing money to and voting for the candidate*".

[8] Aldrich (1983), uses the idea that more confident voters are usually more active voters.

[9] Zaller (1992) states: *"It is interesting to note that political interest is a strong correlate of voter turnout"*.

[10] French (1956) defines a unit of time as the time required by an agent to accommodate her initial precision to the final one.

with $g'(\cdot) < 0$. In the paper, we use the quadratic distance. Thus, $d(\theta, m(\theta)) = (\theta - m(\theta))^2$, where

$$\theta - m(\theta) = \begin{cases} \frac{(\theta-\overline{x})x_{\min}}{\overline{x}} & \text{if } \theta \leq \overline{x} \\ \frac{(1-x_{\max})(\theta-\overline{x})}{1-\overline{x}} & \text{if } \theta \geq \overline{x}. \end{cases}$$

The reader should note that, implicit in this formulation of $\tau^1(\theta)$, is the fact that the media can only reinforce their viewers' prior opinions, but never weaken them. The reason that we formulate the problem in such a way is because empirical evidence has shown that the media messages that people perceive as being dissonant with their own opinions are not usually taken into account, and therefore have few consequences. This is in line with Petty and Priester (1994), who state: "*One of the most important determinants of the motivation to think about a message is the perceived personal relevance of that message. Most of the media messages that people receive are probably not perceived as directly relevant and therefore have few personal consequences*". It would seem, therefore, that the most important role of the media is to reinforce, rather than weaken the opinions of their viewers.

We shall now define the objective function of media outlets, which are assumed to be either audience maximizers or influence maximizers. Let us first define the objective function of a media outlet j which seeks to maximize its audience, i.e., the time the viewers attend to their tv newscasts. In such a case, the objective function is

$$A_j(x_j, x_k) := \int_0^1 T^j(\theta)dF(\theta).$$

Or substituting,

$$A_{\mathsf{L}}(x_{\mathsf{L}}, x_{\mathsf{R}}) = \begin{cases} \int_0^{\overline{x}} \frac{2\overline{x}-\theta}{2\overline{x}} f(\theta)d\theta + \int_{\overline{x}}^1 \frac{1-\theta}{2(1-\overline{x})} f(\theta)d\theta & \text{if } x_{\mathsf{L}} < x_{\mathsf{R}} \\ \int_0^{\overline{x}} \frac{1}{2\overline{x}}\theta f(\theta)d\theta + \int_{\overline{x}}^1 \frac{1-2\overline{x}+\theta}{2(1-\overline{x})} f(\theta)d\theta & \text{if } x_{\mathsf{L}} > x_{\mathsf{R}} \\ \lambda_1(x) \quad \text{if } x_{\mathsf{L}} = x_{\mathsf{R}} = x \end{cases}$$

$$A_{\mathsf{R}}(x_{\mathsf{R}}, x_{\mathsf{L}}) = \begin{cases} \int_0^{\overline{x}} \frac{1}{2\overline{x}}\theta f(\theta)d\theta + \int_{\overline{x}}^1 \frac{1-2\overline{x}+\theta}{2(1-\overline{x})} f(\theta)d\theta & \text{if } x_{\mathsf{L}} < x_{\mathsf{R}} \\ \int_0^{\overline{x}} \frac{2\overline{x}-\theta}{2\overline{x}} f(\theta)d\theta + \int_{\overline{x}}^1 \frac{1-\theta}{2(1-\overline{x})} f(\theta)d\theta & \text{if } x_{\mathsf{L}} > x_{\mathsf{R}} \\ 1 - \lambda_1(x) \quad \text{if } x_{\mathsf{L}} = x_{\mathsf{R}} = x \end{cases}$$

where the function $\lambda_1(x) : [0,1] \to [0,1]$, defines the audience of media L in the case $x_{\mathsf{L}} = x_{\mathsf{R}} = x$. This function $\lambda_1(x)$, represents how viewers flip through tv newscasts L and R, when they both project the same ideology.

We shall now define the objective function of a media outlet that aims to maximize political influence, i.e., an outlet that seeks to maximize the expected number of votes for the political party it supports. Without loss of generality, let us assume that media L supports the left-wing party, while media R supports the right-wing one. In such a case, media L will want to maximize the probability of turnout of the viewers in $[0,1/2]$, whereas media R will want to maximize this probability for the viewers in $[1/2,1]$.[11] The objective function is

$$\begin{aligned}\gamma_{\mathsf{L}}(x_{\mathsf{L}},x_{\mathsf{R}}) &:= \int_0^{1/2}\tau^1(\theta)dF(\theta)\\ \gamma_{\mathsf{R}}(x_{\mathsf{R}},x_{\mathsf{L}}) &:= \int_{1/2}^{1}\tau^1(\theta)dF(\theta)\end{aligned}$$

Or substituting,

$$\gamma_{\mathsf{L}}(x_{\mathsf{L}},x_{\mathsf{R}}) = \begin{cases} \int_0^{\overline{x}} g\left(\left(\frac{(\theta-\overline{x})x_{\mathsf{L}}}{\overline{x}}\right)^2\right) f(\theta)d\theta + \int_{\overline{x}}^{1/2} g\left(\left(\frac{(1-x_{\mathsf{R}})(\theta-\overline{x})}{1-\overline{x}}\right)^2\right) f(\theta)d\theta \\ \quad \text{if } x_{\mathsf{L}}\in[0,\min\{1-x_{\mathsf{R}},x_{\mathsf{R}}\}] \\ \int_0^{1/2} g\left(\left(\frac{(\theta-\overline{x})x_{\mathsf{L}}}{\overline{x}}\right)^2\right) f(\theta)d\theta \ \text{ if } x_{\mathsf{L}}\in[1-x_{\mathsf{R}},x_{\mathsf{R}}] \\ \int_0^{\overline{x}} g\left(\left(\frac{(\theta-\overline{x})x_{\mathsf{R}}}{\overline{x}}\right)^2\right) f(\theta)d\theta + \int_{\overline{x}}^{1/2} g\left(\left(\frac{(1-x_{\mathsf{L}})(\theta-\overline{x})}{1-\overline{x}}\right)^2\right) f(\theta)d\theta \\ \quad \text{if } x_{\mathsf{L}}\in[x_{\mathsf{R}},1-x_{\mathsf{R}}] \\ \int_0^{1/2} g\left(\left(\frac{(\theta-\overline{x})x_{\mathsf{R}}}{\overline{x}}\right)^2\right) f(\theta)d\theta \ \text{ if } x_{\mathsf{L}}\in[\max\{x_{\mathsf{R}},1-x_{\mathsf{R}}\},1]. \end{cases}$$

$$\gamma_{\mathsf{R}}(x_{\mathsf{R}},x_{\mathsf{L}}) = \begin{cases} \int_{1/2}^{1} g\left(\left(\frac{(1-x_{\mathsf{L}})(\theta-\overline{x})}{1-\overline{x}}\right)^2\right) f(\theta)d\theta \ \text{ if } x_{\mathsf{R}}\in[0,\min\{x_{\mathsf{L}},1-x_{\mathsf{L}}\}] \\ \int_{1/2}^{1} g\left(\left(\frac{(1-x_{\mathsf{R}})(\theta-\overline{x})}{1-\overline{x}}\right)^2\right) f(\theta)d\theta \ \text{ if } x_{\mathsf{R}}\in[x_{\mathsf{L}},1-x_{\mathsf{L}}] \\ \int_{1/2}^{\overline{x}} g\left(\left(\frac{(\theta-\overline{x})x_{\mathsf{R}}}{\overline{x}}\right)^2\right) f(\theta)d\theta + \int_{\overline{x}}^{1} g\left(\left(\frac{(1-x_{\mathsf{L}})(\theta-\overline{x})}{1-\overline{x}}\right)^2\right) f(\theta)d\theta \\ \quad \text{if } x_{\mathsf{R}}\in[1-x_{\mathsf{L}},x_{\mathsf{L}}] \\ \int_{1/2}^{\overline{x}} g\left(\left(\frac{(\theta-\overline{x})x_{\mathsf{L}}}{\overline{x}}\right)^2\right) f(\theta)d\theta + \int_{\overline{x}}^{1} g\left(\left(\frac{(1-x_{\mathsf{R}})(\theta-\overline{x})}{1-\overline{x}}\right)^2\right) f(\theta)d\theta \\ \quad \text{if } x_{\mathsf{R}}\in[\max\{x_{\mathsf{L}},1-x_{\mathsf{L}}\},1]. \end{cases}$$

We shall now define the concepts of audience and influence equilibrium.

Definition 1.1 *An audience equilibrium is a pair of ideologies* $(x^*_{\mathsf{L}},x^*_{\mathsf{R}})$, *chosen by media outlets* L *and* R, *such that*

$$\begin{aligned} A_{\mathsf{L}}(x^*_{\mathsf{L}},x^*_{\mathsf{R}}) \geq A_{\mathsf{L}}(x_{\mathsf{L}},x^*_{\mathsf{R}}) &\quad \forall\, x_{\mathsf{L}}\neq x^*_{\mathsf{L}},\ x_{\mathsf{L}}\in[0,1]\\ A_{\mathsf{R}}(x^*_{\mathsf{L}},x^*_{\mathsf{R}}) \geq A_{\mathsf{R}}(x^*_{\mathsf{L}},x_{\mathsf{R}}) &\quad \forall\, x_{\mathsf{R}}\neq x^*_{\mathsf{R}},\ x_{\mathsf{R}}\in[0,1]. \end{aligned}$$

Definition 1.2 *An influence equilibrium is a pair of ideologies* $(x^*_{\mathsf{L}},x^*_{\mathsf{R}})$, *chosen by media outlets* L *and* R, *such that*

$$\begin{aligned} \gamma_{\mathsf{L}}(x^*_{\mathsf{L}},x^*_{\mathsf{R}}) \geq \gamma_{\mathsf{L}}(x_{\mathsf{L}},x^*_{\mathsf{R}}) &\quad \forall\, x_{\mathsf{L}}\neq x^*_{\mathsf{L}},\ x_{\mathsf{L}}\in[0,1]\\ \gamma_{\mathsf{R}}(x^*_{\mathsf{L}},x^*_{\mathsf{R}}) \geq \gamma_{\mathsf{R}}(x^*_{\mathsf{L}},x_{\mathsf{R}}) &\quad \forall\, x_{\mathsf{R}}\neq x^*_{\mathsf{R}},\ x_{\mathsf{R}}\in[0,1]. \end{aligned}$$

[11] We implicitly assume that there are two political parties in this economy, which locate symmetrically about one half.

We shall now obtain the results for this first set-up. On the one hand, for the case in which media outlets compete for audience, we present a proposition and a corollary, and show that media outlets do not necessarily locate at the median viewer. That is to say, the result for this case is not necessarily the one given by the Median Voter Theorem (here, the median viewer theorem). On the other hand, for the case in which media outlets compete for influence, we present a proposition, and show that competition is characterized here by a polarization of locations. We then comment on how deeply these results depend on the channel hopping assumption.

Proposition 1.1 *There is a unique audience equilibrium, in which media outlets locate at the same point, $x^*_{\mathsf{L}} = x^*_{\mathsf{R}} = x^*$, and each one gets one half of the audience.*

Proof. Let us suppose $x_{\mathsf{L}} < x_{\mathsf{R}}$. In such a case, we define the objective function of media L as $\Upsilon^1_{\mathsf{L}}(x_{\mathsf{L}}, x_{\mathsf{R}}) = \int_0^{\overline{x}} \left(1 - \frac{1}{2\overline{x}}\theta\right) f(\theta) d\theta + \int_{\overline{x}}^1 \frac{1-\theta}{2(1-\overline{x})} f(\theta) d\theta$.

Then, $\frac{\partial \Upsilon^1_{\mathsf{L}}(x_{\mathsf{L}}, x_{\mathsf{R}})}{\partial x_{\mathsf{L}}} = \int_0^{\overline{x}} \frac{1}{4\overline{x}^2}\theta f(\theta)\, d\theta + \int_{\overline{x}}^1 \frac{1-\theta}{4(1-\overline{x})^2} f(\theta)\, d\theta > 0$.

Let us now suppose $x_{\mathsf{L}} > x_{\mathsf{R}}$. In such a case, we define the objective function of media L as $\Upsilon^2_{\mathsf{L}}(x_{\mathsf{L}}, x_{\mathsf{R}}) = \int_0^{\overline{x}} \frac{1}{2\overline{x}}\theta f(\theta) d\theta + \int_{\overline{x}}^1 \frac{1-2\overline{x}+\theta}{2(1-\overline{x})} f(\theta) d\theta$.

Then, $\frac{\partial \Upsilon^2_{\mathsf{L}}(x_{\mathsf{L}}, x_{\mathsf{R}})}{\partial x_{\mathsf{L}}} = \int_0^{\overline{x}} \frac{-1}{4\overline{x}^2}\theta f(\theta) d\theta + \int_{\overline{x}}^1 \frac{-1+\theta}{4(1-\overline{x})^2} f(\theta) d\theta < 0$.

It is therefore clear that the best response of media L, against x_{R}, is either $x^*_{\mathsf{L}}(x_{\mathsf{R}}) = x_{\mathsf{R}}$, or it does not exist. Using analogous arguments we get that, for media R, its best response is either $x^*_{\mathsf{R}}(x_{\mathsf{L}}) = x_{\mathsf{L}}$ or it does not exist. Hence, the equilibrium in pure strategies is either $x^*_{\mathsf{L}} = x^*_{\mathsf{R}} = x^*$, or does not exist.

Let us now define $\Upsilon(x) = \int_0^x \left(1 - \frac{1}{2x}\theta\right) f(\theta) d\theta + \int_x^1 \frac{1-\theta}{2(1-x)} f(\theta) d\theta$, where $\Upsilon^1_{\mathsf{L}}(x,x) = \Upsilon(x)$ and $\Upsilon^2_{\mathsf{L}}(x,x) = 1 - \Upsilon(x)$. Let us consider a hypothetical equilibrium such that $x^*_{\mathsf{L}} = x^*_{\mathsf{R}} = x^*$. In such a case, $A_{\mathsf{L}}(x^*_{\mathsf{L}}, x^*_{\mathsf{R}}) = \lambda_1(x^*)$, $A_{\mathsf{R}}(x^*_{\mathsf{L}}, x^*_{\mathsf{R}}) = 1 - \lambda_1(x^*)$. Then, for $x^*_{\mathsf{L}} = x^*_{\mathsf{R}} = x^*$ to be an equilibrium, it must be that

$$\begin{aligned} \lambda_1(x^*) &\geq \max\{\Upsilon(x^*), 1 - \Upsilon(x^*)\} \\ 1 - \lambda_1(x^*) &\geq \max\{\Upsilon(x^*), 1 - \Upsilon(x^*)\} \end{aligned}$$

We therefore necessarily have $\Upsilon(x^*) = \frac{1}{2}$, $\lambda_1(x^*) = \frac{1}{2}$. Note furthermore that since $\Upsilon(x)$ is a continuous increasing function, with $\Upsilon(0) = \frac{1-E[\theta]}{2} < \frac{1}{2}$, and $\Upsilon(1) = 1 - \frac{E[\theta]}{2} > \frac{1}{2}$, we can ensure that the equilibrium $x^*_{\mathsf{L}} = x^*_{\mathsf{R}} = x^*$ exists, is unique, and satisfies $\Upsilon(x^*) = A_{\mathsf{L}}(x^*_{\mathsf{L}}, x^*_{\mathsf{R}}) = A_{\mathsf{R}}(x^*_{\mathsf{L}}, x^*_{\mathsf{R}}) = \frac{1}{2}$. ■

We should stress the fact that the precise relationship between the equilibrium location of media outlets, x^*, and that of the median viewer, θ_m, depends entirely on the asymmetry of $f(\theta)$. Thus, we observe that we are not necessarily constrained to the median viewer location as the equilibrium outcome. The next Corollary formalizes this idea, where $E[\theta]$ represents the mathematical expectation on θ.

Corollary 1.1 *If $E[\theta] = \theta_m = 1/2$, then $x^* = \theta_m$.*
If $E[\theta] < 1/2 < \theta_m$, then $x^* < \theta_m$.
If $\theta_m < 1/2 < E[\theta]$, then $x^* > \theta_m$.

Proof. Let us denote $G(\theta_m) = \int_0^{\theta_m} \theta f(\theta) d\theta$. We therefore have $x^* \lesseqgtr \theta_m \Longleftrightarrow \frac{1}{2} \lesseqgtr \Upsilon(\theta_m) \Longleftrightarrow \frac{1}{2} \lesseqgtr \frac{1}{2} - \frac{G(\theta_m)}{2\theta_m} + \frac{\frac{1}{2} - E[\theta] + G(\theta_m)}{2(1-\theta_m)} \Longleftrightarrow (1 - 2\theta_m)G(\theta_m) \lesseqgtr \theta_m(\frac{1}{2} - E[\theta])$, which provides the conditions of the Corollary. ∎

Now that we know how media outlets behave in competing for audience, we go on to analyze the influence set-up. The following result shows that media outlets polarize their locations in such a case.

Proposition 1.2 *There is a unique influence equilibrium, in which media outlets polarize their locations,* $x_{\mathsf{L}}^* = 0$, $x_{\mathsf{R}}^* = 1$.

Proof. Let us define the objective function of media outlet L, in the case $x_{\mathsf{L}} \in [0, \min\{1 - x_{\mathsf{R}}, x_{\mathsf{R}}\}]$, $x_{\mathsf{L}} \in [1 - x_{\mathsf{R}}, x_{\mathsf{R}}]$, $x_{\mathsf{L}} \in [x_{\mathsf{R}}, 1 - x_{\mathsf{R}}]$ and $x_{\mathsf{L}} \in [\max\{1 - x_{\mathsf{R}}, x_{\mathsf{R}}\}, 1]$, as $\Gamma_{\mathsf{L}}^1(x_{\mathsf{L}}, x_{\mathsf{R}})$, $\Gamma_{\mathsf{L}}^2(x_{\mathsf{L}}, x_{\mathsf{R}})$, $\Gamma_{\mathsf{L}}^3(x_{\mathsf{L}}, x_{\mathsf{R}})$ and $\Gamma_{\mathsf{L}}^4(x_{\mathsf{L}}, x_{\mathsf{R}})$, respectively. We obtain,

$\frac{\partial \Gamma_{\mathsf{L}}^2(x_{\mathsf{L}}, x_{\mathsf{R}})}{\partial x_{\mathsf{L}}} = \frac{-2x_{\mathsf{L}}}{\overline{x}^3} \int_0^{1/2} g'(\cdot) \left(\frac{1}{2}(\theta - \overline{x}) x_{\mathsf{L}} \theta - (\theta - \overline{x})^2 \overline{x}\right) f(\theta) d\theta < 0$, since $g'(\cdot) < 0$ and $\overline{x} \geq \theta$.[12]

$\frac{\partial \Gamma_{\mathsf{L}}^4(x_{\mathsf{L}}, x_{\mathsf{R}})}{\partial x_{\mathsf{L}}} = \frac{-(x_{\mathsf{R}})^2}{\overline{x}^3} \int_0^{1/2} g'(\cdot)(\theta - \overline{x}) \theta f(\theta) d\theta < 0$, since $g'(\cdot) < 0$ and $\overline{x} \geq \theta$.

The equilibrium, if it exists, will therefore be such that $x_{\mathsf{L}}^* \in [0, 1 - x_{\mathsf{R}}]$. Proceeding in the same way, we obtain for media R that $x_{\mathsf{R}}^* \in [1 - x_{\mathsf{L}}, 1]$. Then, $x_{\mathsf{R}}^* = 1 - x_{\mathsf{L}}^*$ in equilibrium, i.e., the equilibrium will be symmetric about one half. By using this symmetry, we obtain

$$\frac{\partial \Gamma_{\mathsf{L}}^1(x_{\mathsf{L}}, x_{\mathsf{R}})}{\partial x_{\mathsf{L}}} = -8x_{\mathsf{L}} \int_0^{1/2} g'(\cdot) \left((\theta - \tfrac{1}{2}) x_{\mathsf{L}} \theta - (\theta - \tfrac{1}{2})^2\right) f(\theta) d\theta < 0.$$

$$\frac{\partial \Gamma_{\mathsf{L}}^3(x_{\mathsf{L}}, x_{\mathsf{R}})}{\partial x_{\mathsf{L}}} = -4(x_{\mathsf{R}})^2 \int_0^{1/2} g'(\cdot)(2\theta - 1) \theta f(\theta) d\theta < 0.$$

Then, $\frac{\partial \gamma_{\mathsf{L}}(x_{\mathsf{L}}, x_{\mathsf{R}})}{\partial x_{\mathsf{L}}} < 0$, and therefore $x_{\mathsf{L}}^* = 0$, $x_{\mathsf{R}}^* = 1$ is the unique equilibrium. ∎

We therefore observe that if media outlets wish to maximize their influence, they end up locating themselves at the extremes of the unit interval. The reason for this is that, given the location of the other media, the best an outlet can do is to locate itself a little further away from when the other media is. As such, it can offset the negative influence that its competitor has on its relevant viewers.

The reader should note that this polarization of locations is due to the fact that viewers channel-hop, and as such, may be influenced by the two media outlets. If each viewer only watched one channel, the result would not imply a polarization. To demonstrate this in a simple way, let us assume that viewers are distributed according to a uniform distribution function, $\theta \sim U[0, 1]$, and that they are only exposed to the channel that is closest to their ideological position. In such a case, we obtain that, in the case of media outlets competing for influence, the equilibrium is $\left(x_{\mathsf{L}}^* = \frac{1}{4}, x_{\mathsf{R}}^* = \frac{3}{4}\right)$, rather than $\left(x_{\mathsf{L}}^* = 0, x_{\mathsf{R}}^* = 1\right)$. This is so because neither channel has now to worry about the ideology aired by the other, since none of its relevant viewers watch the other station's newscast. As such, it no longer needs to differentiate its positions so much, as there is no opposing influence to offset. Indeed, both media now enjoy local monopolies, and thus, maximize their influence by locating

[12] Note that $g'(.)$ stands for the derivative of $g(.)$, evaluated following the Chain Rule.

themselves at the centre of their own markets, i.e., at $\left(\frac{1}{4}, \frac{3}{4}\right)$. On the other hand, we also observe that in the case of media outlets competing for audience, the fact that viewers channel hop implies that audience and ideology are no longer distributed in the same way, and thus, the outlets do not necessarily need to locate themselves at the median viewer. In contrast, in the case of viewers who only watch their most closely located channel, the equilibrium location of media outlets is that of the median viewer, i.e., $(x_{\mathsf{L}}^* = x_{\mathsf{R}}^* = \theta_m)$. We therefore conclude that channel hopping does play an important role in the model, as it decides the sort of behavior the media will adopt.

1.4 Media influence: the Attitudinal Orientations Approach

> "Television matters insofar as it can subtly, but significantly, affect the attitudinal orientations of citizens, even to the point of shifting enough votes to determine the outcome of an election under certain circumstances".
>
> Gunther and Mughan.

There is wide consensus on the fact that the media's influence can actually induce viewers to change their preferences. Along these lines, Gunther et al., (2000) point out that "*In Spain, for example, it was found that a shift to the Partido Socialista Obrero Español (PSOE) by formerly undecided voters who believed that Felipe González had won the second televised debate produced an overall net shift in the national vote of 4 percent, which was just enough to offset his rival's initial lead in the polls and reelect the Prime Minister to a fourth term. Even more convincing evidence found that, because Silvio Berlusconi shamelessly used his private television networks to advance his party's electoral prospects, while the public Radiotelevisione Italiana (RAI) channels were much more impartial, Berlusconi was able to benefit from a net shift of over 6 percent of all votes cast*".

Several other studies, which mainly consist on experiments and sample surveys studies,[13] also agree that the media can modify the preferences of the public. Such studies, however, do not agree on the importance of this effect. Thus, Lazarsfeld et al., (1954), for instance, state that: "*Controlled experiments always greatly overrate effects, as compared with those that really occur, because of the self-selection of audiences*". Despite these differences, however, it is quite general the belief that the shorter the distance between the ideology of the agent and the one she perceives from the media, or that the lower the precision of the agent, the higher the influence of the media will be.

We now consider a set-up in which the media modify the ideology of the viewers. To do so, we need to define a new variable that represents the final ideology of an agent θ. We denote it by $Y(\theta)$. We assume that viewers are rational, and as such,

[13] See Hovland (1956) for a discussion on the topic.

update their beliefs (i.e., their political preferences) after receiving information from the media, according to the following updating rule,[14]

$$Y(\theta) = \frac{\theta\tau + m(\theta)g\left(d(\theta, m(\theta))\right)}{\tau + g\left(d(\theta, m(\theta))\right)} = \frac{\theta\tau\left|\theta - m(\theta)\right| + m(\theta)}{\tau\left|\theta - m(\theta)\right| + 1} \tag{1.4}$$

with $g(d(\theta, m(\theta))) = \frac{1}{|(d(\theta,m(\theta)))^{1/2}|}$, and $d(\theta, m(\theta)) = (\theta - m(\theta))^2$, as in the previous case. We therefore assume that a viewer's final ideology of is a convex combination of her prior ideology and the one she perceives on television newscasts. We observe that this specification implies

$$\frac{|Y(\theta) - \theta|}{|m(\theta) - \theta|} = \frac{1}{\tau\left|\theta - m(\theta)\right| + 1}$$

as such, the relative change in an agent's ideology is decreasing in her precision, and in the initial distance between the ideology of the agent and that of the media.

We shall now analyze two different scenarios, one in which the viewers are not confident at all of their prior opinions, i.e., $\tau = 0$, and another in which they have an initial precision of one, i.e., $\tau = 1$. We think that the most interesting case would be one in which precision is a function of ideology, i.e., $\tau(\theta)$, since many studies suggest that this seems to be the case in reality.[15] Due to the complexity of such an analysis, however, we do not perform this study, although we do comment, later on in this paper, on the sort of results we could expect from such a case.

We now define the objective function of a media j, with $j \in \{\mathsf{L}, \mathsf{R}\}$, which aims to maximize its audience. As audiences are usually computed at the end of a period, say a week or a month, we shall compute our audiences at the end of period one. That is to say, when the media have already exerted their influence. Thus, the objective function will be

$$A_j(x_j, x_k) := \int_{R_Y} T^j(y)d\widehat{F}(y; x_j, x_k)$$

with $k \in \{\mathsf{L}, \mathsf{R}\}$, $j \neq k$. The audience is therefore obtained by using the final distribution of the viewers' ideologies, which we shall denote as $\widehat{F}(y; x_\mathsf{L}, x_\mathsf{R})$,[16] and taking also into account the way the agents are now exposed to the tv newscasts given their new preferences, i.e., $T^j(y)$.

We next define the objective function of a media outlet j, with $j \in \{\mathsf{L}, \mathsf{R}\}$, which aims to maximize political influence. In such a case, the media outlets want

[14]This updating rule is used in Blomberg and Harrington (2000).

[15]Gunther and Mughan (2000) state: "*The Spanish study found that individuals with strongly rooted opinions on either the left or the right are largely unfazed by the partisan bias of the media. Those near the middle of the ideological continuum (many of whom are presumably "false centrist", with weakly rooted or nonexistent attitudes on most issues), by contrast, can be significantly influenced by media biases, whether these biases are exerted by television, radio, or newspapers. Since these centrist are often the crucial swing voters in many elections, their susceptibility to media influences has considerable political significance*".

[16]This is the probabilistic distribution of Y, with support R_Y.

to maximize the number of voters who will support their preferred political party. That is to say, station L wants to maximize voters for the left-wing party, and as such, will want to shift the mass of the distribution function as far to the left as possible; whereas media R tries to shift it as far to the right as it can.

$$\gamma_{\mathsf{L}}(x_{\mathsf{L}}, x_{\mathsf{R}}) \quad : \quad = \int_0^{1/2} \tau d\widehat{F}(y; x_{\mathsf{L}}, x_{\mathsf{R}}) = \tau \widehat{F}(\frac{1}{2}; x_{\mathsf{L}}, x_{\mathsf{R}})$$
$$\gamma_{\mathsf{R}}(x_{\mathsf{R}}, x_{\mathsf{L}}) \quad : \quad = \int_{1/2}^{1} \tau d\widehat{F}(y; x_{\mathsf{L}}, x_{\mathsf{R}}) = \tau \left[1 - \widehat{F}(\frac{1}{2}; x_{\mathsf{L}}, x_{\mathsf{R}})\right].$$

In this scenario, we observe that the media's influence actually affects the viewer's ideology, whereas it only affected her precision in the previous set-up.

1.4.1 Null precision

Let us first consider the case in which the viewers are not at all confident in their prior opinions, i.e., $\tau = 0$. In such a case, agents do not resist the influence of the media, and thus, their final preferences will be given by what they observe on the media. That is to say,

$$Y(\theta) = m(\theta).$$

The reader should note that $\tau = 0$ implies that the viewers are not convinced about their prior political opinions, and will therefore abstain from voting in the next election. The reason for this is that we assume that agents only vote when they are reasonably confident of their political opinions. Hence, in the case of $\tau = 0$, the media only cares about the economic aspect, as the influence objective is now not well defined. In this case, the objective function of media $j \in \{\mathsf{L}, \mathsf{R}\}$, is

$$A_j(x_j, x_k) = \int_{R_Y} T^j(y) d\widehat{F}(y; x_j, x_k)$$

or

$$A_j(x_j, x_k) = \int_0^1 T^j(m(\theta)) dF(\theta).$$

We use the second specification because it is easier to work with. Using therefore the latter specification, and taking into account equations (2) and (3), and the fact that $T^j(\overline{x}) = \frac{1}{2}$ with $j \in \{\mathsf{L}, \mathsf{R}\}$, and $m(\theta) = \overline{x}\ \forall \theta$ when $x_{\mathsf{L}} = x_{\mathsf{R}}$, we obtain

$$A_{\mathsf{L}}(x_{\mathsf{L}}, x_{\mathsf{R}}) = \begin{cases} \int_0^{\overline{x}} \left(\frac{x_{\mathsf{R}}}{2\overline{x}} + \frac{x_{\mathsf{L}} - x_{\mathsf{R}}}{4\overline{x}^2}\theta\right) f(\theta) d\theta + \int_{\overline{x}}^1 \left(\frac{1 - x_{\mathsf{R}}}{2(1-\overline{x})} + \frac{x_{\mathsf{R}} - x_{\mathsf{L}}}{4(1-\overline{x})^2}(1-\theta)\right) f(\theta) d\theta \\ \quad \text{if } x_{\mathsf{L}} \neq x_{\mathsf{R}} \\ \frac{1}{2} \quad \text{if } x_{\mathsf{L}} = x_{\mathsf{R}}. \end{cases}$$

$$A_{\mathsf{R}}(x_{\mathsf{R}}, x_{\mathsf{L}}) = \begin{cases} \int_0^{\overline{x}} \left(\frac{x_{\mathsf{L}}}{2\overline{x}} + \frac{x_{\mathsf{R}} - x_{\mathsf{L}}}{4\overline{x}^2}\theta\right) f(\theta) d\theta + \int_{\overline{x}}^1 \left(\frac{1 - x_{\mathsf{L}}}{2(1-\overline{x})} + \frac{x_{\mathsf{L}} - x_{\mathsf{R}}}{4(1-\overline{x})^2}(1-\theta)\right) f(\theta) d\theta \\ \quad \text{if } x_{\mathsf{L}} \neq x_{\mathsf{R}} \\ \frac{1}{2} \quad \text{if } x_{\mathsf{L}} = x_{\mathsf{R}}. \end{cases}$$

At this point, we have to assume some particular distribution function for the viewers. Thus, let us assume $\theta \sim U[0,1]$. In such a case, we obtain that any pair $(x_L^*, x_R^*) \in [0,1]^2$, is an equilibrium. This is so because the payoff of any media outlet is one half, regardless of its location. The reason for this is that whenever a media outlet moves towards the centre, it wins over the viewers it approaches, but losses the ones it moves away from, since the domain of $Y(\theta)$ is not fixed but depends on $x_{\min}$, $x_{\max}$. Thus, a move towards the centre implies both a gain and a loss, which, due to linearity, are of the same size. Hence the continuum of equilibria.

Proposition 1.3 *Let us suppose* $\tau = 0$ *and* $\theta \sim U[0,1]$. *In such a case, any pair* $(x_L^*, x_R^*) \in [0,1]^2$ *constitutes an audience equilibrium.*

Proof. Let us denote the audience payoff function of media L, in the case $x_L \neq x_R$, by $\Omega_L(x_L, x_R)$. In such a case, $\Omega_L(x_L, x_R) = \frac{1}{2} + \frac{x_L - x_R}{8} + \frac{x_R - x_L}{4(1-\overline{x})} - \frac{x_R - x_L}{8(1-\overline{x})^2}(1-\overline{x}^2) = \frac{1}{2}$.

Let us now denote the audience payoff function of media R, in the case $x_L \neq x_R$, by $\Omega_R(x_L, x_R)$. Here also, $\Omega_R(x_L, x_R) = \frac{1}{2}$.

Furthermore, note that $A_L(x_L, x_R) = A_R(x_L, x_R) = \frac{1}{2}$, in the case $x_L = x_R$.

Hence, both media outlets have the same payoffs, whatever their locations. Thus, any pair $(x_L^*, x_R^*) \in [0,1]^2$ is an equilibrium. ∎

We now present the result of Proposition 1.3, observing that whenever a media outlet moves from x_L to x_L', it achieves a gain which is equal to the loss it sustains. Thus the continuum of equilibria.

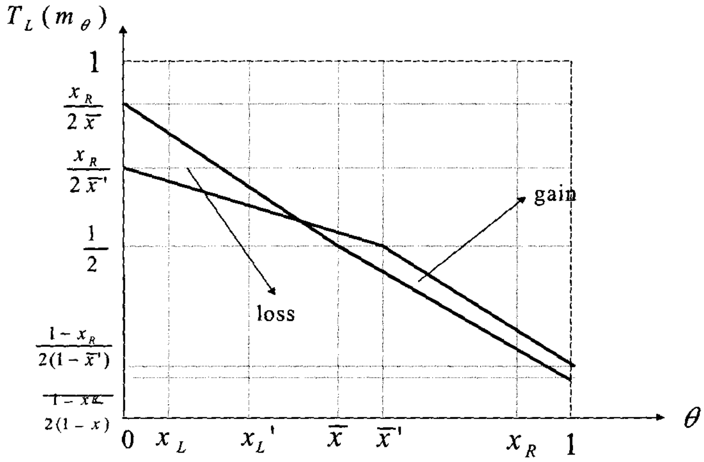

Figure 1.3: **Gain and loss of audience for media L, when it moves from x_L to x_L'.**

We next study some other cases in which we suppose that θ is not uniformly distributed, and for which we obtain the following results.

Case 1.1 *Let us suppose* $\theta \sim Beta[p,p]$, *with* $p \geq 2$. *In such a case,* $x_L^* = x_R^* = \frac{1}{2} = \theta_m$.

Case 1.2 *Let us suppose* $f(\theta) = 1 + b(\theta - \frac{1}{2})$, *with* $b \in (0, 2)$, *i.e., the family of linear increasing density functions. In such a case,* $x^*_{\mathsf{L}} = x^*_{\mathsf{R}} = 1 > \theta_m$.

Case 1.3 *Let us suppose* $f(\theta) = 1 + b(\frac{1}{2} - \theta)$, *with* $b \in (0, 2)$, *i.e., the family of linear decreasing density functions. In such a case,* $x^*_{\mathsf{L}} = x^*_{\mathsf{R}} = 0 < \theta_m$.

We therefore observe that the equilibrium location of media outlets depends on the distribution function we assume for θ. Thus, in the case of $\theta \sim Beta[p,p]$, we observe that the media outlets locate at the median viewer, since in this case most of the viewers have a center-wing ideology. In the case of $f(\theta) = 1 + b(\theta - \frac{1}{2})$, however, we observe that the media outlets locate to the right of the median viewer, since in this case most of the viewers are of the right-wing ideology. Finally, in the case of $f(\theta) = 1 + b(\frac{1}{2} - \theta)$, we observe that the media outlets are located to the left of the median viewer, as the left-wing ideology is now the most popular one.

1.4.2 Unitarian precision

Let us now consider a case in which the viewers' initial precision is equal to one, i.e., $\tau = 1$. In this case, the viewers are more confident of their initial opinions, and will therefore resist the media's influence to a certain extent. This resistance, however, is not sufficiently strong, and the viewers will therefore end up with a final ideology that is a convex combination of their original ideology and the one they have been exposed to through the media. Thus, the final ideology $Y(\theta)$, of a viewer θ, is

$$Y(\theta) = \begin{cases} \dfrac{\theta \dfrac{x_{\min}(\overline{x} - \theta)}{\overline{x}} + x_{\min} + \dfrac{\Delta x}{2\overline{x}}\theta}{\dfrac{x_{\min}(\overline{x} - \theta)}{\overline{x}} + 1} & \text{if } \theta \leq \overline{x} \\[2ex] \dfrac{\theta \dfrac{(1 - x_{\max})(\theta - \overline{x})}{1 - \overline{x}} + x_{\max} - \dfrac{\Delta x}{2(1 - \overline{x})}(1 - \theta)}{\dfrac{(1 - x_{\max})(\theta - \overline{x})}{1 - \overline{x}} + 1} & \text{if } \theta \geq \overline{x}. \end{cases} \tag{1.5}$$

Here also, we have to assume that the viewers are initially distributed according to some particular distribution function. Let us assume $\theta \sim U[0, 1]$. In such a case, we observe that the previous result of Proposition 1.3 no longer holds. This is so because in the case of $\tau = 1$, the gain for a media outlet that shifts towards the centre is higher than its loss, as the viewers now offer some resistance to the media, and the domain of $Y(\theta)$ do not therefore change quite as much as previously.

We shall now determine the audience payoff function for the media outlets. The form of the new distribution and density functions is written in the Appendix.

$$A_{\mathsf{L}}(x_{\mathsf{L}},x_{\mathsf{R}}) = \begin{cases} \int_{\frac{x_{\mathsf{L}}}{1+x_{\mathsf{L}}}}^{\overline{x}} \frac{2\overline{x}-y}{2\overline{x}}\widehat{f}(y)\,dy + \int_{\overline{x}}^{\frac{1}{2-x_{\mathsf{R}}}} \frac{1-y}{2(1-\overline{x})}\widehat{f}(y)\,dy & \text{if } x_{\mathsf{L}} < x_{\mathsf{R}} \\ \int_{\frac{x_{\mathsf{R}}}{1+x_{\mathsf{R}}}}^{\overline{x}} \frac{y}{2\overline{x}}\widehat{f}(y)\,dy + \int_{\overline{x}}^{\frac{1}{2-x_{\mathsf{L}}}} \frac{1-2\overline{x}+y}{2(1-\overline{x})}\widehat{f}(y)\,dy & \text{if } x_{\mathsf{L}} > x_{\mathsf{R}} \\ \lambda_2(x) \quad \text{if } x_{\mathsf{L}} = x_{\mathsf{R}} = x \end{cases}$$

$$A_{\mathsf{R}}(x_{\mathsf{L}},x_{\mathsf{R}}) = \begin{cases} \int_{\frac{x_{\mathsf{L}}}{1+x_{\mathsf{L}}}}^{\overline{x}} \frac{y}{2\overline{x}}\widehat{f}(y)\,dy + \int_{\overline{x}}^{\frac{1}{2-x_{\mathsf{R}}}} \frac{1-2\overline{x}+y}{2(1-\overline{x})}\widehat{f}(y)\,dy & \text{if } x_{\mathsf{L}} < x_{\mathsf{R}} \\ \int_{\frac{x_{\mathsf{R}}}{1+x_{\mathsf{R}}}}^{\overline{x}} \frac{2\overline{x}-y}{2\overline{x}}\widehat{f}(y)\,dy + \int_{\overline{x}}^{\frac{1}{2-x_{\mathsf{L}}}} \frac{1-y}{2(1-\overline{x})}\widehat{f}(y)\,dy & \text{if } x_{\mathsf{L}} > x_{\mathsf{R}} \\ 1-\lambda_2(x) \quad \text{if } x_{\mathsf{L}} = x_{\mathsf{R}} = x \end{cases}$$

where $\lambda_2(x) : [0,1] \rightarrow [0,1]$ is a function that defines the audience of media L, for the case $x_{\mathsf{L}} = x_{\mathsf{R}} = x$. The reader should note that we take into account $\widehat{f}(y)$, i.e., the new density function, because as previously stated, audience shares are computed at the end of period one, time at which the viewers have already updated their preferences. Working through the algebra we get Lemma 1.1.

Lemma 1.1 *Let us suppose $\tau = 1$ and $\theta \sim U[0,1]$. In such a case, the audience payoff functions of media outlets are:*

$$\begin{aligned} A_{\mathsf{L}}(x_{\mathsf{L}},x_{\mathsf{R}}) &= \begin{cases} \frac{1}{4}\left(1+x_{\mathsf{L}}+x_{\mathsf{R}}+\frac{2\log[1+x_{\mathsf{L}}]}{x_{\mathsf{L}}}-\frac{2\log[2-x_{\mathsf{R}}]}{1-x_{\mathsf{R}}}\right) & \text{if } x_{\mathsf{L}} < x_{\mathsf{R}} \\ \frac{1}{4}\left(3-x_{\mathsf{L}}-x_{\mathsf{R}}-\frac{2\log[1+x_{\mathsf{R}}]}{x_{\mathsf{R}}}+\frac{2\log[2-x_{\mathsf{L}}]}{1-x_{\mathsf{L}}}\right) & \text{if } x_{\mathsf{L}} > x_{\mathsf{R}} \\ \lambda_2(x) \quad \text{if } x_{\mathsf{L}} = x_{\mathsf{R}} = x \end{cases} \\ A_{\mathsf{R}}(x_{\mathsf{R}},x_{\mathsf{L}}) &= 1-A_{\mathsf{L}}(x_{\mathsf{L}},x_{\mathsf{R}}). \end{aligned}$$

We next present the results for the audience scenario, as well as a sketch of the proof.[17]

Proposition 1.4 *Let us suppose $\tau = 1$ and $\theta \sim U[0,1]$. In such a case, there is a unique audience equilibrium, in which the media outlets locate at the median viewer, $x^{\mathsf{L}*} = x^{\mathsf{R}*} = \frac{1}{2}$, and each one enjoys one half of the audience.*

Proof. Let us define the objective function of media L, in the case $x_{\mathsf{L}} < x_{\mathsf{R}}$, as $\Sigma^1_{\mathsf{L}}(x_{\mathsf{L}},x_{\mathsf{R}})$. It results from operations that $\frac{\partial \Sigma^1_{\mathsf{L}}(x_{\mathsf{L}},x_{\mathsf{R}})}{\partial x_{\mathsf{L}}} = \frac{1}{4}\left(1+\frac{2}{x_{\mathsf{L}}+(x_{\mathsf{L}})^2}-\frac{2\log[1+x_{\mathsf{L}}]}{(x_{\mathsf{L}})^2}\right)$, which can be shown to be positive.

Let us now define the objective function of media L, in the case $x_{\mathsf{L}} > x_{\mathsf{R}}$, as $\Sigma^2_{\mathsf{L}}(x_{\mathsf{L}},x_{\mathsf{R}})$. It results from operations that $\frac{\partial \Sigma^2_{\mathsf{L}}(x_{\mathsf{L}},x_{\mathsf{R}})}{\partial x_{\mathsf{L}}} = -\frac{1}{4}\left(1+\frac{2}{(1-x_{\mathsf{L}})(2-x_{\mathsf{L}})}-\frac{2\log[2-x_{\mathsf{L}}]}{(1-x_{\mathsf{L}})^2}\right)$, which can be shown to be negative.

Thus, the best response of media L against x_{R}, is either $x^*_{\mathsf{L}}(x_{\mathsf{R}}) = x_{\mathsf{R}}$, or it does not exist. By analogy, we obtain that the best response of media R against x_{R},

[17] Due to lack of space, the complete proof of Proposition 1.4 is omitted, but is available from the author upon request.

is either $x^*_{\mathsf{R}}(x_{\mathsf{L}}) = x_{\mathsf{L}}$ or it does not exist. Subsequently, there is either a unique equilibrium, in pure strategies, which is $x^*_{\mathsf{L}} = x^*_{\mathsf{R}} = x^*$, or it does not exist.

Let us consider the hypothetical equilibrium $x^*_{\mathsf{L}} = x^*_{\mathsf{R}} = x^*$. We shall now prove that $A_{\mathsf{L}}(x^*) = A_{\mathsf{R}}(x^*) = \frac{1}{2}$, must hold. To this aim, we use a similar argument to the one used in the proof of Proposition 1, which shows that $\lambda_2(x^*) = \frac{1}{2} = \Sigma(x^*)$, with $\Sigma(x^*) = \frac{1}{4}\left(1 + 2x^* + \frac{2\log[1+x^*]}{x^*} - \frac{2\log[2-x^*]}{1-x^*}\right)$.

Finally, the existence and uniqueness of the equilibrium $x^*_{\mathsf{L}} = x^*_{\mathsf{R}} = x^*$, is easily proved, as $\Sigma(x)$ is a continuous and increasing function in x, with $\Sigma(0) < \frac{1}{2}$ and $\Sigma(1) > \frac{1}{2}$. Therefore, there exists a unique value of x^*, such that $\Sigma(x^*) = \frac{1}{2}$, which furthermore is $\frac{1}{2}$. ■

Proposition 1.4 shows that the equilibrium location of media outlets coincides with the location of the new median viewer, which can easily be shown to be one half as the equilibrium location of media outlets is symmetric about one half. We claim that the reason for this equilibrium location is the assumption $\theta \sim U[0,1]$. Thus, we expect that this result would change if we assumed any other distribution function for the viewer's initial ideology, θ.

We shall now examine the case in which the media outlets aim at influencing their viewers, i.e., they attempt to change the political preferences of their viewers in favor of the ideology they support. We no longer need to assume any particular distribution function for θ,[18] as we can now derive a general result, which we express in the following proposition.

Proposition 1.5 *Let us suppose $\tau = 1$. In such a case, there is a unique influence equilibrium, in which media outlets polarize their locations, $x^*_{\mathsf{L}} = 0$, $x^*_{\mathsf{R}} = 1$.*

Proof. Note that $Y(\theta)$ is an increasing function in x_{L} and x_{R}.

The influence payoff function of media L is $\tau\widehat{F}(\frac{1}{2}; x_{\mathsf{L}}, x_{\mathsf{R}})$. Then, $\widehat{F}(\frac{1}{2}; x_{\mathsf{L}}, x_{\mathsf{R}}) > \widehat{F}(\frac{1}{2}; x'_{\mathsf{L}}, x_{\mathsf{R}})$ for $x'_{\mathsf{L}} > x_{\mathsf{L}}$, and therefore $x^*_{\mathsf{L}} = 0$.

The influence payoff function of media R is $\tau\left[1 - \widehat{F}(\frac{1}{2}; x_{\mathsf{L}}, x_{\mathsf{R}})\right]$. Then, $\widehat{F}(\frac{1}{2}; x_{\mathsf{L}}, x_{\mathsf{R}}) > \widehat{F}(\frac{1}{2}; x_{\mathsf{L}}, x'_{\mathsf{R}})$, and $1 - F(\frac{1}{2}; x_{\mathsf{L}}, x_{\mathsf{R}}) < 1 - \widehat{F}(\frac{1}{2}; x_{\mathsf{L}}, x'_{\mathsf{R}})$ for $x'_{\mathsf{R}} > x_{\mathsf{R}}$, and therefore $x^*_{\mathsf{R}} = 1$. ■

As can be observed, regardless of the type of influence the media outlets exert, whenever they compete for influence they polarize their locations in equilibrium.

Before concluding, we should like to make a few pertinent remarks.

Remark 1.1 *Let us suppose that τ is a function on θ, that holds the required empirical properties.*[19] *In such a case, we could not derive any result, but we guess that the equilibrium location for media outlets that compete for influence is $x^*_{\mathsf{L}} = 0$, $x^*_{\mathsf{R}} = 1$. The reason that we think so is that in this case, the media outlets will be*

[18] The only requirement here is that the density function has positive measure in all the interval $[0,1]$.

[19] This means that $\tau(\theta)$ is a function which is symmetric about one half, with $\tau'(\theta) < 0\ \forall\theta < \frac{1}{2}$ and $\tau'(\theta) > 0\ \forall\theta > \frac{1}{2}$.

specially interested in the centrist viewers, who are the most easily-influenced viewers. As such, they should also find it profitable to differentiate their ideologies to the point of polarization, since given their competitor's location, polarizing is the only way of offsetting its influence over their relevant viewers.

Remark 1.2 *Let us suppose* $\tau(\theta) \to \infty\ \forall\theta$. *In such a case,*[20] $\lim_{\tau(\theta)\to\infty} Y(\theta) = \theta$. *Hence, the audience payoff function of media* $j \in \{\mathsf{L}, \mathsf{R}\}$ *would be, in the limit,* $A_j(x_j, x_k) = \int_0^1 T^j(\theta)dF(\theta)$, *i.e., the one in Section* 1.3. *Thus, the audience equilibrium would approach the audience equilibrium in such a case. Additionally, in the case of* $\tau(\theta) \to \infty\ \forall\theta$, *media outlets would not be interested in political influence, as viewers are totally rigid, and do not therefore allow the media to influence their initial opinions.*

1.5 Conclusion

Media is supposed to expose the public to information. This endows the media with great power, allowing them to influence voters' opinions about the world they live in. To this respect, McCombs states: "To a considerable degree, the news media literally create in our heads the pictures of many public issues... Going beyond public issues, there is also good evidence that news coverage influences the pictures that people have of the candidates vying for political office". Yet, the media great capacity to influence our opinions has long been ignored in Economics, which, in contrast to other sciences, seems not to fully appreciate the importance of media.

The aim of this paper is to analyze how media outlets compete when they are either audience maximizers or influence maximizes and have the capacity to influence viewers. To do so, we have borrowed a few Sociology theories about the way the media exert their influence. We have particularly focused our attention on two of these theories, the so-called "Reinforcement Approach", which states that the media can reinforce their viewers' prior opinions, and the "Attitudinal Orientations Approach", which supposes that the media can modify the political preferences of the viewers.

Furthermore, we present a model in which the viewers have a taste for variety and, as such, watch both channels in equilibrium. However, we assume that this taste for variety depends on the prior ideology of the agent. Thus, we obtain that in equilibrium the viewers attend to the media outlets in a different way, i.e., viewers channel-hop.

Our results show that regardless of the type of influence the media exert, whenever they compete for influence, they polarize their locations in equilibrium, whereas they moderate their political philosophies when they aim to maximize their audience. As such, whether the "Reinforcement Approach" or the "Attitudinal Orientations Approach" holds, does not make a difference. On the other hand, we show that

[20] In the case of $\tau(\theta) \to \infty\ \forall\theta$, we obtain $\lim_{\tau(\theta)\to\infty} Y(\theta) = \lim_{\tau(\theta)\to\infty} \frac{\theta\tau(\theta)d(\theta,m(\theta))+m(\theta)}{\tau(\theta)d(\theta,m(\theta))+1} = \frac{\theta d(\theta,m(\theta))}{d(\theta,m(\theta x))} = \theta$.

the fact that the viewers do channel hopping does matter. In summary then, when viewers channel-hop and media outlets compete for influence, the channels tend to polarize their locations, whereas when viewers only watch the channel that is most closely located to their own political beliefs, they do not differentiate so much. This is so because when viewers watch both newscasts, each channel tries to offset the negative influence that the other channel might have on its relevant viewers by differentiating more, whilst, in the case of viewers who only watch one channel, there is no competitive influence and, therefore, no need for any great differentiation. Additionally, we observe that when the viewers channel-hop and the stations compete for audience, the media does not necessarily locate at the median viewer, whereas in the case of viewers who only watch one channel, they do. In the former case, the distribution of the ideology and the audience is not quite the same. Therefore, the locations of the two channels do not necessarily coincide with that of the median viewer. In the latter case, however, the distributions do coincide and the media's equilibrium is therefore located at the median viewer.

This paper, therefore, is an attempt to integrate theories taken from two distinct disciplines, Economics and Sociology, which share a number of interesting fields but do not easily find ways of sharing their findings. We therefore believe that, apart from the results it provides, this study is important in its explanation of why media outlets sometimes seem to be quite well-defined and polarized in their political preferences, while at other times they seem to be surprisingly neutral. Indeed, while the reasons for such contrasting behavior obviously depends on other minor factors, if the Communication Theory is right in claiming that the media influences public opinion, we can therefore go on to explain the political ideology of many media outlets as the direct result of their biased owners, who endeavour to control the opinions expressed by the outlets under their patronage.

1.6 Appendix

We obtain the distribution function of the new variable, $Y(\theta)$, for the case of $\tau = 1$.

From (5), we observe that $Y(\theta)$ is an increasing function in θ. We further observe that $Y(\theta)$ is concave in θ, $\forall\theta \leq \overline{x}$, and convex in θ, $\forall\theta \geq \overline{x}$. We depict $Y(\theta)$ below.

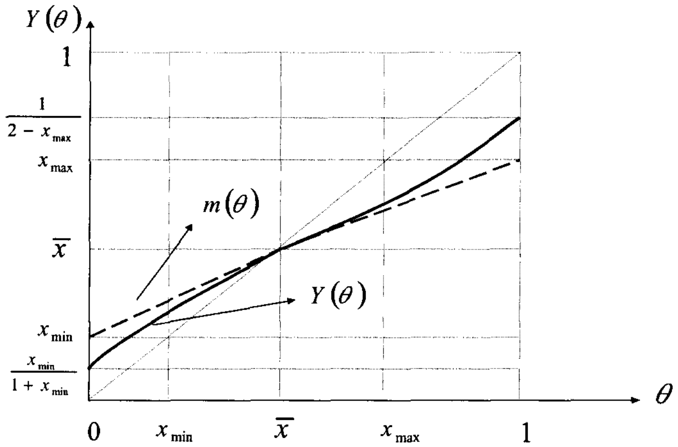

Figure 1.4: **Final ideology as a function of initial ideology.**

Note that θ is a random variable, with density function $f(\theta) > 0$ $\forall\theta \in [0,1]$. Thus, the new variable $Y(\theta) : [0,1] \rightarrow [\frac{x_{\min}}{x_{\min}+1}, \frac{1}{2-x_{\max}}]$ is Borel measurable, i.e., it is continuous in θ, and therefore, $Y(\theta)$ is a continuous random variable with a continuous distribution function

$$\widehat{F}(y;\Pi^L,\Pi^R) = F(Y^{-1}(y)) \; \forall y \in [\frac{\Pi^{\min}}{\Pi^{\min}+1}, \frac{1}{2-\Pi^{\max}}].$$

To be more specific,

$$\widehat{F}(y;x_{\mathsf{L}},x_{\mathsf{R}}) = \begin{cases} 0 & \text{when } \; y < \frac{x_{\min}}{x_{\min}+1} \\ F\left(\frac{a(y,x_{\mathsf{L}},x_{\mathsf{R}})-\sqrt{b(y,x_{\mathsf{L}},x_{\mathsf{R}})}}{c(x_{\mathsf{L}},x_{\mathsf{R}})}\right) & \text{when } \; \frac{x_{\min}}{x_{\min}+1} \leq y \leq \overline{x} \\ F\left(\frac{d(y,x_{\mathsf{L}},x_{\mathsf{R}})+\sqrt{e(y,x_{\mathsf{L}},x_{\mathsf{R}})}}{m(x_{\mathsf{L}},x_{\mathsf{R}})}\right) & \text{when } \; \overline{x} \leq y \leq \frac{1}{2-x_{\max}} \\ 1 & \text{when } \; y > \frac{1}{2-x_{\max}} \end{cases}$$

With density function $\widehat{f}(y;x_{\mathsf{L}},x_{\mathsf{R}}) = \frac{\partial \widehat{F}(y;x_{\mathsf{L}},x_{\mathsf{R}})}{\partial y}$,[21] and

$$\begin{aligned} a\,(y,x_{\mathsf{L}},x_{\mathsf{R}}) &= \Delta x + x_{\min}^2 + x_{\mathsf{L}}x_{\mathsf{R}} + 2x_{\min}y \\ b\,(y,x_{\mathsf{L}},x_{\mathsf{R}}) &= \left(-\Delta x - x_{\min}^2 - x_{\mathsf{L}}x_{\mathsf{R}} - 2x_{\min}y\right)^2 - 8x_{\min}\left(-x_{\min}^2 - x_{\mathsf{L}}x_{\mathsf{R}} + x_{\min}y\right. \\ &\quad \left.(1+x_{\min}) + x_{\max}y(1+x_{\min})\right) \end{aligned}$$

[21] For the sake of simplicity, we write $\widehat{f}(y)$ rather than $\widehat{f}(y;x_{\mathsf{L}},x_{\mathsf{R}})$.

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$$
\begin{aligned}
c(x_{\mathsf{L}}, x_{\mathsf{R}}) &= 4x_{\min} \\
d(y, x_{\mathsf{L}}, x_{\mathsf{R}}) &= 2x_{\min} - x_{\mathsf{L}}x_{\mathsf{R}} - x_{\max}^2 + 2y(1 - x_{\max}) \\
e(y, x_{\mathsf{L}}, x_{\mathsf{R}}) &= \left(2x_{\min} - x_{\mathsf{L}}x_{\mathsf{R}} - x_{\max}^2 + 2y(1 - x_{\max})\right)^2 + 8(1 - x_{\max})\left(x_{\mathsf{R}}^2 - 2\overline{x} + \right. \\
&\quad \left. x_{\mathsf{L}}x_{\mathsf{R}}(1 + y) + 2y(1 - x_{\mathsf{L}})\right) - 8yx_{\min}(1 - x_{\max})(2 - x_{\min}) \\
h(x_{\mathsf{L}}, x_{\mathsf{R}}) &= 4(1 - x_{\max}).
\end{aligned}
$$

Chapter 2

Asymmetric Information and Electoral Campaigns: The Monitoring Role of Media

> "The media do play a role in shaping the public image of corporate managers and directors and in so doing they pressure them to behave according to societal norms".
>
> Dyck and Zingales, 2002.

2.1 Introduction

Election campaigns are an important feature of the political game. In fact, they are the platforms used by candidates to present themselves and their goals to the voters. It is not certain, however, that they are accurate signals of future policies. The reason for this is that there is no legal regulation that forces candidates to implement what they propose in their platforms. Despite this fact, voters usually take campaigns into account if they want to be informed about the skills of the politicians running for office. So much so, that a significant number of undecided or swing voters usually decide their votes during the electoral period. In this respect, evidence for Great Britain shows that the percentage of the population who was "absolutely certain" to vote was 72% in the first week (of the electoral process), whereas it was 85% in the fourth week.[1] This proves that the electoral process plays an important role in determining the chances of a candidate being elected and may explain why the amounts of money spent in pre-electoral periods have increased greatly over the last decades.[2]

[1] Worcester (1995) in a study for the British general election campaign of 1992.

[2] "*The exercise of politics in contemporary America is very expensive, elections costs having increased an average of 125 percent with each quadrennial election year*". Crotty (1985) in a study for the US.

In other words, campaigns seem to be powerful instruments in the hands of politicians, making their run for office easier. However, they are often "cheap talk". Along these lines, Krukones[3] (1984) found that for candidates running for the White House between 1912 and 1976, the percentage of fulfilled promises was around 75%. We present this evidence in Table 2.1.

Table 2.1: **Percent of Domestic and Foreign Campaign Issues Fulfilled : 1912 – 76**

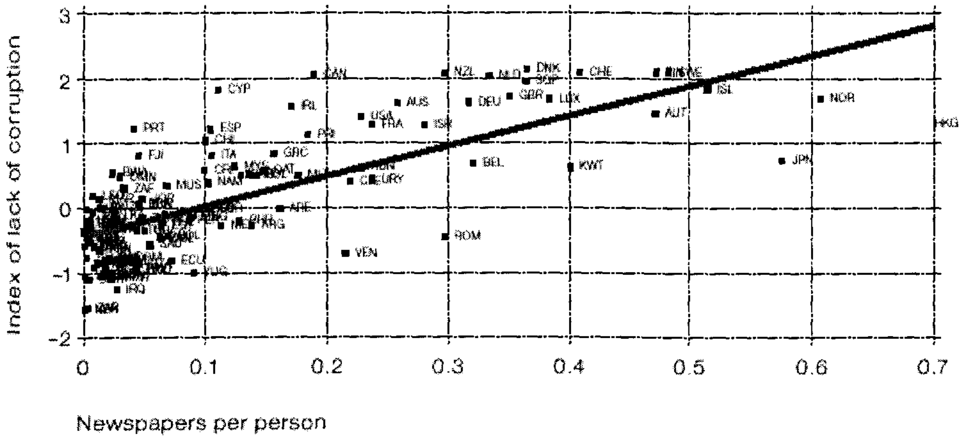
	Domestic	**Foreign**
Democrat	86.5%	70.2%
Republican	75.6%	71.6%
All Presidents	82.1%	70.8%

Source: Krukones (1984).

This data suggest that politicians do not always fullfil their campaign promises. The question is therefore if there is a mechanism that could discipline politicians' behavior. We argue in this paper that media is such a mechanism.

There is no empirical evidence to support this idea that media reduce the candidates' incentives to cheat, but there is a good proxy to it: the level of corruption in governments is negatively correlated with the degree of information held by the citizens.[4] We show the data in Figure 2.1.

Figure 2.1: **Level of Corruption and Newspaper Circulation: 1997-98**



Source: Adserà, Boix and Payne (2000).

[3] In a study for the U.S.

[4] Adserà, Boix and Payne (2000) write: *"More precisely, the extent to which politicians engage in rent-seeking behavior and other corrupt practices declines with: the presence of free and regular elections, which allow citizens to discipline politicians; the degree of information of citizens (measured through the frequency of newspapers readership), which curbs the opportunities politicians may have to engage in political corruption and mismanagement; and the involvement of citizens in politics (measured through electoral turnout)"*.

The main objective of this paper is, therefore, to show that the media can improve the accuracy of electoral campaigns as signals of the candidates' real goals. To this aim, we propose a signalling game with three types of players: political parties, media outlets and voters. There are two political parties: a left-wing party and a right-wing one. From each of the two parties a candidate emerges, who can be either moderate or extreme. This is private information of each agent. The two candidates propose non-binding platforms, choosing either a moderate or an extreme platform. The aim of candidates is to win the election. Therefore, they may well choose a platform that does not correspond to their respective types if this were profitable to them. The aim of media is to maximize their profits (i.e. audience in the case of them being neutral; political benefits in the case of them being ideological). The aim of voters is to maximize their own utility, but as such utility is not defined on the platforms proposed by the parties but rather on the post-election policy, voters will want to know the true intentions of politicians (their types). Hence the role of media.

We start the analysis with the study of a benchmark case, where there is no media, and we show that in equilibrium candidates pool either at the moderate or at the extreme platform. We then analyze the case where there is a neutral media industry, i.e. outlets with no political preferences. We show that the existence of such an industry is desirable, as the media can induce politicians to discard the use of pooling strategies. We also show that the monitoring role of media is more likely to appear in societies with a large number of swing voters or with great competition among the media. Nevertheless, and since revealing (their types) is never an equilibrium for candidates, we allow politicians and media outlets to use mixed strategies. Here, we obtain that candidates tend to a certain extend to separate their types. Finally, we explore the case of an ideological media industry. The findings here show that if each candidate has the support of one outlet, then no distortion appears; but that asymmetries may arise when just one politician has the loyalty of the media. These results clearly show that ideology is not harmful *per se*, but asymmetries in the support of different candidates may well be.

There is little literature on the role of media in politics. Andina Díaz (2004a) considers the possibility that media influence the public in two different ways: they can reinforce viewers in their prior attitudes, and they can modify the attitude itself. The author studies, under the two set-ups, how media outlets compete when they are either profit-maximizers or ideology-motivated, showing that minimal (ideology) differentiation arises when the outlets compete for audience, whereas maximal differentiation results when they have important political incentives. Andina Díaz (2004c) focuses on the location decisions of political parties in a game where media create the candidates' charisma. The author shows that depending on the way voters attend to the media, the equilibrium location of candidates may differ. In particular, she states that political competition may end in polarization if voters only attend to the outlets that are ideologically close to their convictions. However, political moderation is easily reached if voters get information from various sources. Besley and Prat (2001) study the relationship between the media and the outcomes of a political system. They use an adverse selection model to capture the possible influencing effects of a bad government on the media industry, and they show that if this influence does exist, what deeply depends on the number of media outlets in the economy, then the role of media as a source of information is shadowed. Additionally, Besley and Burgess (2001) find empirical evidence, for Indian states, supporting the idea of a strong correlation between the level of circulation of newspapers and the responsiveness of the governments. Finally, Strömberg has a series of papers (2001) and (2004a), in which he analyzes the influence that the media have on the determination of policy outcomes. Thus, he shows that due to the increasing returns to scale of the media industry, a political bias appears, hurting smaller groups of voters while benefiting larger groups. This could somehow offset the bias introduced by interest groups (which favor these small groups), leading to more desirable policies. This author also analyzes the role of radio (2004b) in reaching heterogeneous groups of voters, and he concludes that counties with more radio listeners usually receive more government funds.

There is also some literature on the problem of the control of politicians. In particular, Barro (1973) and Ferejohn (1986) study how to induce office-holders to choose the policies preferred by the electorate rather than those preferred by themselves. They set up their models in dynamic contexts, and show that the presence of regular elections act as a monitor of the politicians' behavior.

Finally, our paper is also related to the literature on electoral campaigns. Banks (1990) and Harrington (1992) analyze the incentives of candidates to reveal their true policy preferences through the electoral process. In particular, Banks shows how the presence of costs that arise from proposing platforms different from their true intentions can make the electoral process more informative. Nevertheless, for costs to play a role, they should be understood as a punishment, which makes sense in a dynamic model.[5] On the other hand, Harrington proves that an informative equilibrium[6] does exist. However, this equilibrium relies on the condition of having non-powerful offices, i.e., not an absolute majority. The aim of our paper is somehow related to these studies, as we shall also look for the conditions under which candidates make informative speeches. Nevertheless, we introduce an additional player, i.e., media outlets, and we show that the revelation is more likely to occur when the media industry exists.

The paper is organized as follows. Section 2.2 presents the model and some basic ideas. Section 2.3 analyzes the benchmark case, where there is no media industry in the economy. In section 2.4 we introduce a neutral media industry (outlets with no political preference) and we analyze its implications. Section 2.5 studies the case of an ideological industry. Section 2.6 concludes.

[5] In fact Banks says: "*The presence of costs deserves some justification. One possible rational is that voters condition future behavior on past performance and announcements, in essence punishing candidates for past indiscretions. [...] then we can think of the announcements costs in the current model as summarizing the reduced form payoffs from a more dynamic, repeated elections model*".

[6] An equilibrium in which candidates truthfully reveal their types.

2.2 The Model

Two political parties compete for office. The left-wing party is labelled L, and the right-wing party R. Political parties face an electorate of n citizens, where $n = n_{\mathcal{L}} + n_{\mathcal{C}} + n_{\mathcal{R}}$ is a finite and odd number. The group of left-wing agents is $n_{\mathcal{L}}$ and the right-wing is $n_{\mathcal{R}}$. The centrist agents are denoted by $n_{\mathcal{C}}$. We assume $n_{\mathcal{L}} = n_{\mathcal{R}}$, and so guarantee the median voter is in $n_{\mathcal{C}}$.

Prior to the general election, there is a round of primaries. From these internal elections two candidates emerge, who can be either moderate, M, or extreme, E, with $E \in \{L, R\}$ for the left and the right-wing parties respectively. Thus, the set of possible types is $T_{\mathsf{L}} = \{L, M\}$, $T_{\mathsf{R}} = \{R, M\}$ with $t_{\mathsf{L}} \in T_{\mathsf{L}}$, $t_{\mathsf{R}} \in T_{\mathsf{R}}$. A moderate candidate in party L can project himself as being either moderate or extreme. This means that he can propose either moderate, m, or extreme left, l, platforms. The same thing applies to the extreme candidate in party L, and for both types, M and R, in the right-wing party. Thus, the space of platforms is $\mathsf{P_L} = \{l, m\}$, $\mathsf{P_R} = \{r, m\}$ with $\mathsf{p_L} \in \mathsf{P_L}$, $\mathsf{p_R} \in \mathsf{P_R}$.

We propose a signaling game where Nature moves first and chooses the types of both candidates. A candidate's type is his own private information, although voters have priors on it. We denote the probability of candidate L being L (resp. M) as q_{L} (resp. $1 - q_{\mathsf{L}}$), and the probability of candidate R being R (resp. M) as q_{R} (resp. $1 - q_{\mathsf{R}}$). We interpret this as the priors agents have on the proportion of extreme and moderate politicians in each party.

A strategy for a candidate from party L is a function $\Upsilon_{\mathsf{L}} : T_{\mathsf{L}} \to \Delta(\{l, m\})$, and that of a candidate from party R is $\Upsilon_{\mathsf{R}} : T_{\mathsf{R}} \to \Delta(\{r, m\})$. These functions map the types of a candidate into the choice of a platform (allowing for stochastic decisions). Candidates' objective is to win the elections. However, and since we have a structure where candidates cannot propose party lines out of their ideological spaces, we argue that our parties are both office seeking and ideology motivated.

Voters' objective is to maximize utility, which is defined on the ex-post policy, i.e., the policy implemented by the elected candidate. Hence, voters maximize expected utility. The Bernoulli utilities are:

$$\begin{aligned} u_k(L) &> u_k(M) > u_k(R) \quad \forall k \in n_{\mathcal{L}} \\ u_k(R) &> u_k(M) > u_k(L) \quad \forall k \in n_{\mathcal{R}} \\ u_k(M) &> u_k(L) = u_k(R) \quad \forall k \in n_{\mathcal{C}} \end{aligned}$$

We assume that agents in $n_{\mathcal{L}}$ and $n_{\mathcal{R}}$ are captive voters, i.e., they always vote for the candidates L and R respectively.[7] Hence, the game focuses on the centrist voters, more specifically on the median voter, who can swing the outcome of the election. The median voter, and in general voters in $n_{\mathcal{C}}$, vote for the candidate that maximize their expected utilities. Thus, they will prefer L instead of R if they believe L to be

[7] This is an assumption only in the case of voters facing two candidates which are assigned a probability of being moderates equal to one. In any other case, voters in $n_{\mathcal{L}}$ (resp. $n_{\mathcal{R}}$) always prefer candidate L to R (resp. R to L).

more likely a moderate type than R. In the case of indifference, voters use mixed strategies. For the sake of simplicity, we restrict our attention to the case in which each candidate has a fifty per cent probability of being elected. Nevertheless, some of the results hold true when we consider voters who use any other mixed strategy or even a pure strategy. In such cases, a note is added.

There is a set $\mathcal{S} = \{1, 2, ..., s\}$ of media outlets. The objective of media outlets is to maximize audience, i.e., the fraction of voters that attend to the outlet. In order to increase the audience, an outlet can choose to investigate the candidates. This is so because we assume that centrist voters demand more information.[8] Thus, a media investigating and delivering new information about some candidate will attract the attention of the centrist voters, gaining audience over the other media outlets. In contrast, agents in $n_{\mathcal{L}}$ and $n_{\mathcal{R}}$ are captive voters, and therefore do not take information into account when deciding for whom to cast their votes. This means they do not prefer an outlet that has investigated, but rather pay equal attention to all. Hence, the audience of an outlet is $\frac{n_{\mathcal{L}}+n_{\mathcal{R}}}{s}$ plus the number of centrist voters it attracts.

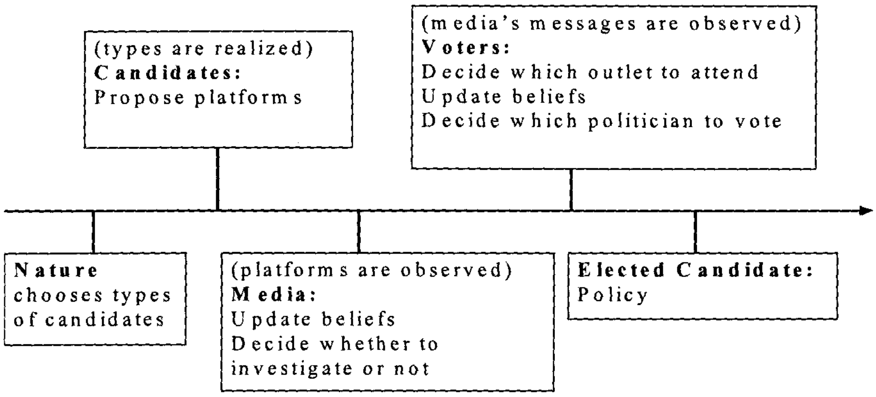
Media outlets decide whether to investigate or not simultaneously and only after the candidates have proposed their platforms. When media outlets are neutral, they investigate both candidates, whereas when they are ideological, they choose to investigate just the non-preferred politician. We assume that when an outlet investigates, it observes the type/s of the candidate/s and informs the public about them. When no investigation is done, voters obtain no extra information. In such a case, the outlet is constrained to report what candidates have previously proposed in their campaigns. By $\mathsf{M}_i = \{lr, lm, mr, mm\}$ we denote the space of messages for an outlet i and by $\mathsf{m}_i \in \mathsf{M}_i$, $\forall i \in \mathcal{S} = \{1, 2, ..., s\}$ an element of this set.

A key assumption we make is that voters do not observe directly whether a particular outlet has chosen to investigate or not, but they infer it from what the media report. That is to say, voters do not observe neither the strategies nor the actions of the media, but only the messages they send. Because of this, and since we assume that no new information can be created, voters will know for sure that an outlet has investigated when it publishes something that is different from what a particular candidate has previously stated in his platform. In this case, the outlet will be rewarded for its investigation and it will gain the centrist voters. In contrast, if media report precisely what the candidates have stated in their platforms, the agents will not be aware of the investigation carried out by the media. This means that the voters are unable to distinguish between the outlets that have investigated and those that have not. In such a case, a media outlet cannot expect any extra audience by investigating the candidates. The direct implication of this assumption is that the outlets will investigate only when the voters can recognize that they have done such investigation. Finally, to investigate implies a strictly positive fixed cost, $K > 0$.

[8] Centrist voters are swing voters, i.e., those who are not loyal to a specific candidate. Thus, it is natural to assume that they demand information, as they will take it into account when deciding for whom to vote.

A strategy for an outlet i is a function $\Psi_i : \mathsf{P_L} \times \mathsf{P_R} \rightarrow \Delta(\{I, NI\})$ that maps the platforms proposed by the candidates into the choice of whether to investigate or not (allowing for stochastic decisions). A strategy for a centrist voter is a function $\Gamma_{\mathcal{C}} : \prod_{j=\mathsf{L,R}} \mathsf{P}_j \times \prod_{i=1}^{s} \mathsf{M}_i \rightarrow \Delta(\{\mathsf{L}, \mathsf{R}\})$ that maps the platforms received from both candidates and the messages received from the s media, into the choice of whom to vote for (allowing for stochastic decisions). Note that since voters in $n_{\mathcal{C}}$ and $n_{\mathcal{R}}$ are captive voters, they have no choice to make.

The timeline summarizing the sequence of decisions is depicted below.



Finally, the notion of equilibrium we use is the Perfect Bayesian Equilibrium, which, for this game, is a vector of strategies for candidates, media outlets and centrist voters, and a vector of beliefs for media outlets and centrist voters such that:

(i) Candidates maximize votes, media outlets maximize audience and centrist voters maximize utility.

(ii) The belief of the media on a candidate $j \in \{\mathsf{L}, \mathsf{R}\}$ is derived from Bayes' Rule, i.e.

$\forall \mathsf{p}_j \in \mathsf{P}_j$,

$\mu_j^*(t \mid \mathsf{p}_j) = \frac{\Upsilon_j^*(t)(\mathsf{p}_j)P(t)}{\sum_{t' \in T_j} \Upsilon_j^*(t')(\mathsf{p}_j)P(t')}$ $\forall t \in T_j$, whenever possible.

(iii) The belief of a centrist voter on a candidate $j \in \{\mathsf{L}, \mathsf{R}\}$ is derived from Bayes' Rule, i.e.

$\forall \mathsf{p_L} \in \mathsf{P_L}$, $\forall \mathsf{p_R} \in \mathsf{P_R}$, $\forall \mathsf{m}_i \in \mathsf{M}_i$,

$\gamma_j^*(t \mid \mathsf{p_L}, \mathsf{p_R}, \{\mathsf{m}_i\}_{i \in \mathcal{S}}) = \frac{\xi_j(\{\mathsf{m}_i\}_{i \in \mathcal{S}} | \mathsf{p_L}, \mathsf{p_R}; t) \Upsilon_j^*(t)(\mathsf{p}_j)P(t)}{\sum_{t' \in T_j} \xi_j(\{\mathsf{m}_i\}_{i \in \mathcal{S}} | \mathsf{p_L}, \mathsf{p_R}; t') \Upsilon_j^*(t')(\mathsf{p}_j)P(t')}$ $\forall t \in T_j$, whenever possible.[9]

[9] Where $\xi_j(\{\mathsf{m}_i\}_{i \in \mathcal{S}} \mid \mathsf{p_L}, \mathsf{p_R}; t)$ is the probability that the media send the messages $\{\mathsf{m}_i\}_{i \in \mathcal{S}}$, when the candidates have proposed the platforms $\mathsf{p_L}, \mathsf{p_R}$ being $t \in T_j$ the type of the candidate j.

2.3 A Benchmark: The Case without Media

In an economy without a media industry, all the agents know about the candidates is what they themselves state. Therefore, as parties do not lose anything (votes, reputation...) from not being truthful, but can derive an advantage from lying, it is clear that politicians do not have any incentive to make informative speeches.

We denote by $x_{\mathsf{L}} \in [0,1]$ (resp. x_{R}) the belief voters assign to candidate L (resp. R) L being (resp. R) off the equilibrium path. The following proposition states the results that hold in this scenario. It says that only pooling equilibria exist, i.e., equilibria where different types of candidates propose the same platform, which means that they do not make informative speeches.

Proposition 2.1 *In pure strategies only pooling equilibria exist. Candidates can propose either moderate or extreme platforms and the voters' beliefs off the equilibrium path must satisfy:*
(*a*) $x_{\mathsf{L}} > q_{\mathsf{R}}$ *if* $q_{\mathsf{L}} > q_{\mathsf{R}}$.
(*b*) $x_{\mathsf{R}} > q_{\mathsf{L}}$ *if* $q_{\mathsf{R}} > q_{\mathsf{L}}$.
(*c*) $\min\{x_{\mathsf{L}}, x_{\mathsf{R}}\} \geq q$, *if* $q_{\mathsf{L}} = q_{\mathsf{R}} = q$.

Proof. (*i*) We first prove that there are no separating equilibria, either truthful or untruthful. Let us consider such a hypothetical separating equilibrium. Here, voters' beliefs are such that they assign a probability of the candidate being moderate equal to one, when the message he sends is the one that the true moderate sends in equilibrium. Then, at least one of the extreme types will find it profitable to mimic the program sent by the moderate type in his party, as in this case voters will recognize him as a truthful moderate and will vote for him.[10]

(*ii*) We shall now prove that there are no equilibria in which one candidate separates and the other pools. Let us consider such a hypothetical equilibrium. Here, the extreme candidate who separates has an incentive to deviate. This is because the use of his equilibrium platform is a signal of his type (extreme). Likewise, the use of the platform proposed by the moderate type is a signal of his being a moderate. Hence, the extreme type will always find it profitable to mimic the platform proposed by the moderate candidate, because this affords him more political support.[11]

(*iii*) Our next step is to prove that there are equilibria in which candidates pool if conditions (*a*) or (*b*) are satisfied. Without loss of generality, let us consider the case $q_{\mathsf{L}} > q_{\mathsf{R}}$. This implies that candidate L is never elected in equilibrium. This is also the case when, by deviating, he is assigned a higher probability of being extreme than candidate R, i.e., when $x_{\mathsf{L}} > q_{\mathsf{R}}$. Thus, $x_{\mathsf{L}} > q_{\mathsf{R}}$ guarantees the existence of

[10] One can easily prove that the same reasoning applies when the voters use pure strategies in the case of their being indifferent. The result is therefore robust to these sorts of changes.

[11] Here also, the same reasoning holds for any other kind of strategy followed by the voters in the case of their being indifferent.

pooling equilibria when $q_L > q_R$.[12]

(*iv*) Finally, we prove that there are equilibria in which candidates pool if $q_L = q_R = q$ and $q \leq \min\{x_L, x_R\}$. If $q_L = q_R = q$, candidates get one half of the centrist votes by playing their equilibrium strategies. The additional requirement $q \leq \min\{x_L, x_R\}$ implies that politicians do not find it strictly profitable to deviate, as a deviation, in this case, will be understood as a signal of being extreme with an equal or even greater probability. Thus, $q \leq \min\{x_L, x_R\}$ guarantees the existence of pooling equilibria when $q_L = q_R = q$.[13] ■

2.4 Neutral Media

By the term "neutral media" we imply media outlets that have no political preference and, therefore, do not favor any of the candidates. This is the case of the television in the U.K., where there is a CODE[14] that regulates political news, calling for impartiality and neutrality. It is also the case of the BBC radio, which a recent study reveals is perceived as neutral and therefore trusted by the 78% of the UK citizens, while the government, for example, deserves the trust of just 19%.[15]

Recall that the voters vote for the candidate that maximizes their own expected utility, and that, in the case of their being indifferent, each politician is elected with one half probability. The expected utility that a voter derives from a certain candidate is contingent on her belief regarding the type of the politician. Such a belief depends not only on the platforms proposed by the politicians, but also on the information published by the media. For the beliefs in the equilibrium path, the Bayes' Rule applies. For those off the equilibrium path, we assume that voters

[12] In these equilibria, there is always one type for each candidate that is cheating, even though they do not gain any additional votes from this sort of behavior. Hence, we could argue that such candidates would prefer to deviate from their cheating behavior and be truthful instead, because their payoffs would not change anyway. Therefore, if candidates are ethical in the case of their being indifferent, no pooling equilibria exist when $q_L \neq q_R$. Additionally, the reasoning in the proof holds true when the indifferent voters use any other mixed or pure strategy. The result is therefore robust to these sorts of changes.

[13] This result is robust to changes in the probabilities voters use when they are indifferent between the candidates. More precisely, the result holds true for values α, β, δ satisfying some conditions according to the probabilities q, x_L and x_R; where α is the proportion of centrist voters who vote for the left-wing candidate in the case of both candidates proposing the same policy; β is the proportion of centrist voters who vote for L when, in the case of candidate R deviating, are indifferent; and δ is the proportion of centrist voters who vote for L when, in the case of candidate L deviating, are indifferent. Recall that the value of the parameters we use in the proof is one-half. Additionally, note that if candidates prefer to be truthful in the case of their cheating affording them no additional votes, the condition for the existence of such equilibria is stronger. Specifically, it is $q < \min\{x_L, x_R\}$.

[14] "*The Broadcasting Act 1990 makes it the statutory duty of the ITC (Independent Television Commission) to draw up, and from time to time, review a code giving guidance as to the rules to be observed for the purpose of preserving due impartiality on the part of licensees as respects matters of political or industrial controversy or relating to current public policy* ". The ITC Programme Code.

[15] *Readers Digest* in a study on the institutions that UK citizens trust. The information is from "El Pais", April 4, 2004.

trust the media whenever they investigate;[16] and voters form beliefs $x_j \in [0,1]$, with $j \in \{L, R\}$, whenever no investigation is done. We argue that media outlets cannot lie, so that information obtained by investigating is hard evidence, and therefore voters trust them. We call this assumption TM. Thus, whenever the media report something different about a candidate's type, the voters identify the candidate as a liar and punish him by voting for his opponent. Such punishment is enacted when the voters are indifferent between the two candidates and one of them has cheated. We denote the punishment the liar suffers by LP. We now clarify how in some cases LP determines the strategies of the centrist voters:[17]

$$\Gamma^*_C(lm, \{lr\}_i) = \mathsf{L} \qquad \Gamma^*_C(mr, \{mm\}_i) = \mathsf{L}$$
$$\Gamma^*_C(lm, \{mm\}_i) = \mathsf{R} \qquad \Gamma^*_C(mr, \{lr\}_i) = \mathsf{R}$$

where $\Gamma^*_C(lm, \{lr\}_i) = \mathsf{L}$ means that the centrists vote for candidate L when the platform profile the voters observe from candidates is (lm), and the message profile the voters receive from at least one media is (lr).

We start by analyzing the case of a monopoly, and show that the results in such a case are analogous to those obtained in the previous section. We then study the case of a duopoly, and show that when the media outlets always investigate, there is no equilibrium in pure strategies. Next, we extend the model to the case of s outlets, and show that the monitoring role of media arises more easily when the competition among the outlets increases. Finally, we analyze the mixed strategies equilibrium.

■ The Monopoly Case

Let us suppose that there is just one media outlet in the industry. This might well be the case in some non-democratic or undeveloped countries, where the media is a state monopoly. Evidence for these countries shows that a high degree of corruption is common, corruption meaning a lack of free media.[18] In this section, we neither model ideological media nor government manipulation.[19] We therefore perform no positive analysis of such countries. Even so, the analysis we carry out is helpful as it shows that the existence of a monopoly is not sufficient to control the politicians' behavior.

Let us suppose that there is a monopoly. In such a case, the outlet chooses not to investigate, as it is a dominant strategy given its position. The candidates would therefore behave as though no media industry existed in the economy, and they would make uninformative speeches.

■ The Duopoly Case

This is the case of two media outlets. Here we show that a duopoly is not sufficient for a truthful separating equilibrium to exist, i.e., an equilibrium where

[16] Specifically, we just need the voters to trust in the media more than in the candidates.

[17] LP determines the vote of an agent when, in the case of indifference, there is a candidate who has cheated.

[18] Adserà, Boix and Payne (2000).

[19] Besley and Prat (2001) show how collusion between government and media can undermine the role the latter plays in informing voters.

the candidates reveal their true types. The reason for this is that, in the case of candidates separating their types, no media outlet chooses to investigate, and therefore, the candidates do better by pooling than by separating. In fact, this is so for any number of media outlets in the economy.

Let θ be the generic probability that the media assign to both candidates being truthful in a particular equilibrium. Note that θ might be different in every subgame. Thus, the probability θ is $\mu_{\mathsf{L}}^*(L \mid l)\mu_{\mathsf{R}}^*(R \mid r)$, $\mu_{\mathsf{L}}^*(L \mid l)\mu_{\mathsf{R}}^*(\mathrm{M} \mid m)$, $\mu_{\mathsf{L}}^*(M \mid m)\mu_{\mathsf{R}}^*(R \mid r)$ or $\mu_{\mathsf{L}}^*(M \mid m)\mu_{\mathsf{R}}^*(M \mid m)$, when the platform profile the media observe are either (l,r), (l,m), (m,r) or (m,m), respectively. We provide an example that helps make this point. Let us consider a hypothetical equilibrium where $\Upsilon_{\mathsf{L}}^*(L) = l$, $\Upsilon_{\mathsf{L}}^*(M) = l$, $\Upsilon_{\mathsf{R}}^*(R) = m$, $\Upsilon_{\mathsf{R}}^*(M) = m$. In this case, there are four possible situations: (i) The media outlets observe the equilibrium platform profile (l,m). Here, $\theta = q_{\mathsf{L}}(1 - q_{\mathsf{R}})$. (ii) The candidate R deviates. Then, the platform profile the media observe is (l,r), and therefore $\theta = q_{\mathsf{L}} x_{\mathsf{R}}$. (iii) The candidate L deviates. The platform profile the outlets observe is (m,m), and then $\theta = (1-x_{\mathsf{L}})(1-q_{\mathsf{R}})$. (iv) Both candidates deviate, and the platform profile the media observe is (m,r). Therefore $\theta = (1 - x_{\mathsf{L}})x_{\mathsf{R}}$.

We now present the results for the media sector. The idea of the proposition below is that, in equilibrium, either both media outlets investigate or neither of them does. This happens unless $\frac{1-\theta}{2}n_C = K$, in which case any choice made by the outlets constitutes an equilibrium.

Proposition 2.2 *In the duopoly case, and for each platform profile, the media outlets play a game in which "to investigate" is a dominant strategy if* $\frac{1-\theta}{2}n_C > K$, *and "not to investigate" is dominant if* $\frac{1-\theta}{2}n_C < K$. *Additionally, if* $\frac{1-\theta}{2}n_C = K$, *any choice made by the outlets constitutes an equilibrium.*

Proof. The generic game the media outlets play has payoffs:

1\2	I	NI
I	$\frac{1}{2}n_C - K, \frac{1}{2}n_C - K$	$\frac{2-\theta}{2}n_C - K, \frac{\theta}{2}n_C$
NI	$\frac{\theta}{2}n_C, \frac{2-\theta}{2}n_C - K$	$\frac{1}{2}n_C, \frac{1}{2}n_C$

Here, "to investigate" is a dominant strategy if $\frac{1-\theta}{2}n_C > K$, whereas "not to investigate" is dominant if $\frac{1-\theta}{2}n_C < K$. In the case $\frac{1-\theta}{2}n_C = K$, either of the two outlets receives the same payoff regardless of its strategy. Therefore, any choice made by the outlets constitutes an equilibrium. ■

Note that although the voters know the values of n_C, K and θ and, therefore, know whether "to investigate"/"not to investigate" is a dominant strategy, they cannot infer anything with regard to the cases where only one outlet investigates. Hence the payoffs of the matrix. Note also that although the prevailing equilibrium of the above game depends on the values of n_C, K and θ in the specific subgame, we know that the larger the number of centrist voters, the smaller the costs, or the smaller the value of θ, the more profitable is to investigate. This is what Corollary 2.1 says.

Corollary 2.1 *Media investigation is more likely in societies with larger numbers of centrist voters, lower costs, or with politicians who are suspected of cheating.*

The following proposition gives the results for the entire game, where we consider pure strategy profiles.

Proposition 2.3 *In the duopoly case and in pure strategies:*

(i) There is no equilibrium in which the media investigate for every platform profile.

(ii) There is no equilibrium in which at least one candidate separates, and the media do not investigate for every platform profile.

(iii) There are equilibria in which the candidates pool, the media never investigate, and the voters' beliefs off the equilibrium path are:

(a) $x_{\mathsf{L}} > q_{\mathsf{R}}$ *if* $q_{\mathsf{L}} > q_{\mathsf{R}}$,

(b) $x_{\mathsf{R}} > q_{\mathsf{L}}$ *if* $q_{\mathsf{R}} > q_{\mathsf{L}}$,

(c) $\min\{x_{\mathsf{L}}, x_{\mathsf{R}}\} \geq q$, *if* $q_{\mathsf{L}} = q_{\mathsf{R}} = q$,

where $x_{\mathsf{L}} \in [0,1]$ *(resp.* x_{R}*) is the belief voters assign to candidate* L *(resp.* R*) L being (resp. R) off the equilibrium path, when the media do not investigate.*

Proof. *(i)* Let us consider a hypothetical equilibrium where $\frac{1-\theta}{2}n_C > K$ for every platform profile. Given the strategies of the outlets, the voters' beliefs are $\gamma_j^*(E \mid p_j, p_k, (\mathsf{m}^j = e, \mathsf{m}^k)) = 1$, $\gamma_j^*(M \mid p_j, p_k, (\mathsf{m}^j = m, \mathsf{m}^k)) = 1$.[20] Note that for some of the cases we use the assumption TM. Given these beliefs, the extreme candidates always prefer to reveal their types rather than cheat. This is because the payoff of the extreme candidate j, when he reveals, is either $q_k(n_j + n_C) + (1 - q_k)n_j$ if $\Upsilon_k^*(E) = m$, or $q_k(n_j + \frac{1}{2}n_C) + (1 - q_k)n_j$ if $\Upsilon_k^*(E) = e$; whereas his payoff, if he cheats, is either $q_k(n_j + \frac{1}{2}n_C) + (1 - q_k)n_j$ if $\Upsilon_k^*(E) = m$, or $q_k n_j + (1 - q_k)n_j$ if $\Upsilon_k^*(E) = e$. Thus, the extreme candidates prefer to be truthful.[21] Using analogous arguments, we prove that moderate candidates also prefer to reveal. But if the candidates truthfully separate their types, then $\theta = 1$, and therefore $\frac{1-\theta}{2}n_C < K$, which contradicts the initial assumption. Thus, there is no equilibrium in which the candidates use pure strategies and the media outlets investigate for every platform profile.[22]

(ii) Let us consider a hypothetical equilibrium in which at least one candidate separates and the outlets do not investigate for every platform profile. Here, voters' beliefs coincide with those of the media for the messages that in equilibrium are sent with positive probability. This includes the beliefs on the candidate that separates. Hence, voters' best responses, following these messages, coincide with those in the model without media. Therefore, from point *(ii)* of Proposition 2.1, we know that the

[20] Recall that in the case of $s = 2$, when $\frac{1-\theta}{2}n_C > K$, both media outlets investigate in equilibrium. Hence, m gathers all the information in $\{\mathsf{m}_i\}_{i \in S=\{1,2\}}$, and we can therefore write $\gamma_j^*(t \mid \mathsf{p}_{\mathsf{L}}, \mathsf{p}_{\mathsf{L}}, \mathsf{m})$ instead of $\gamma_j^*(t \mid \mathsf{p}_{\mathsf{L}}, \mathsf{p}_{\mathsf{L}}, \{\mathsf{m}_i\}_{i \in S})$.

[21] We use LP.

[22] This result holds true for any other mixed strategy that the indifferent voters use.

extreme candidate who separates will want to deviate. Thus, there is no equilibrium in which at least one candidate separates and the outlets do not investigate for every platform profile.[23]

(*iii*) Let us now suppose a hypothetical equilibrium in which $\frac{1-\theta}{2}n_C < K$ for every platform profile. Let us consider that candidate L pools at a generic platform $\widehat{p}_\mathsf{L}$, and candidate R does so at $\widehat{p}_\mathsf{R}$. Voters' beliefs coincide with those of the media for the messages $\widehat{p}_\mathsf{L}, \widehat{p}_\mathsf{R}$, i.e., those that, in equilibrium, are sent with positive probability. For any other message off the equilibrium path, $\overline{p}_\mathsf{L}, \overline{p}_\mathsf{R}$, voters' beliefs on candidate j are $\{\gamma_j^*(t \mid \overline{p}_j, p_k, (\mathsf{m}^j = \overline{p}_j, \mathsf{m}^k)\}_{t \in T_j}$, which we denote as x_j, for $j \in \{\mathsf{L}, \mathsf{R}\}$, for the sake of simplicity. The payoff of candidate j in playing $\widehat{p}_j$ is either n_j if $q_j > q_k$; $n_j + \frac{1}{2}n_C$ if $q_\mathsf{L} = q_\mathsf{R} = q$; or $n_j + n_C$ if $q_j < q_k$, for $j \in \{\mathsf{L}, \mathsf{R}\}$. For an equilibrium to hold, candidates must not gain from a deviation. This means that voters' beliefs off the equilibrium path must satisfy:

(*a*) $x_\mathsf{L} > q_\mathsf{R}$ if $q_\mathsf{L} > q_\mathsf{R}$.

(*b*) $x_\mathsf{R} > q_\mathsf{L}$ if $q_\mathsf{R} > q_\mathsf{L}$.

(*c*) $\min\{x_\mathsf{L}, x_\mathsf{R}\} \geq q$, if $q_\mathsf{L} = q_\mathsf{R} = q$.

The reader can easily verify that such restrictions do not contradict $\frac{1-\theta}{2}n_C < K$, and the media outlets are therefore not interested in deviating. Thus, there are equilibria in which the candidates pool and the outlets do never investigate.[24] ■

Proposition 2.3 refers to cases in which the media outlets either always investigate or never do so. There are, however, other possibilities. For instance, the media outlets could find it profitable to investigate in equilibrium but not off the equilibrium path, or the other way round.[25] To this respect, we should point out that only pooling equilibria exist, although we do not go into further details.

■ The Oligopoly Case

We now focus on situations in which the media industry is composed of more than two outlets, which is often the case in democratic or better-developed countries. Empirical evidence shows that greater competition among the media is usually linked to healthier democracies.[26] Our aim in this section is to verify how well our model fits such empirical evidence.

To this aim, we analyze our game in the context of more than two media outlets, and observe that in such a case, the strategy "to investigate" is more profitable than it was before. This is so because the greater the competition, the smaller the audience of any outlet that does not investigate. Thus, the greater the number of media outlets, the larger the incentive to investigate, and therefore, the easier it is the control of the politicians' behavior.

[23] As in point (*ii*) of Proposition 2.1, this reasoning holds true for any other strategy followed by the indifferent voters.

[24] Note that if the candidates are ethical, when cheating gives them no additional support, the number of equilibria is lower. In particular, the only equilibria that survive are those satisfying condition (*c*) with a strict inequality.

[25] This depends on the values of n_C, K and θ in each corresponding subgame.

[26] Remember Figure 2.1.

Let us denote the number of media outlets that choose to investigate by s_1, and the number of them that choose not to so by s_2, with $s_1 + s_2 = s \geq 2$. Next, we solve for the number of media outlets in s_1 and s_2, which depends on the critical value $\frac{(1-\theta)}{K} n_C$, i.e., on the profitability of investigating.

Proposition 2.4 *In the oligopoly case:*
If $\frac{(1-\theta)}{K} n_C \leq 1$, *then* $s_1 = 0$.
If $1 < \frac{(1-\theta)}{K} n_C < 2$ *and* $s = 2$, *then* $s_1 = 0$.
If $1 < \frac{(1-\theta)}{K} n_C < 2$ *and* $s > 2$, *then* $s_1 = 0$ *if* $1 < (1-\theta)\frac{n_C}{K} \leq \frac{1}{[1-\frac{1}{s}]}$, *and* $s_1 = 1$ *if* $\frac{1}{[1-\frac{1}{s}]} \leq (1-\theta)\frac{n_C}{K} < 2$.
If $\frac{(1-\theta)}{K} n_C = 2$ *and* $s = 2$, *then* $s_1 = 0$, $s_1 = 1$ *or* $s_1 = 2$.
If $\frac{(1-\theta)}{K} n_C = 2$ *and* $s > 2$, *then* $s_1 = 1$ *or* $s_1 = 2$.
If $\frac{(1-\theta)}{K} n_C \in [2, s] \backslash \{2, 3, ..., s\}$, *then* $s_1 = \lfloor \frac{(1-\theta)}{K} n_C \rfloor$.
If $\frac{(1-\theta)}{K} n_C \in \{2, 3, ..., s\}$, *then* $s_1 = \frac{(1-\theta)}{K} n_C$ *or* $s_1 = \frac{(1-\theta)}{K} n_C - 1$.
If $\frac{(1-\theta)}{K} n_C \geq s$, *then* $s_1 = s$.

Proof. Let $S_1 = \{i \in S / \Psi_i^*(\mathsf{p_L}, \mathsf{p_R})(I) > 0\}$ and $S_2 = \{i \in S / \Psi_i^*(\mathsf{p_L}, \mathsf{p_R})(NI) > 0\}$.

The payoff of an outlet $i \in S_2$ is $\frac{\theta}{s} n_C$ if $s_1 \geq 1$ and $\frac{n_C}{s}$ if $s_1 = 0$. On the other hand, the payoff of an outlet $i \in S_1$ is $\frac{\theta}{s} n_C + \frac{(1-\theta)}{s_1} n_C - K$.

In equilibrium, neither do the media outlets in S_2 want to join S_1, nor do those in S_1 want to join S_2. That is to say,
$\frac{\theta}{s} n_C \geq \frac{\theta}{s} n_C + \frac{(1-\theta)}{s_1+1} n_C - K$ when $0 < s_2 < s$,
$\frac{n_C}{s} \geq \frac{\theta}{s} n_C + (1-\theta) n_C - K$ when $s_2 = s$,
$\frac{\theta}{s} n_C + \frac{(1-\theta)}{s_1} n_C - K \geq \frac{\theta}{s} n_C$ when $s_1 > 1$,
$\frac{\theta}{s} n_C + (1-\theta) n_C - K \geq \frac{n_C}{s}$ when $s_1 = 1$.
Rearranging, we have:
$\frac{(1-\theta)}{K} n_C - 1 \leq s_1$ if $s > s_1 \geq 1$; $\frac{(1-\theta)}{K} n_C \geq s_1$ if $s_1 > 1$; $(1-\theta)\frac{n_C}{K}[1 - \frac{1}{s}] \geq 1$ if $s_1 = 1$; and
$(1-\theta)\frac{n_C}{K}[1 - \frac{1}{s}] \leq 1$ if $s_1 = 0$,
and rewriting, we obtain the conditions in Proposition 2.4. ■

Recall that θ varies with the platform profile. Therefore, the conditions in Proposition 2.4 must apply correctly in every subgame.

In Proposition 2.4, we consider $s = 2$ as a particular case of the oligopoly set-up. The results for this case are the same as those we obtained from the duopoly analysis. That is to say, either $s_1 = 0$ or $s_1 = 2$ are possible in equilibrium, except when $\frac{(1-\theta)}{2} n_C = K$, in which case $s_1 = 0, s_1 = 1$ or $s_1 = 2$. The main point of the proposition is that, as s increases, the game the media outlets play no longer has an equilibrium in dominant strategies, which implies that the likelihood of an outlet investigating increases. We formalize this idea in Corollary 2.2.

Corollary 2.2 *Ceteris paribus, an increase in the number of media outlets makes finding a situation in which at least one outlet investigates more likely.*

Proof. Let us consider a situation where $s_2 = s$, i.e., no media outlet investigates.

In such a situation, if one outlet decides to investigate, it would be profitable if $\frac{\theta}{s}n_C + (1-\theta)n_C - K > \frac{1}{s}n_C$. That is to say, if $(1-\theta)\frac{s-1}{s}n_C > K$.

Here, note that $\frac{s-1}{s} \geq \frac{1}{2}\ \forall s \geq 2$, and recall that $(1-\theta)\frac{1}{2}n_C > K$ is the condition that makes the investigation in the duopoly set-up profitable. This completes the proof. ■

The idea of the proof is that the audience gained by the first outlet that chooses to investigate increases with the size of the industry. Hence, there will be values of K for which it was not profitable to investigate before, when $s = 2$, but for which it now is.

We can therefore state that competition among the media is desirable, as it induces outlets to investigate under weaker conditions. This is an important result, because the existence of at least one outlet investigating is enough to guarantee the use of separating strategies by the candidates. But in such a case, no investigation will be done, as the use of this type of strategy by the candidates, makes investigation unprofitable. To summarize then, as s increases, it becomes more likely that at least one outlet will decide to investigate. In such a case, and if this occurs for any platform profile, no equilibrium will exist in pure strategies. Hence, the natural next step is to look for equilibrium in mixed strategies.

■ Symmetric Mixed Strategies Equilibrium

We consider candidates and media outlets that make stochastic decisions. The reason we do so is because as the number of media outlets increases, the likelihood of an equilibrium where no investigation is done decreases. This means that for a high enough number of media outlets, it is quite likely that at least one of them will decide to investigate. We know that in such a case the candidates have a clear best response: to reveal their types. But we also know that in such a case, the media outlets have also a best response: not to investigate. We solve this inconsistency by allowing candidates and media outlets to use mixed strategies.

We assume $q_L = q_R = q$, and we focus on the symmetric mixed strategies equilibrium. For the sake of simplicity, we also assume that the moderate types do not propose extreme platforms. Hence, we just have to define the probability of the extreme types proposing an extreme platform, p; and the probability of the extreme types proposing a moderate platform, $1-p$.

Recall that the media outlets decide whether to investigate the politicians only after they have observed the platforms proposed by the candidates. This means that the probability of the media investigating varies, depending on the platform profile observed in equilibrium. Thus, we have to define three probabilities, which correspond to the three different situations the media can face. Let us denote the probability that an outlet investigates when it observes the profile (l, r) by z_1. Let z_2 be the probability that an outlet investigates when the profile observed is either (l, m) or (m, r). Finally, let z_3 be the probability that an outlet investigates when it observes the profile (m, m). Thus, $(1-z_i)^s$ with $i \in \{1, 2, 3\}$, is the probability that no media outlet investigates in situation i, and $1-(1-z_i)^s$ is the probability that at least one does. We now outline the conditions that define the symmetric mixed strategies equilibrium.

Proposition 2.5 *In the symmetric mixed strategies equilibrium:*

(a) Moderate types propose moderate platforms with a probability of one.

(b) Media investigate with a probability of zero when the platform profile observed is (l, r).

(c) Extreme types propose extreme platforms with a probability of p, the media investigate with a probability of z_2 when the platform profile observed is either (l, m) or (m, r), and with a probability of z_3 when the profile observed is (m, m). The probabilities p, z_2 and z_3 are implicitly defined by the following three equations:

$$q\tfrac{1}{2}n_C - (1-z_2)^s q n_C - (1-z_3)^s (1-q)\tfrac{1}{2}n_C = 0$$

$$\frac{q(1-p)}{1-pq}\left[\frac{n_C}{s}(1-z_2)^{s-1} - \sum_{j=0}^{s-1}\binom{s-1}{j} z_2^j (1-z_2)^{s-j-1}\frac{n_C}{j+1}\right] + K = 0$$

$$\left[1 - \frac{(1-q)^2}{(1-pq)^2}\right]\left[\frac{n_C}{s}(1-z_3)^{s-1} - \sum_{j=0}^{s-1}\binom{s-1}{j} z_3^j (1-z_3)^{s-j-1}\frac{n_C}{j+1}\right] + K = 0$$

Proof. In the appendix. ■

As we cannot procure generic expressions for the probabilities p, z_2 and z_3, and therefore cannot do a comparative static analysis, we provide an example that gives an intuition on the way the mixed strategies equilibrium goes.

Table 2.2: **A comparison of the equilibrium values for three and four media outlets**

	p		z1		z2		z3	
	s=3	s=4	s=3	s=4	s=3	s=4	s=3	s=4
nc=100 k=15 q=0.3	0.2186	0.2755	0	0	0.2063	0.1648	0.9745	0.6714
nc=100 k=40 q=0.3	0	0	0	0	0	0	0	0
nc=125 k=15 q=0.3	0.4141	0.4553	0	0	0.2062	0.1634	1	0.6933
nc=100 k=15 q=0.7	0.8564	0.8677	0	0	0.2063	0.1602	0.9745	0.6677
nc=100 k=40 q=0.7	0.1268	0.2594	0	0	0.211	0.1673	0.6541	0.4519
nc=125 k=15 q=0.7	0.8923	0.9004	0	0	0.2062	0.1599	1	0.6904

The table above presents the equilibrium values for the probabilities p, z_1, z_2 and z_3, for different values for the parameters n_C, K and q. We present the data for the cases of three and four media outlets. Note that when $n_C = 100$, $K = 40$ and $q = 0.3$ we have zeros. This means that the equilibrium is in pure strategies. In particular, for this parameters configuration, we obtain that there is an equilibrium in which the candidates pool at the moderate platform (hence $p = 0$), the media outlets never investigate (hence $z_i = 0 \; \forall i \in \{1, 2, 3\}$), and x_L, x_R are close to 0.7. Going back to the table, the data suggests that: (*i*) An increase in q, increases the probability of the candidates proposing the extreme platforms. (*ii*) An increase in K for small values of q, makes investigation unprofitable. The equilibrium will be therefore in pure strategies. On the other hand, an increase in K for high values of q, implies a decrease in the probability of the outlets choosing to investigate. Therefore, the candidates increase their probability of proposing the moderate platform. (*iii*) A rise in n_C increases the profitability of investigation, and therefore reduces the probability of the candidates sending the moderate proposal. (*iv*) Finally, an increase in s implies a decrease in the probability that an outlet investigates. One possible explanation for this is that the already existing outlets have to accommodate the entrance of the new firm and, therefore, have to reduce both z_2 and z_3. This in turn will lead to an increase in the probability of both candidates proposing extreme platforms, because the probability of at least one outlet investigating is greater when $s = 4$ than when $s = 3$.

To summarize then, a rise in the parameters q, n_C and s, implies an increase in the probability that the candidates propose an extreme platform. On the other hand, a rise in K implies an increase in the probability that the candidates propose a moderate platform. Additionally, and more importantly, we observe that the higher the number of media outlets in the economy, the greater the probability that an extreme candidate proposes an extreme platform. That is to say, the fiercer the competition among the media is, the more the candidates tend to separate their types. Then, we cannot have an informative equilibrium,[27] but despite this, we obtain that such an equilibrium is approached when the candidates and the media outlets use mixed strategies and there is a certain number of outlets competing in the industry. Hence, the first policy guide-line we propose is that media competition should be fostered, as it is a good way of monitoring politicians' behavior.

2.5 Ideological Media

One question to be addressed is the extent to which previous results are robust to the existence of an ideological media industry. By ideological media we mean media outlets that have a political preference and therefore try to favor a given candidate. An example of ideological outlets are newspapers in the U.K., which are strongly partisan, or the case of Italy and Spain, where not only newspapers but also radio and television stations show an ideological bias.[28]

[27] This is due to the assumption that voters do not observe directly whether a media outlet has investigated or not, but they infer it from what the media report.

[28] In Spain there are television channels (*Antena 3*/*Canal Plus*), newspapers (*El Mundo*/*El Pais*), and radio stations (*Onda Cero*/*Cadena Ser*), that favor the right/left-wing parties respectively. The

Media outlets may be ideological either because their core members have a political preference, because they receive funds from a lobby, or for many other reasons one might think of. We do not consider any particular argument for such a bias. We merely identify ideological outlets as those that perceive political benefits from having their preferred politician in office. We denote the political benefit by Λ, with $\Lambda > 0$. We also assume that ideological outlets compete for political benefits, which means they do not care about audience, but merely about Λ. A more general framework would be one in which the outlets compete for both audience and political gains. However, and due to the complexity of such an approach, we skip it and obtain clearer results.

We consider two media outlets, one that prefers the left-wing policies, the other supporting right-wing policies. We label these outlets L (left) and R (right). Thus, media L will receive a benefit of Λ in the event that candidate L is elected for office, and media R receives a benefit of Λ if candidate R is elected. As we have already stated, ideological outlets only investigate their non-preferred politician. The reason for this is that they do not have any incentive to investigate their supported politicians, as, in such a case, the information revealed could damage him and subsequently the outlet. Hence, the decision for media L (resp. R), is whether to investigate candidate R (resp. L) or not. This implies that media L gives valuable information only about candidate R, whereas media R does the same about candidate L. Hence, the voters attend to the two outlets but select from each one only the information that they know can be relevant. They then update their beliefs using Bayes' Rule and finally decide for whom to vote.

We now specify the assumptions we use to determine the beliefs off the equilibrium path. As in the previous section, we assume that whenever candidate $\mathsf{j} \in \{\mathsf{L}, \mathsf{R}\}$ does not use his equilibrium strategy, the $k \in \{\mathrm{L}, \mathrm{R}\}$, $k \neq j$ outlet does not investigate him and there is nothing that contradicts this fact, voters form belief $x_{\mathsf{j}} \in [0, 1]$, with $\mathsf{j} \in \{\mathsf{L}, \mathsf{R}\}$.[29] However, if the candidate is off his equilibrium path and the corresponding outlet does not investigate him but there is evidence that contradicts this fact, then the voters trust the media regarding the new information. Likewise, we assume that the voters trust the media whenever the candidates use their equilibrium strategies, the media do not investigate but the evidence is against this fact. In either case, assumption TM applies. Finally, in the case of one of the candidates deviating and the corresponding outlet investigating him, voters trust the outlet. Here also, assumption TM applies. The reason that the agents in our model trust in media more than in candidates is because the media cannot lie, and therefore information obtained through investigation is hard evidence.

We focus our attention on the case $q_{\mathsf{L}} = q_{\mathsf{R}} = q$. We start the analysis with the study of the monopoly set-up and show that, under certain conditions, a political

case of Italy is even stronger, where Berlusconi owns the huge media conglomerate, Mediaset.

[29] Where x_{j} is the probability of candidate $\mathsf{j} \in \{\mathsf{L}, \mathsf{R}\}$ being extreme, when he does not use his equilibrium strategy, the $k \in \{\mathrm{L}, \mathrm{R}\}$, $k \neq j$ outlet does not investigate him and there is nothing that contradicts this fact.

bias might be introduced in the candidates' game.[30] Next, we analyze the duopoly set-up and show that such political favors no longer arise. This stresses the following idea: ideology is not harmful *per se*, but the possibility of asymmetries in the support of different candidates may well be.[31]

■ The Monopoly Case

Let us consider the case of just one ideological medium. This set-up could be understood as an approximation to the reality of some non-democratic countries, where the state usually owns the media, which is used for manipulation purposes.

Without loss of generality, we assume that the monopoly is right-wing, R, which means that it is the left-wing politician who might be investigated, but that the right-wing will never be.

The results obtained from this setup differ from those of the case of a neutral monopoly. On the one hand, we now obtain that the monopoly finds it profitable to investigate under certain circumstances, which was not the case at all in the previous analysis. This difference is explained by the fact that in the ideological set-up, the outlet wants its candidate to be elected, which happens to be easier if the other politician is found cheating, which naturally requires that he is investigated. On the other hand, we now obtain that the existence of an ideological monopoly may bias the political game in favor of its candidate.

The following proposition states that only pooling equilibria exist. It also states that in all the equilibria, the left-wing candidate is never investigated when he deviates, which implies that he cannot signal his type by deviating.[32] As such, the left-wing candidate derives no benefit from the existence of a right-wing media.

We have worked out the entire characterization of these equilibria, but, for reasons of space, have relegated it to the Appendix.

Proposition 2.6 *In the monopoly case and in pure strategies, only pooling equilibria exist. In all these equilibria, the left-wing candidate is never investigated when he deviates, which guarantees that he cannot signal his type by so doing.*

The proposition establishes that only pooling equilibria exist, which is nothing more than what we got in the neutral media set-up. Additionally, it also states that the left-wing candidate has no way of signalling his type. In other words, he cannot derive any benefit from the existence of a media outlet. Indeed, the existence of such a media can only damage the left-wing candidate, as it would introduce a bias in favor of the right-wing politician. We now explain this bias.

[30] Where bias means that the candidate with the support of the media has an advantage over his rival in their run for office.

[31] In Spain, the two main opposition parties, PSOE and IU, claimed to the Spanish Television (TVE) that their leaders should be interviewed by this television as much as the President of Spain and leader of the Conservative Party is (Diario de León, 22 April 2003).

[32] The media outlet never investigates the left-wing candidate when he deviates and proposes a extreme platform. In so doing, it guarantees that the voters will never meet a moderate left-wing type.

In all equilibria, but those in which the left-wing candidate is investigated in equilibrium, either candidate gains one half of the votes. In those exceptional cases, winning the election (in expected terms) depends on the value of the probability q. In particular, if $q < \frac{1}{2}$, the left-wing candidate wins, whereas if $q > \frac{1}{2}$, it is the right-wing candidate who wins. Finally, if $q = \frac{1}{2}$, they tie and therefore, each politician gets one half of the votes. We here observe that the sets of parameter values sustaining the equilibria in which the right-wing candidate wins have higher measure than the sets of parameter values sustaining the equilibria in which the left-wing candidate wins. Therefore, the existence of an right-wing media favors the right-wing candidate in his running for office. The next Corollary formalizes this idea.

Corollary 2.3 *The existence of an ideological monopoly favors the candidate supported by the outlet in his running for office.*

Proof. We focus on the equilibria in which the left-wing candidate is investigated in equilibrium. Let us suppose that the parameters q, K and Λ are uniformed and independently distributed.

In such a case, let us consider the equilibrium (mm, rr), $\Psi_{\mathrm{R}}(m,r) = I$, $\Psi_{\mathrm{R}}(m,m) = I$, $\Psi_{\mathrm{R}}(l,r) = NI$, $\Psi_{\mathrm{R}}(l,m) = NI$, $x_{\mathsf{L}} > q$, $x_{\mathsf{R}} = 1$. The set of parameter values sustaining this equilibrium is $\left\{K : 0 < K \leq q\frac{\Lambda}{2}\right\}$. We know that candidate L wins when $q < \frac{1}{2}$, and thus, the measure of the set sustaining the equilibrium in which this candidate wins is $\int_0^{\frac{1}{2}} q\frac{\Lambda}{2}dq = \frac{\Lambda}{16}$. On the other hand, candidate R wins when $q > \frac{1}{2}$, and thus, the measure of the set sustaining the equilibrium in which he wins is $\int_{\frac{1}{2}}^1 q\frac{\Lambda}{2}dq = \frac{3\Lambda}{16}$. The latter set is higher than the former, and thus, we can say that candidate R wins with a higher probability.

Let us consider (mm, rr), $\Psi_{\mathrm{R}}(m,r) = I$, $\Psi_{\mathrm{R}}(m,m) = I$, $\Psi_{\mathrm{R}}(l,r) = NI$, $\Psi_{\mathrm{R}}(l,m) = NI$, $x_{\mathsf{L}} > q$, $x_{\mathsf{R}} \in (0,1)$. The set of parameters that sustains this equilibrium is $\{K : 0 < K \leq q\Lambda\}$. We observe that $\int_0^{\frac{1}{2}} q\Lambda dq = \frac{\Lambda}{8}$, and $\int_{\frac{1}{2}}^1 q\Lambda dq = \frac{3\Lambda}{8}$, and thus, there is a bias in favor of the right-wing candidate.

Let us now consider (mm, mm), $\Psi_{\mathrm{R}}(m,m) = I$, $\Psi_{\mathrm{R}}(m,r) = I$, $\Psi_{\mathrm{R}}(l,m) = NI$, $\Psi_{\mathrm{R}}(l,r) = NI$, $x_{\mathsf{L}} > q$, $x_{\mathsf{R}} \in [0,1]$. The set of parameters that sustains this equilibrium is $\{K : 0 < K \leq q\Lambda\}$. There is therefore a bias in favor of the right-wing candidate.

Let us now consider the equilibrium (mm, rr), $\Psi_{\mathrm{R}}(m,r) = I$, $\Psi_{\mathrm{R}}(m,m) = NI$, $\Psi_{\mathrm{R}}(l,r) = NI$, $\Psi_{\mathrm{R}}(l,m) = NI$, $x_{\mathsf{L}} > q$, $q < x_{\mathsf{R}} < 1$. The set of parameters is now $\{K : 0 < K = q\Lambda\}$, which has zero measure and thus, there is no bias in favor of any of the candidates.

The same occurs in the case of the equilibrium (mm, mm), $\Psi_{\mathrm{R}}(m,m) = I$, $\Psi_{\mathrm{R}}(m,r) = NI$, $\Psi_{\mathrm{R}}(l,m) = NI$, $\Psi_{\mathrm{R}}(l,r) = NI$, $x_{\mathsf{L}} > q$, $q < x_{\mathsf{R}} \leq 1$.

Let us now consider (mm, rr), $\Psi_{\mathrm{R}}(m,r) = I$, $\Psi_{\mathrm{R}}(m,m) = NI$, $\Psi_{\mathrm{R}}(l,r) = NI$, $\Psi_{\mathrm{R}}(l,m) = NI$, $x_{\mathsf{L}} > q$, $q < x_{\mathsf{R}} = 1$. The set of parameters in such a case is

$\{K : q\frac{\Lambda}{2} \leq K \leq q\Lambda\}$. Thus, $\int_0^{\frac{1}{2}} q\frac{\Lambda}{2}dq = \frac{\Lambda}{16}$, and $\int_{\frac{1}{2}}^1 q\frac{\Lambda}{2}dq = \frac{3\Lambda}{16}$. There is therefore a bias in favor of the right-wing candidate.

Finally, let us consider the equilibrium (mm, pp), $\Psi_{\mathrm{R}}(m,p) = I$, $\Psi_{\mathrm{R}}(m,\overline{p}) = NI$, $\Psi_{\mathrm{R}}(l,p) = NI$, $\Psi_{\mathrm{R}}(l,\overline{p}) = NI$, $x_{\mathsf{L}} > q$, $q = x_{\mathsf{R}} \geq \frac{1}{2}$, $p \in \{r, m\}$. The set of parameters that sustains this equilibrium is $\{K : q\frac{\Lambda}{2} \leq K \leq q\Lambda\}$. Thus, $\int_{\frac{1}{2}}^1 q\frac{\Lambda}{2}dq = \frac{3\Lambda}{16}$. Note however that $q < \frac{1}{2}$ and $q \geq \frac{1}{2}$ are exclusive, and then, there is not an equilibrium in which candidate L wins. There is therefore a bias in favor of the right-wing candidate. ■

■ The Duopoly Case

Finally, let us consider the case of two media outlets competing in the industry. As previously pointed out, we assume that each media has a preferred candidate. Thus, media L will support candidate L, whereas media R will support candidate R.

We now obtain that with two media outlets with different political preferences, it is no longer possible to find an equilibrium in which one candidate is favored. The reason for this is that the bias introduced by the media cancels each other out when there is an outlet on each side of the ideological space. Hence, if we want politics to be fair, we should not worry about the existence of ideological outlets, but rather about the asymmetries that may arise in the support of different candidates.

The problem that ideological media brings is that the incentive to investigate decreases, i.e., ideological outlets will investigate less than they would do if they were neutral. The reason for this is that ideological outlets want to make their preferred candidate's campaign easier. Therefore, they should not signal that the other candidate is moderate. This implies that the media outlets will not investigate when they observe that the other politician sends an extreme platform, either in equilibrium or off the equilibrium path. Hence, moderate candidates will not be able to signal their types by deviating, and the voters will therefore be worse off than in a situation in which they could do so.[33]

The following proposition states that only pooling equilibria exist. Here also, the complete characterization of the equilibria is presented in the Appendix.

Proposition 2.7 *In the duopoly case and in pure strategies, only pooling equilibria exist.*

Proposition 2.7 gives an insight into the implications of an ideological set-up. From the proof of the proposition, we learn that the bias that previously appeared no longer arise. That is to say, there is not any candidate that wins with a higher probability. The following Corollary formalizes this idea.

Corollary 2.4 *The existence of an outlet in each side of the ideological space makes no longer unfair the political game.*

[33] For example, the neutral media set-up.

To summarize then, the main idea that arises from the comparison of the monopoly and the duopoly results, is that ideology is not harmful *per se*, although the possibility of asymmetries in the encouragement of different candidates may well be. Hence, our second policy guide-line is that governments should not worry about the existence of ideological media outlets, but rather about the asymmetries that may arise in the support of different candidates.[34]

2.6 Conclusion

Electoral campaigns are important as they are the way politicians use to present their platforms and skills in their run for office. However, empirical evidence shows that they are not always accurate signals of the parties' goals. The role of media is therefore to improve the quality of these signals, by threatening candidates with the loss of their reputations if they are found cheating.

The main objective of this paper is to show that the media play an important role in the political game. To this aim, we have analyzed an electoral competition game where candidates have private information about their own types. Voters want to find out the targets of the parties, since they know that, once in office, politicians implement their preferred policies. At first, the agents do not have any other information about such policies except what the candidates themselves release in their platforms. In such a context, we show that the existence of a media industry improves the quality of the political game. This is so because the media have incentives to investigate and reveal the true intentions of the politicians. This is sufficient, under certain conditions, to discipline politicians' behavior. We show that the control of the candidates becomes easier as the competition among the outlets increases. We also show that this monitoring role of the media depends positively on the number of swing voters in the population and negatively on the cost of the investigation. Nevertheless, and since revealing their types is never an equilibrium for candidates, we analyze the mixed strategies equilibrium, in which candidates and media outlets use stochastic decisions. On this point, we observe that candidates tend somehow to separate their types. Finally, we explore the case of an ideological media industry. The results we report here indicate that if each candidate has the support of one media outlet, no distortion appears. However, if just one candidate has the loyalty of the media the results might well change, and this candidate could gain from such a bias. Thus, the two policy guide-lines we provide are: first, media competition should be fostered, as it is a good way of controlling politicians' behavior; secondly, the existence of ideological outlets is not harmful as long as each candidate is supported by one of the media outlets.[35]

[34] Ideology does not play an important role in our model because we assume that all the centrist voters receive the same extra information. If this were not the case, but different voters were exposed to different information instead, the results we present in the model may well change. Thus, the innocuous role of the ideology should be carefully understood.

[35] The innocuous role of ideology in our model is due to the fact that all the centrist voters receive the same information. If this were not the case, our results may well change, and the role of ideology

Despite the theoretical results derived from the model, the evidence available for different countries shows that media is not always a threat to candidates. Nevertheless, we think that the data provided here on government corruption and newspapers' circulation give some empirical support to our theoretical results. We also believe that the findings of our model reflect somehow what holds for democratic countries, where, although there is sometimes evidence of selfish behaviors in politicians, their reputations depend, primarily, on what the media say.

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should be therefore reinterpreted.

2.7 Appendix

Proposition 2.5

Proof. Let us consider the symmetric mixed strategies equilibrium defined by the strategies:

$$\begin{array}{ll} \Upsilon_{\mathsf{L}}(L)(l) = p \in [0,1] & \Upsilon_{\mathsf{L}}(M)(m) = 1 \\ \Upsilon_{\mathsf{R}}(R)(r) = p \in [0,1] & \Upsilon_{\mathsf{R}}(M)(m) = 1 \end{array}$$

$$\begin{array}{l} \Psi_i(l,r)(I) = z_1 \in [0,1] \ \forall i \in \mathcal{S} \\ \Psi_i(l,m)(I) = \Psi_i(m,r)(I) = z_2 \in [0,1] \ \forall i \in \mathcal{S} \\ \Psi_i(m,m)(I) = z_3 \in [0,1] \ \forall i \in \mathcal{S}. \end{array}$$

The media's beliefs must be consistent in equilibrium. That is to say:

$$\begin{array}{ll} \mu^*_{\mathsf{L}}(L \mid l) = 1 & \mu^*_{\mathsf{R}}(R \mid r) = 1 \\ \mu^*_{\mathsf{L}}(M \mid m) = \frac{1-q}{1-pq} & \mu^*_{\mathsf{R}}(M \mid m) = \frac{1-q}{1-pq}. \end{array}$$

Let us denote by θ the probability that both candidates are truthful in equilibrium, and recall that θ may be different in each subgame.

We now obtain the expected payoff of an outlet that chooses not to investigate:

$$\theta\frac{n_{\mathcal{C}}}{s} + (1-\theta)\frac{n_{\mathcal{C}}}{s}(1-z_i)^{s-1}$$

and its payoff if it chooses to investigate:

$$\theta\frac{n_{\mathcal{C}}}{s} + (1-\theta)\sum_{j=0}^{s-1}\binom{s-1}{j} z_i^j(1-z_i)^{s-j-1}\frac{n_{\mathcal{C}}}{j+1} - K$$

■

Both expected payoffs must be equal in equilibrium. Thus, we obtain three equations that implicitly define the probabilities z_1, z_2 and z_3. With respect to z_1, we know that it is zero in equilibrium. This is so because the moderate candidates do never propose the extreme platforms, and therefore there is no point for media outlets to investigate when they observe the profile (l, r). With respect to z_2 and z_3, we give the equations that implicitly define these two probabilities.

$$\left(\frac{q(1-p)}{1-pq}\right)\left[\frac{n_{\mathcal{C}}}{s}(1-z_2)^{s-1} - \sum_{j=0}^{s-1}\binom{s-1}{j} z_2^j(1-z_2)^{s-j-1}\frac{n_{\mathcal{C}}}{j+1}\right] + K = 0 \tag{2.1}$$

$$\left(1-\frac{(1-q)^2}{(1-pq)^2}\right)\left[\frac{n_{\mathcal{C}}}{s}(1-z_3)^{s-1} - \sum_{j=0}^{s-1}\binom{s-1}{j} z_3^j(1-z_3)^{s-j-1}\frac{n_{\mathcal{C}}}{j+1}\right] + K = 0. \tag{2.2}$$

Proof. Once the media outlets have reported their messages, the voters update their beliefs. They are: ■

$\gamma_j^*(E \mid e, \cdot, (\cdot, \cdot)) = \mu_j^*(E \mid e) = 1$ for $j \in \{\mathsf{L}, \mathsf{R}\}$

$\gamma_j^*(M \mid m, \cdot, (e, \cdot)) = 0$ for $j \in \{\mathsf{L}, \mathsf{R}\}$

$\gamma_j^*(M \mid m, m, (m, e)) = 1$ for $j \in \{\mathsf{L}, \mathsf{R}\}$

$\gamma_j^*(M \mid m, e, (m, e)) = \frac{q\, p(1-q)}{q\, p(1-q)+q^2\, p(1-p)(1-z_2)^s}$ for $j \in \{\mathsf{L}, \mathsf{R}\}$

$\gamma_j^*(M \mid m, m, (m, m)) = \frac{(1-q)[(1-q)+q(1-p)(1-z_3)^s]}{(1-q)[(1-q)+q(1-p)(1-z_3)^s]+q(1-p)[(1-q)(1-z_3)^s+q(1-p)(1-z_3)^s]}$

for $j \in \{\mathsf{L}, \mathsf{R}\}$.

Proof. The extreme candidates take into account the voters' beliefs and the different probabilities with which the media outlets investigate in each situation. Then, they decide the platforms to propose. This gives the third equation:

$$q\frac{1}{2}n_C - (1 - z_2)^s q n_C - (1 - z_3)^s (1 - q)\frac{1}{2}n_C = 0 \tag{2.3}$$

which implicitly define, together with (1) and (2), the probabilities p, z_2 and z_3. ■

Proposition 2.6

Proof. The schedule of the proof is as follows. We first prove that there is no equilibrium in which at least one candidate separates, either truthfully or untruthfully. We then consider pooling equilibria of the form (mm, pp), with $p \in \{m, r\}$, and show when there is an equilibrium in which the candidates pool in such a way. Finally, we analyze pooling equilibria of the form (ll, pp), with $p \in \{m, r\}$, and show when there is an equilibrium of this sort.

(i) Let us start considering a hypothetical equilibrium in which at least one candidate separates, either truthfully or untruthfully. Here, voters' beliefs assign a probability of the candidate being moderate equal to one, when the message he sends is the one that the true moderate sends in equilibrium. Thus, the extreme type has an incentive to deviate and mimic the programme sent by the moderate, as in this case voters will recognize him as a truthful moderate and will vote for him.[36]

(ii) Second, let us consider a hypothetical equilibrium in which $\Upsilon_{\mathsf{L}}^*(L) = \Upsilon_{\mathsf{L}}^*(M) = m$, $\Upsilon_{\mathsf{R}}^*(R) = \Upsilon_{\mathsf{R}}^*(M) = p$, with $p, \overline{p} \in \{m, r\}$, $p \neq \overline{p}$. Our way of proceeding here is: first, we analyze the media's behavior; second, we analyze the candidates' behavior. Before proceeding, let us denote by $\gamma_{p_{\mathsf{R}} m_{\mathsf{R}}^{\mathsf{R}}}^{p_{\mathsf{L}} m_{\mathsf{R}}^{\mathsf{L}}} = (\gamma_{\mathsf{L}}(L \mid p_{\mathsf{L}}, m_{\mathsf{R}}^{\mathsf{L}}), \gamma_{\mathsf{R}}(R \mid p_{\mathsf{R}}, m_{\mathsf{R}}^{\mathsf{R}}))$, the belief that the voters have on candidate L being L, given his platform p_{L} and the R media's message on him, $m_{\mathsf{R}}^{\mathsf{L}}$; and the voters' belief on candidate R being R, given his platform p_{R} and the R media's message on him $m_{\mathsf{R}}^{\mathsf{R}}$.[37]

We start with the analysis of the media's behavior.

Let us consider the subgame that follows the candidates' platform profile (l, p), and let us suppose $\Psi_{\mathsf{R}}(l, p) = I$ with $p \in \{m, r\}$. Here, voters' beliefs are $\gamma_{pp}^{ll} =$

[36] This result is robust to changes in the way voters cast their votes in the case of them being indifferent.

[37] In the case of a right-wing monopoly, $m_{\mathsf{R}}^{\mathsf{R}} = p_{\mathsf{R}}$, as that media never investigates the right-wing candidate.

$(1^{(TM)}, q)$ and $\gamma^{lm}_{pp} = (0^{(TM)}, q)$, where the superscript (TM) means that the assumption "trust media" applies. The payoff of the outlet when it observes (l,p) is $x_{\mathsf{L}}\Lambda - K$, whereas if it deviates and does not investigate, its payoff is Λ. Hence, $\Psi_{\mathrm{R}}(l,p) = I$ cannot be in equilibrium. Let us now suppose $\Psi_{\mathrm{R}}(l,p) = NI$ with $p \in \{m, r\}$. Here, voters' belief are $\gamma^{ll}_{pp} = (x_{\mathsf{L}}, q)$ and $\gamma^{lm}_{pp} = (0^{(TM)}, q)$.[38] The payoff of the media when it observes (l,p) is either Λ if $x_{\mathsf{L}} > q$, $\frac{\Lambda}{2}$ if $x_{\mathsf{L}} = q$, or 0 if $x_{\mathsf{L}} < q$; whereas if it deviates and investigates, its payoff is either $x_{\mathsf{L}}\Lambda - K$ if $x_{\mathsf{L}} > q$, $x_{\mathsf{L}}\frac{\Lambda}{2} - K$ if $x_{\mathsf{L}} = q$, or $-K$ if $x_{\mathsf{L}} < q$. Hence, $\Psi_{\mathrm{R}}(l,p) = NI$ is possible in equilibrium.

Let us consider the subgame that follows the candidates' platform profile $(l, \overline{p})$, and let us suppose $\Psi_{\mathrm{R}}(l,\overline{p}) = I$ with $\overline{p} \in \{m, r\}$, $p \neq \overline{p}$. Here, voters' beliefs are $\gamma^{ll}_{p\overline{p}} = (1^{(TM)}, x_{\mathsf{R}})$ and $\gamma^{lm}_{p\overline{p}} = (0^{(TM)}, x_{\mathsf{R}})$. The payoff of the outlet when it investigates is always smaller than its payoff when it does not so, as by investigating it can signal that the left-wing candidate is moderate, which is bad for him. Hence, $\Psi_{\mathrm{R}}(l,\overline{p}) = I$ cannot be in equilibrium. Now, let us suppose $\Psi_{\mathrm{R}}(l,\overline{p}) = NI$ with $\overline{p} \in \{m, r\}$, $p \neq \overline{p}$. Here, voters' beliefs are $\gamma^{ll}_{p\overline{p}} = (x_{\mathsf{L}}, x_{\mathsf{R}})$ and $\gamma^{lm}_{p\overline{p}} = (0^{(TM)}, x_{\mathsf{R}})$. The payoff of the outlet is either Λ if $x_{\mathsf{L}} > x_{\mathsf{R}}$ or $x_{\mathsf{L}} = x_{\mathsf{R}} = 0$, $\overline{p} = m$; $\frac{\Lambda}{2}$ if $0 < x_{\mathsf{L}} = x_{\mathsf{R}} < 1$ or $x_{\mathsf{L}} = x_{\mathsf{R}} = 0$, $\overline{p} = r$ or $x_{\mathsf{L}} = x_{\mathsf{R}} = 1$, $\overline{p} = r$; or 0 if $x_{\mathsf{L}} < x_{\mathsf{R}}$, or $x_{\mathsf{L}} = x_{\mathsf{R}} = 1$, $\overline{p} = m$; whereas if it deviates and investigates, its payoff is always smaller. Thus, $\Psi_{\mathrm{R}}(l,\overline{p}) = NI$ is possible in equilibrium.

So far, we know that $\Psi_{\mathrm{R}}(l,p) = NI$, $\Psi_{\mathrm{R}}(l,\overline{p}) = NI$ are possible in equilibrium, and that $\Psi_{\mathrm{R}}(l,p) = I$, $\Psi_{\mathrm{R}}(l,\overline{p}) = I$ are not. We now study the other four possible cases: (1) $\Psi_{\mathrm{R}}(m,p) = I$; (2) $\Psi_{\mathrm{R}}(m,p) = NI$; (3) $\Psi_{\mathrm{R}}(m,\overline{p}) = I$; (4) $\Psi_{\mathrm{R}}(m,\overline{p}) = NI$.

Case (1) $\Psi_{\mathrm{R}}(m,p) = I$. Voters' beliefs are $\gamma^{mm}_{pp} = (0, q)$ and $\gamma^{ml}_{pp} = (1, q)$. The payoff of the outlet is $q\Lambda - K$; whereas if it deviates and investigates, its payoff is 0. Thus, $\Psi_{\mathrm{R}}(m,p) = I$ implies $q\Lambda \geq K$.

Case (2) $\Psi_{\mathrm{R}}(m,p) = NI$. Voters' beliefs are $\gamma^{mm}_{pp} = (q, q)$ and $\gamma^{ml}_{pp} = (1^{(TM)}, q)$. The payoff of the outlet is $\frac{\Lambda}{2}$, whereas if it deviates and investigates, its payoff is $(1-q)\frac{\Lambda}{2} + q\Lambda - K$. Thus $\Psi_{\mathrm{R}}(m,p) = NI$ implies $K \geq q\frac{\Lambda}{2}$.

Case (3) $\Psi_{\mathrm{R}}(m,\overline{p}) = I$. Voters' beliefs are $\gamma^{mm}_{p\overline{p}} = (0, x_{\mathsf{R}})$ and $\gamma^{ml}_{p\overline{p}} = (1, x_{\mathsf{R}})$. Proceeding as previously, we obtain that $\Psi_{\mathrm{R}}(m,\overline{p}) = I$ implies either $q\Lambda \geq K$, $x_{\mathsf{R}} \in (0,1)$, $\overline{p} = m$; $q\frac{\Lambda}{2} \geq K$, $x_{\mathsf{R}} \in \{0,1\}$, $\overline{p} = m$; or $q\Lambda \geq K$, $x_{\mathsf{R}} \in [0,1]$, $\overline{p} = r$.[39]

Case (4) $\Psi_{\mathrm{R}}(m,\overline{p}) = NI$. Voters' beliefs are $\gamma^{mm}_{p\overline{p}} = (q, x_{\mathsf{R}})$ and $\gamma^{ml}_{p\overline{p}} = (1^{(TM)}, x_{\mathsf{R}})$. Here, $\Psi_{\mathrm{R}}(m,\overline{p}) = NI$ implies either $q > x_{\mathsf{R}}$; $K \geq q\frac{\Lambda}{2}$, $x_{\mathsf{R}} = q$; $K \geq q\frac{\Lambda}{2}$, $x_{\mathsf{R}} = 1$, $\overline{p} = m$; $K \geq q\Lambda$, $q < x_{\mathsf{R}} < 1$, $\overline{p} = m$; or $K \geq q\Lambda$, $q < x_{\mathsf{R}} \leq 1$, $\overline{p} = r$.

We now analyze the candidates' behavior.

$(ii.1)$ Let us consider a hypothetical equilibrium strategy profile (mm, pp), $\Psi_{\mathrm{R}}(m,p) = I$, $\Psi_{\mathrm{R}}(m,\overline{p}) = I$, $\Psi_{\mathrm{R}}(l,p) = NI$, $\Psi_{\mathrm{R}}(l,\overline{p}) = NI$, where conditions in (1) and (3) must be satisfied. Here, candidate L type L gains zero in equilibrium, whereas if he deviates and sends the message l, he gains either n_C if $x_{\mathsf{L}} < q$, $\frac{n_C}{2}$ if $x_{\mathsf{L}} = q$, or 0 if

[38] As already pointed, the assumption TM applies when the media outlet does not investigate in equilibrium, yet, it deviates and sends new information. Here also, we assume that voters trust the media.

[39] We apply the assumption LP when the candidate L is recognized as a liar.

$x_{\mathsf{L}} > q$. Thus, for candidate L type L being in equilibrium we need $q < x_{\mathsf{L}}$. We also observe that candidate L type M has not a profitable deviation. Finally, both types of candidate R gain $qn_{\mathcal{C}}$, whereas if they deviate they gain either $(1-q)\frac{n_{\mathcal{C}}}{2} + qn_{\mathcal{C}}$ if $\overline{p} = m$, $x_{\mathsf{R}} = 0$; $qn_{\mathcal{C}}$ if $\overline{p} = m$, $x_{\mathsf{R}} \in (0,1)$; $q\frac{n_{\mathcal{C}}}{2}$ if $\overline{p} = m$, $x_{\mathsf{R}} = 1$; or $qn_{\mathcal{C}}$ if $\overline{p} = r$, $x_{\mathsf{R}} \in [0,1]$. Thus, for the candidate R being in equilibrium we need either $\overline{p} = r$ or $\overline{p} = m$, $x_{\mathsf{R}} > 0$. This strategy profile conforms therefore an equilibrium when parameters and beliefs satisfy $q < x_{\mathsf{L}}$ and either $K \leq q\frac{\Lambda}{2}$, $\overline{p} = m$, $x_{\mathsf{R}} = 1$; $K \leq q\Lambda$, $\overline{p} = m$, $x_{\mathsf{R}} \in (0,1)$; or $K \leq q\Lambda$, $\overline{p} = r$, $x_{\mathsf{R}} \in [0,1]$.

$(ii.2)$ Let us now consider a hypothetical equilibrium strategy profile (mm,pp), $\Psi_{\mathrm{R}}(m,p) = I$, $\Psi_{\mathrm{R}}(m,\overline{p}) = NI$, $\Psi_{\mathrm{R}}(l,p) = NI$, $\Psi_{\mathrm{R}}(l,\overline{p}) = NI$, where conditions in (1) and (4) must be satisfied. Candidate L does not deviate if $q < x_{\mathsf{L}}$, whereas candidate R neither deviates if either $q < x_{\mathsf{R}}$ or $x_{\mathsf{R}} = q \geq \frac{1}{2}$. Then, this strategy profile conforms an equilibrium when parameters and beliefs satisfy $q < x_{\mathsf{L}}$ and either $K = q\Lambda$, $q < x_{\mathsf{R}} < 1$, $\overline{p} = m$; $K = q\Lambda$, $q < x_{\mathsf{R}} \leq 1$, $\overline{p} = r$; $q\frac{\Lambda}{2} \leq K \leq q\Lambda$, $q < x_{\mathsf{R}} = 1$, $\overline{p} = m$; or $q\frac{\Lambda}{2} \leq K \leq q\Lambda$, $q = x_{\mathsf{R}} \geq \frac{1}{2}$.

$(ii.3)$ We now consider the hypothetical equilibrium strategy profile (mm,pp), $\Psi_{\mathrm{R}}(m,p) = NI$, $\Psi_{\mathrm{R}}(m,\overline{p}) = I$, $\Psi_{\mathrm{R}}(l,p) = NI$, $\Psi_{\mathrm{R}}(l,\overline{p}) = NI$, where conditions in (2) and (3) must be satisfied. Here, either type of candidate L gains $\frac{n_{\mathcal{C}}}{2}$ in equilibrium, whereas one of them deviates, he gains either $n_{\mathcal{C}}$ if $x_{\mathsf{L}} < q$, $\frac{n_{\mathcal{C}}}{2}$ if $x_{\mathsf{L}} = q$, or 0 if $x_{\mathsf{L}} > q$. Thus, for L being in equilibrium we need $q \leq x_{\mathsf{L}}$. Additionally, either type of candidate R gains $\frac{n_{\mathcal{C}}}{2}$, whereas if one of them deviates, he gains either $(1+q)\frac{n_{\mathcal{C}}}{2}$ if $x_{\mathsf{R}} = 0$, $\overline{p} = m$; $qn_{\mathcal{C}}$ if $x_{\mathsf{R}} \in (0,1)$, $\overline{p} = m$; $q\frac{n_{\mathcal{C}}}{2}$ if $x_{\mathsf{R}} = 1$, $\overline{p} = m$; or $qn_{\mathcal{C}}$ if $x_{\mathsf{R}} \in [0,1]$, $\overline{p} = r$. Thus, candidate R does not deviate if either $q \leq \frac{1}{2}$, $x_{\mathsf{R}} \in (0,1)$, $\overline{p} = m$; $x_{\mathsf{R}} = 1$, $\overline{p} = m$; or $q \leq \frac{1}{2}$, $x_{\mathsf{R}} \in [0,1]$, $\overline{p} = r$. Then, this strategy profile conforms an equilibrium when parameters and beliefs satisfy $q \leq x_{\mathsf{L}}$ and either $K = q\frac{\Lambda}{2}$, $x_{\mathsf{R}} = 1$, $\overline{p} = m$; $q\frac{\Lambda}{2} \leq K \leq q\Lambda$, $q \leq \frac{1}{2}$, $x_{\mathsf{R}} \in (0,1)$, $\overline{p} = m$; or $q\frac{\Lambda}{2} \leq K \leq q\Lambda$, $q \leq \frac{1}{2}$, $x_{\mathsf{R}} \in [0,1]$, $\overline{p} = r$.

$(ii.4)$ Last, let us consider a hypothetical equilibrium strategy profile (mm,pp), $\Psi_{\mathrm{R}}(m,p) = NI$, $\Psi_{\mathrm{R}}(m,\overline{p}) = NI$, $\Psi_{\mathrm{R}}(l,p) = NI$, $\Psi_{\mathrm{R}}(l,\overline{p}) = NI$, where conditions in (2) and (4) must be satisfied. Candidate L does not deviate when $q \leq x_{\mathsf{L}}$, whereas candidate R neither does when $q \leq x_{\mathsf{R}}$. Then, this strategy profile conforms an equilibrium when parameters and beliefs satisfy $q \leq x_{\mathsf{L}}$ and either $K \geq q\frac{\Lambda}{2}$, $q = x_{\mathsf{R}}$; $K \geq q\frac{\Lambda}{2}$, $q \leq x_{\mathsf{R}} = 1$, $\overline{p} = m$; $K \geq q\Lambda$, $q < x_{\mathsf{R}} < 1$, $\overline{p} = m$; or $K \geq q\Lambda$, $q < x_{\mathsf{R}} \leq 1$, $\overline{p} = r$.

(iii) Finally, let us consider a hypothetical equilibrium in which $\Upsilon^*_{\mathsf{L}}(L) = \Upsilon^*_{\mathsf{L}}(M) = l$, $\Upsilon^*_{\mathsf{R}}(R) = \Upsilon^*_{\mathsf{R}}(M) = p$, with $p,\overline{p} \in \{m,r\}$, $p \neq \overline{p}$. We start analyzing the media's behavior.

Proceeding as in (ii), we obtain that only $\Psi_{\mathrm{R}}(l,p) = NI$, $\Psi_{\mathrm{R}}(l,\overline{p}) = NI$, with $p \in \{m,r\}$, are possible in equilibrium. Next, we analyze the other four possible cases: (1) $\Psi_{\mathrm{R}}(m,p) = I$; (2) $\Psi_{\mathrm{R}}(m,p) = NI$; (3) $\Psi_{\mathrm{R}}(m,\overline{p}) = I$; (4) $\Psi_{\mathrm{R}}(m,\overline{p}) = NI$.

Case (1) $\Psi_{\mathrm{R}}(m,p) = I$. Here, voters' beliefs are $\gamma^{mm}_{pp} = (0^{(TM)}, q)$ and $\gamma^{ml}_{pp} = (1^{(TM)}, q)$. The payoff of the outlet is $x_{\mathsf{L}}\Lambda - K$, whereas if it deviates its payoff is 0. Thus, $\Psi_{\mathrm{R}}(m,p) = I$ implies $x_{\mathsf{L}}\Lambda \geq K$.

Case (2) $\Psi_R(m,p) = NI$. Voters' beliefs are $\gamma_{pp}^{mm} = (x_L, q)$ and $\gamma_{pp}^{ml} = (1^{(TM)}, q)$. The payoff of the outlet is either Λ if $q < x_L$, $\frac{\Lambda}{2}$ if $q = x_L$, or 0 if $q > x_L$; whereas if it deviates its payoff is either $\Lambda - K$ if $q < x_L$, $(1-x_L)\frac{\Lambda}{2} + \Lambda x_L - K$ if $q = x_L$, or $\Lambda x_L - K$ if $q > x_L$. Thus $\Psi_R(m,p) = NI$ implies either $q < x_L$; $K \geq x_L\frac{\Lambda}{2}$, $q = x_L$; or $K \geq x_L\Lambda$, $q > x_L$.

Case (3) $\Psi_R(m,\overline{p}) = I$. Voters' beliefs are $\gamma_{\overline{pp}}^{mm} = (0^{(TM)}, x_R)$ and $\gamma_{\overline{pp}}^{ml} = (1^{(TM)}, x_R)$. Hence, $\Psi_R(m,\overline{p}) = I$ implies either $x_L\Lambda \geq K$, $x_R \in (0,1)$, $\overline{p} = m$; $x_L\Lambda \geq K$, $x_R \in [0,1]$, $\overline{p} = r$; or $x_L\frac{\Lambda}{2} \geq K$, $x_R \in \{0,1\}$, $\overline{p} = m$.

Case (4) $\Psi_R(m,\overline{p}) = NI$. Voters' beliefs are $\gamma_{\overline{pp}}^{mm} = (x_L, x_R)$ and $\gamma_{\overline{pp}}^{ml} = (1^{(TM)}, x_R)$. Then, $\Psi_R(m,\overline{p}) = NI$ implies either $x_L > x_R$; $x_L = x_R = 1$; $K \geq x_L\frac{\Lambda}{2}$, $0 < x_R = x_L < 1$; $K \geq x_L\frac{\Lambda}{2}$, $x_L = x_R = 0$, $\overline{p} = m$; $K \geq x_L\frac{\Lambda}{2}$, $x_L < x_R = 1$, $\overline{p} = m$; $K \geq x_L\Lambda$, $x_L < x_R < 1$; $K \geq x_L\Lambda$, $x_L < x_R = 1$, $\overline{p} = r$; or $K \geq x_L\Lambda$, $x_L = x_R = 0$, $\overline{p} = r$.

We now analyze the candidates' behavior.

(*iii*.1) Let us consider a hypothetical equilibrium strategy profile (ll, pp), $\Psi_R(l,p) = NI$, $\Psi_R(l,\overline{p}) = NI$, $\Psi_R(m,p) = I$, $\Psi_R(m,\overline{p}) = I$, where conditions in (1) and (3) must be satisfied. Candidate L type M gains $\frac{n_C}{2}$ in equilibrium, whereas if he deviates and sends the message m he gains n_C. Therefore, this strategy profile cannot constitute an equilibrium.

(*iii*.2) The same argument proves that the strategy profile (ll, pp), $\Psi_R(l,p) = NI$, $\Psi_R(l,\overline{p}) = NI$, $\Psi_R(m,p) = I$, $\Psi_R(m,\overline{p}) = NI$ neither constitutes an equilibrium.

(*iii*.3) We now consider the strategy profile (ll, pp), $\Psi_R(l,p) = NI$, $\Psi_R(l,\overline{p}) = NI$, $\Psi_R(m,p) = NI$, $\Psi_R(m,\overline{p}) = I$, where conditions in (2) and (3) must hold. Candidate L gains $\frac{n_C}{2}$ in equilibrium, whereas if he deviates he gains either n_C if $x_L < q$, $\frac{n_C}{2}$ if $x_L = q$, or 0 if $x_L > q$. Thus, for L being in equilibrium we need $q \leq x_L$. Analogously, for R being in equilibrium we need $q \leq x_R$. Then, this strategy profile conforms an equilibrium when parameters and beliefs satisfy either $K \leq x_L\Lambda$, $q < x_L$, $x_R = 1$, $\overline{p} = r$; $K \leq x_L\Lambda$, $q < x_L$, $q \leq x_R < 1$; $K \leq x_L\frac{\Lambda}{2}$, $q < x_L$, $x_R = 1$, $\overline{p} = m$; $x_L\frac{\Lambda}{2} \leq K \leq x_L\Lambda$, $q = x_L$, $q \leq x_R < 1$; $x_L\frac{\Lambda}{2} \leq K \leq x_L\Lambda$, $q = x_L$, $x_R = 1$, $\overline{p} = r$; or $K = x_L\frac{\Lambda}{2}$, $q = x_L$, $x_R = 1$, $\overline{p} = m$.

(*iii*.4) Finally, let us consider a hypothetical equilibrium strategy profile (ll, pp), $\Psi_R(l,p) = NI$, $\Psi_R(l,\overline{p}) = NI$, $\Psi_R(m,p) = NI$, $\Psi_R(m,\overline{p}) = NI$, where conditions in (2) and (4) must be satisfied. Both candidates do not want to deviate if $q \leq \min\{x_L, x_R\}$. Thus, this strategy profile conforms an equilibrium when parameters and beliefs satisfy either $q \leq x_R < x_L$; $q < x_L = x_R = 1$; $K \geq x_L\Lambda$, $q \leq x_L < x_R < 1$; $K \geq x_L\frac{\Lambda}{2}$, $q \leq x_L = x_R < 1$; $K \geq x_L\frac{\Lambda}{2}$, $q \leq x_L < x_R = 1$, $\overline{p} = m$; or $K \geq x_L\Lambda$, $q \leq x_L < x_R = 1$, $\overline{p} = r$. ■

Proposition 2.7

Proof. Here, we use the same schedule for the proof as previously. Firstly, we prove that there is no equilibrium in which at least one candidate separates, either truthfully or untruthfully. Second, we consider pooling equilibria of the form (mm, mm), and show when this type of equilibria exist. Third, we analyze pooling equilibria such as (ll, rr). Finally, we study equilibria of the form (ll, mm) or (mm, rr).

(*i*) Let us start considering a hypothetical equilibrium in which at least one candidate separates, either truthfully or untruthfully. Arguing as in the proof of Proposition 2.6, we observe that voters' belief on the candidate that separates are such that they assign a probability of the candidate being moderate equal to one, when the message he sends is the one that the true moderate sends in equilibrium. Thus, the extreme type that separates has an incentive to deviate and mimic the platforms sent by the moderate, as in this case voters will recognize him as a truthful moderate and will vote for him.[40].

(*ii*) Second, let us consider a hypothetical equilibrium in which $\Upsilon^*_{\mathsf{L}}(L) = \Upsilon^*_{\mathsf{L}}(M) = m$, $\Upsilon^*_{\mathsf{R}}(R) = \Upsilon^*_{\mathsf{R}}(m) = m$. Here, the messages the media can observe are four: the equilibrium messages (m, m), and the off the equilibrium messages (l, m), (m, r) and (l, r). We denote by $\gamma^{p_{\mathsf{L}} m^{\mathsf{L}}_{\mathrm{R}}}_{p_{\mathsf{R}} m^{\mathsf{R}}_{\mathrm{L}}} = (\gamma_{\mathsf{L}}(L \mid p_{\mathsf{L}}, m^{\mathsf{L}}_{\mathrm{R}}), \gamma_{\mathsf{R}}(R \mid p_{\mathsf{R}}, m^{\mathsf{R}}_{\mathrm{L}}))$, the belief that voters have on candidate L being L, given his platform p_{L}, and the R media's message on him, $m^{\mathsf{L}}_{\mathrm{R}}$; and the voters' belief on candidate R being R, given his platform p_{R}, and the L media's message on him $m^{\mathsf{R}}_{\mathrm{L}}$. We now analyze the media's behavior, and then the candidates' behavior. Let us start with the media's behavior.

Case (1). Let us consider the subgame that follows the equilibrium platform profile (m, m). Let us suppose $\Psi_{\mathrm{L}}(m, m) = I$, $\Psi_{\mathrm{R}}(m, m) = I$. Here, voters' beliefs are $\gamma^{mm}_{mm} = (0, 0)$ and $\gamma^{ml}_{mr} = (1, 1)$. The payoff of either outlet is $(1-q)^2\frac{\Lambda}{2} + q(1-q)\Lambda + q^2\frac{\Lambda}{2} - K$, whereas by deviating the outlets gets $(1-q)\frac{\Lambda}{2}$. Thus $\Psi_{\mathrm{L}}(m, m) = I$, $\Psi_{\mathrm{R}}(m, m) = I$ implies $q\frac{\Lambda}{2} \geq K$. Let us now suppose $\Psi_{\mathrm{L}}(m, m) = I$, $\Psi_{\mathrm{R}}(m, m) = NI$. Here, voters' beliefs are $\gamma^{mm}_{mm} = (q, 0)$ and $\gamma^{ml}_{mr} = (1^{(TM)}, 1)$. Thus, the payoff of L is $q\Lambda - K$, whereas if it deviates it gets 0. In contrast, the payoff of R is $(1-q)\Lambda$, whereas if it deviates it gains $(1-q)\Lambda + q^2\frac{\Lambda}{2} - K$. Thus, $\Psi_{\mathrm{L}}(m, m) = I$, $\Psi_{\mathrm{R}}(m, m) = NI$ implies $q^2\frac{\Lambda}{2} \leq K \leq q\Lambda$. Analogously, we obtain that $\Psi_{\mathrm{L}}(m, m) = NI$, $\Psi_{\mathrm{R}}(m, m) = I$ implies $q^2\frac{\Lambda}{2} \leq K \leq q\Lambda$. Finally, let us suppose $\Psi_{\mathrm{L}}(m, m) = NI$, $\Psi_{\mathrm{R}}(m, m) = NI$. In this case, voters' beliefs are $\gamma^{mm}_{mm} = (q, q)$ and $\gamma^{ml}_{mr} = (1^{(TM)}, 1^{(TM)})$. The payoff of either outlet is $\frac{\Lambda}{2}$, whereas if it deviates it gains $(1-q)\frac{\Lambda}{2} + q\Lambda - K$. Thus, $\Psi_{\mathrm{L}}(m, m) = NI$, $\Psi_{\mathrm{R}}(m, m) = NI$ implies $K \geq q\frac{\Lambda}{2}$.

Case (2). Let us suppose that candidate L deviates. The platform profile the media observe is therefore (l, m). Suppose additionally $\Psi_{\mathrm{L}}(l, m) = NI$, $\Psi_{\mathrm{R}}(l, m) = NI$. In such a case, voters' beliefs are $\gamma^{ll}_{mm} = (x_{\mathsf{L}}, q)$ and $\gamma^{lm}_{mr} = (0^{(TM)}, 1^{(TM)})$. The payoff of the right-wing outlet is either Λ if $x_{\mathsf{L}} > q$, $\frac{\Lambda}{2}$ if $x_{\mathsf{L}} = q$, or 0 if $x_{\mathsf{L}} < q$, whereas if it deviates and investigates is either $x_{\mathsf{L}}\Lambda - K$ if $x_{\mathsf{L}} > q$, $x_{\mathsf{L}}\frac{\Lambda}{2} - K$ if $x_{\mathsf{L}} = q$, or $-K$ if $x_{\mathsf{L}} < q$. Additionally, the payoff of outlet L is either 0 if $x_{\mathsf{L}} > q$, $\frac{\Lambda}{2}$ if $x_{\mathsf{L}} = q$, or Λ if $x_{\mathsf{L}} < q$, whereas if it deviates its payoff is either $q\Lambda - K$ if $q < x_{\mathsf{L}}$, $(1-q)\frac{\Lambda}{2} + q\Lambda - K$ if $x_{\mathsf{L}} = q$, or $\Lambda - K$ if $x_{\mathsf{L}} < q$.[41] Hence, $\Psi_{\mathrm{L}}(l, m) = NI$, $\Psi_{\mathrm{R}}(l, m) = NI$ implies either $K \geq q\Lambda$ if $q < x_{\mathsf{L}}$, $K \geq q\frac{\Lambda}{2}$ if $q = x_{\mathsf{L}}$, or $x_{\mathsf{L}} < q$. Suppose now $\Psi_{\mathrm{L}}(l, m) = I$, $\Psi_{\mathrm{R}}(l, m) = NI$. In such a case, voters' beliefs are $\gamma^{ll}_{mm} = (x_{\mathsf{L}}, 0)$ and $\gamma^{lm}_{mr} = (0^{(TM)}, 1)$. Proceeding as previously, we obtain that

[40] The result is also robust to changes in the way voters cast their votes in the case of them being indifferent.

[41] We use the assumption *LP*.

$\Psi_{\rm L}(l,m)=I$, $\Psi_{\rm R}(l,m)=NI$ implies $q\Lambda\geq K$. Finally, one can prove that neither $\Psi_{\rm L}(l,m)=NI$, $\Psi_{\rm R}(l,m)=I$, nor $\Psi_{\rm L}(l,m)=I$, $\Psi_{\rm R}(l,m)=I$ holds in equilibrium.

Case (3). Using analogous arguments we obtain that either $\Psi_{\rm L}(m,r)=NI$, $\Psi_{\rm R}(m,r)=NI$, $K\geq q\Lambda$, $x_{\sf R}>q$; $\Psi_{\rm L}(m,r)=NI$, $\Psi_{\rm R}(m,r)=NI$, $K\geq q\frac{\Lambda}{2}$, $x_{\sf R}=q$; $\Psi_{\rm L}(m,r)=NI$, $\Psi_{\rm R}(m,r)=NI$, $x_{\sf R}<q$; or $\Psi_{\rm L}(m,r)=NI$, $\Psi_{\rm R}(m,r)=I$, $q\Lambda\geq K$ holds in equilibrium.

Case (4). Let us now suppose that both candidates deviate and the platform profile the media observe is (l,r). Suppose also $\Psi_{\rm L}(l,r)=NI$, $\Psi_{\rm R}(l,r)=NI$. In such a case, voters' beliefs are $\gamma_{rr}^{ll}=(x_{\sf L},x_{\sf R})$ and $\gamma_{rm}^{lm}=(0^{(TM)},0^{(TM)})$. The payoff of outlet L is either 0 if $x_{\sf L}>x_{\sf R}$, $\frac{\Lambda}{2}$ if $x_{\sf L}=x_{\sf R}$, or Λ if $x_{\sf L}<x_{\sf R}$, whereas if it deviates its payoff is always smaller. The same occurs to R. Thus $\Psi_{\rm L}(l,r)=NI$, $\Psi_{\rm R}(l,r)=NI$ is possible in equilibrium. Let us now consider $\Psi_{\rm L}(l,r)=I$, $\Psi_{\rm R}(l,r)=I$. In this case, voters' beliefs are $\gamma_{rr}^{ll}=(1^{(TM)},1^{(TM)})$ and $\gamma_{rm}^{lm}=(0^{(TM)},0^{(TM)})$. The payoff of L is $x_{\sf R}x_{\sf L}\frac{\Lambda}{2}+x_{\sf R}(1-x_{\sf L})\Lambda+(1-x_{\sf R})(1-x_{\sf L})\frac{\Lambda}{2}-K$, whereas if it deviates its payoff is $x_{\sf L}\frac{\Lambda}{2}+(1-x_{\sf L})\Lambda$. The analysis for media R gives similar results. Thus, $\Psi_{\rm L}(l,r)=I$, $\Psi_{\rm R}(l,r)=I$ cannot hold in equilibrium. Analogously, neither $\Psi_{\rm L}(l,r)=I$, $\Psi_{\rm R}(l,r)=NI$, nor $\Psi_{\rm L}(l,r)=NI$, $\Psi_{\rm R}(l,r)=I$ hold in equilibrium.

The next step is to analyze the candidates' behavior.

$(ii.1)$ Let us consider the hypothetical equilibrium strategy profile (mm,mm), $\Psi_j(m,m)=NI$, $\Psi_{\rm L}(l,m)=I$, $\Psi_{\rm R}(l,m)=NI$, $\Psi_{\rm L}(m,r)=NI$, $\Psi_{\rm R}(m,r)=I$, $\Psi_j(l,r)=NI$, for $j\in\{\rm L,R\}$. For an equilibrium of this sort to exists, we need $q\frac{\Lambda}{2}\leq K\leq q\Lambda$. We observe that the candidates gain $\frac{n_{\mathcal{C}}}{2}$ in equilibrium, whereas by deviating they gain $qn_{\mathcal{C}}$. Hence, this strategy profile conforms an equilibrium when $q\frac{\Lambda}{2}\leq K\leq q\Lambda$ and $q\leq\frac{1}{2}$.

$(ii.2)$ Let us consider the hypothetical equilibrium strategy profile (mm,mm), $\Psi_j(m,m)=NI$, $\Psi_{\rm L}(l,m)=I$, $\Psi_{\rm R}(l,m)=NI$, $\Psi_j(m,r)=NI$, $\Psi_j(l,r)=NI$, for $j\in\{\rm L,R\}$. The candidate L is in equilibrium if $q\leq\frac{1}{2}$, whereas the candidate R is so if $x_{\sf R}\geq q$. Hence, this strategy profile conforms an equilibrium when $q\leq\frac{1}{2}$ and either $q\frac{\Lambda}{2}\leq K\leq q\Lambda$, $x_{\sf R}=q$ or $K=q\Lambda$, $x_{\sf R}>q$.

$(ii.3)$ Proceeding as above we obtain that there is an equilibrium (mm,mm), $\Psi_j(m,m)=NI$, $\Psi_j(l,m)=NI$, $\Psi_{\rm L}(m,r)=NI$, $\Psi_{\rm R}(m,r)=I$, $\Psi_j(l,r)=NI$, for $j\in\{\rm L,R\}$, when $q\leq\frac{1}{2}$ and either $q\frac{\Lambda}{2}\leq K\leq q\Lambda$, $x_{\sf L}=q$ or $K=q\Lambda$, $x_{\sf L}>q$.

$(ii.4)$ Let us now consider the hypothetical equilibrium strategy profile (mm,mm), $\Psi_j(m,m)=NI$, $\Psi_j(l,m)=NI$, $\Psi_j(m,r)=NI$, $\Psi_j(l,r)=NI$ for $j\in\{\rm L,R\}$. Either candidate gains $\frac{n_{\mathcal{C}}}{2}$ in equilibrium, whereas if one, let us say candidate $j\in\{{\sf L},{\sf R}\}$, deviates, he gains either $n_{\mathcal{C}}$ if $x_j<q$, $\frac{n_{\mathcal{C}}}{2}$ if $x_j=q$, or 0 if $x_j>q$. Thus, for the equilibrium to exists we need $q\leq\min\{x_{\sf L},x_{\sf R}\}$. Then, this strategy profile conforms an equilibrium when parameters and beliefs satisfy either $q\frac{\Lambda}{2}\leq K$, $q=x_{\sf L}=x_{\sf R}$; $q\Lambda\leq K$, $q<x_{\sf L}$, $q\leq x_{\sf R}$; or $q\Lambda\leq K$, $q=x_{\sf L}$, $q<x_{\sf R}$.

We still have to analyze those cases in which at least one candidate is investigated in equilibrium. Here, we distinguish two set-ups: the first one is when the two outlets investigate in equilibrium; the second set-up is when only one outlet does. With respect to the first case, we observe that either of the two extreme candidates gains $q\frac{n_{\mathcal{C}}}{2}$ in equilibrium, whereas if one deviates he gains either $qn_{\mathcal{C}}$ (if by so doing his opponent is investigated), or at least $\frac{n_C}{2}$ (if by so doing his opponent is not investigated). Therefore, there is no equilibrium in which both outlets investigate in equilibrium. Now, let us consider the cases in which only one politician is investigated in equilibrium. Here, we observe that there is no equilibrium in which the candidate who is investigated in equilibrium is not when he deviates. The reason is that the extreme type of this candidate gets zero in equilibrium, whereas he gets qn_C if he deviates and proposes an extreme platform. With respect to the remaining cases, we obtain the following results.

($ii.5$) There is an equilibrium (mm, mm), $\Psi_{\mathrm{L}}(m,m) = I$, $\Psi_{\mathrm{R}}(m,m) = NI$, $\Psi_{\mathrm{L}}(l,m) = I$, $\Psi_{\mathrm{R}}(l,m) = NI$, $\Psi_j(m,r) = NI$, $\Psi_j(l,r) = NI$, $q < x_{\mathsf{R}}$, for $j \in \{\mathrm{L},\mathrm{R}\}$, when $q\Lambda = K$.

($ii.6$) There is an equilibrium (mm, mm), $\Psi_{\mathrm{L}}(m,m) = NI$, $\Psi_{\mathrm{R}}(m,m) = I$, $\Psi_j(l,m) = NI$, $\Psi_{\mathrm{L}}(m,r) = NI$, $\Psi_{\mathrm{R}}(m,r) = I$, $\Psi_j(l,r) = NI$, $q < x_{\mathsf{L}}$, for $j \in \{\mathrm{L},\mathrm{R}\}$, when $q\Lambda = K$.

($ii.7$) There is an equilibrium (mm, mm), $\Psi_{\mathrm{L}}(m,m) = I$, $\Psi_{\mathrm{R}}(m,m) = NI$, $\Psi_j(l,m) = NI$, $\Psi_j(m,r) = NI$, $\Psi_j(l,r) = NI$, for $j \in \{\mathrm{L},\mathrm{R}\}$, when $q < x_{\mathsf{R}}$, $q\Lambda = K$ and either $q < x_{\mathsf{L}}$ or $q = x_{\mathsf{L}} \geq \frac{1}{2}$.

($ii.8$) There is an equilibrium (mm, mm), $\Psi_{\mathrm{L}}(m,m) = NI$, $\Psi_{\mathrm{R}}(m,m) = I$, $\Psi_j(l,m) = NI$, $\Psi_j(m,r) = NI$, $\Psi_j(l,r) = NI$, for $j \in \{\mathrm{L},\mathrm{R}\}$, when $q < x_{\mathsf{L}}$, $q\Lambda = K$ and either $q < x_{\mathsf{R}}$ or $q = x_{\mathsf{R}} \geq \frac{1}{2}$.

(iii) Third, let us consider a hypothetical equilibrium in which $\Upsilon^*_{\mathsf{L}}(L) = \Upsilon^*_{\mathsf{L}}(M) = l$, $\Upsilon^*_{\mathsf{R}}(R) = \Upsilon^*_{\mathsf{R}}(M) = r$. The messages the media can observe are four: the equilibrium messages (l, r), and the off the equilibrium messages (l, m), (m, r) and (m, m). As previously, we start analyzing the media's behavior.

Case (1). Let us consider the equilibrium platform profile (l, r). Let us suppose $\Psi_{\mathrm{L}}(l,r) = I$, $\Psi_{\mathrm{R}}(l,r) = I$. Voters' beliefs are $\gamma^{ll}_{rr} = (1,1)$ and $\gamma^{lm}_{rm} = (0,0)$. Then, the payoff of either outlet is $q^2\frac{\Lambda}{2} + q(1-q)\Lambda + (1-q)^2\frac{\Lambda}{2} - K$, whereas if it deviates its payoff is $q\frac{\Lambda}{2} + (1-q)\Lambda$. Thus, the outlet finds it profitable to deviate. Analogously, we obtain that neither $\Psi_{\mathrm{L}}(l,r) = I$, $\Psi_{\mathrm{R}}(l,r) = NI$, nor $\Psi_{\mathrm{L}}(l,r) = NI$, $\Psi_{\mathrm{R}}(l,r) = I$ holds in equilibrium. Then, let us consider $\Psi_{\mathrm{L}}(l,r) = NI$, $\Psi_{\mathrm{R}}(l,r) = NI$. Here, voters' beliefs are $\gamma^{ll}_{rr} = (q,q)$ and $\gamma^{lm}_{rm} = (0^{(TM)}, 0^{(TM)})$. The payoff of either outlet is $\frac{\Lambda}{2}$, whereas if it deviates its payoff is $q\frac{\Lambda}{2} - K$. Thus $\Psi_{\mathrm{L}}(l,r) = NI$, $\Psi_{\mathrm{R}}(l,r) = NI$ can hold in equilibrium.

Case (2). Let us suppose that candidate R deviates. Then, the platform profile the media observe is (l, m). Let us suppose $\Psi_{\mathrm{L}}(l,m) = NI$, $\Psi_{\mathrm{R}}(l,m) = NI$. Voters' beliefs are $\gamma^{ll}_{mm} = (q, x_{\mathsf{R}})$ and $\gamma^{lm}_{mr} = (0^{(TM)}, 1^{(TM)})$. The payoff of the left-wing outlet is either Λ if $x_{\mathsf{R}} > q$, $\frac{\Lambda}{2}$ if $x_{\mathsf{R}} = q$, or 0 if $x_{\mathsf{R}} < q$, whereas if it deviates and chooses to investigate its payoff is either $\Lambda - K$ if $x_{\mathsf{R}} > q$, $x_{\mathsf{R}}\Lambda + (1 - x_{\mathsf{R}})\frac{\Lambda}{2} - K$ if $x_{\mathsf{R}} = q$, or $x_{\mathsf{R}}\Lambda - K$ if $x_{\mathsf{R}} < q$. On the other hand, the payoff of media R is either 0 if $x_{\mathsf{R}} > q$, $\frac{\Lambda}{2}$ if $x_{\mathsf{R}} = q$, or Λ if $x_{\mathsf{R}} < q$, whereas if it deviates its payoff is either $-K$ if $x_{\mathsf{R}} > q$, $q\frac{\Lambda}{2} - K$ if $x_{\mathsf{R}} = q$, $q\Lambda - K$ if $0 < x_{\mathsf{R}} < q$, or $q\Lambda + (1-q)\Lambda - K$ if $x_{\mathsf{R}} = 0$. Hence, $\Psi_{\mathrm{L}}(l,m) = NI$, $\Psi_{\mathrm{R}}(l,m) = NI$ implies either $x_{\mathsf{R}} > q$; $K \geq x_{\mathsf{R}}\Lambda$ if $x_{\mathsf{R}} < q$; or $K \geq x_{\mathsf{R}}\frac{\Lambda}{2}$ if $x_{\mathsf{R}} = q$. Let us now suppose $\Psi_{\mathrm{L}}(l,m) = NI$, $\Psi_{\mathrm{R}}(l,m) = I$.

Voters' beliefs are $\gamma^{ll}_{mm} = (1, x_{\mathsf{R}})$ and $\gamma^{lm}_{mr} = (0, 1^{(TM)})$. The payoff of the right-wing media is either $\Lambda - K$ if $x_{\mathsf{R}} = 0$, $q\Lambda - K$ if $x_{\mathsf{R}} \in (0,1)$, or $-K$ if $x_{\mathsf{R}} = 1$, whereas if it deviates its payoff is either Λ if $x_{\mathsf{R}} < 1$ or 0 if $x_{\mathsf{R}} = 1$. Thus, $\Psi_{\mathrm{L}}(l,m) = NI$, $\Psi_{\mathrm{R}}(l,m) = I$ cannot be in equilibrium. Finally, note that we do not analyze the cases $\Psi_{\mathrm{L}}(l,m) = I$, $\Psi_{\mathrm{R}}(l,m) = NI$, and $\Psi_{\mathrm{L}}(l,m) = I$, $\Psi_{\mathrm{R}}(l,m) = I$. The reason is that, as we will show later on, the candidates have a profitable deviation when they are not investigated in equilibrium, but it is the candidate who deviates. Therefore, neither $\Psi_{\mathrm{L}}(l,m) = I$, $\Psi_{\mathrm{R}}(l,m) = NI$ nor $\Psi_{\mathrm{L}}(l,m) = I$, $\Psi_{\mathrm{R}}(l,m) = I$ can hold in equilibrium.

Case (3). Analogous arguments show that $\Psi_j(m,r) = NI$, for $j \in \{\mathsf{L}, \mathsf{R}\}$, implies either $K \geq x_{\mathsf{L}}\Lambda$, $x_{\mathsf{L}} < q$; $K \geq x_{\mathsf{L}}\frac{\Lambda}{2}$, $x_{\mathsf{L}} = q$; or $x_{\mathsf{L}} > q$.

Case (4). Finally, let us consider that both candidates deviate, and the platform profile the media observe is (m,m). Let us suppose $\Psi_{\mathrm{L}}(m,m) = I$, $\Psi_{\mathrm{R}}(m,m) = I$. Voters' beliefs are $\gamma^{mm}_{mm} = (0^{(TM)}, 0^{(TM)})$ and $\gamma^{ml}_{mr} = (1^{(TM)}, 1^{(TM)})$. The payoff of outlet L is $(1 - x_{\mathsf{L}})(1 - x_{\mathsf{R}})\frac{\Lambda}{2} + x_{\mathsf{R}}(1 - x_{\mathsf{L}})\Lambda + x_{\mathsf{L}}x_{\mathsf{R}}\frac{\Lambda}{2} - K$, whereas if it deviates its payoff is $(1 - x_{\mathsf{L}})\frac{\Lambda}{2}$. The analysis is analogous for media R. Thus, $\Psi_{\mathrm{L}}(m,m) = I$, $\Psi_{\mathrm{R}}(m,m) = I$ implies $K \leq \frac{\Lambda}{2}\min\{x_{\mathsf{L}}, x_{\mathsf{R}}\}$. Let us now suppose $\Psi_{\mathrm{L}}(m,m) = I$, $\Psi_{\mathrm{R}}(m,m) = NI$. Here, voters' beliefs are $\gamma^{mm}_{mm} = (x_{\mathsf{L}}, 0^{(TM)})$ and $\gamma^{ml}_{mr} = (1^{(TM)}, 1^{(TM)})$. The payoff of L is either $(1 - x_{\mathsf{R}})\frac{\Lambda}{2} + x_{\mathsf{R}}\Lambda - K$ if $x_{\mathsf{L}} = 0$, $x_{\mathsf{R}}\Lambda - K$ if $x_{\mathsf{L}} \in (0,1)$, or $x_{\mathsf{R}}\frac{\Lambda}{2} - K$ if $x_{\mathsf{L}} = 1$, whereas if it deviates it gets either 0 if $x_{\mathsf{L}} > 0$, or $\frac{\Lambda}{2}$ if $x_{\mathsf{L}} = 0$. On the other hand, the payoff of R is either $(1 - x_{\mathsf{R}})\frac{\Lambda}{2}$ if $x_{\mathsf{L}} = 0$, $(1 - x_{\mathsf{R}})\Lambda$ if $x_{\mathsf{L}} \in (0,1)$, or $(1 - x_{\mathsf{R}})\Lambda + x_{\mathsf{R}}\frac{\Lambda}{2}$ if $x_{\mathsf{L}} = 1$, whereas if it deviates it gains either $(1 - x_{\mathsf{R}})\frac{\Lambda}{2} + x_{\mathsf{R}}x_{\mathsf{L}}\frac{\Lambda}{2} - K$ if $x_{\mathsf{L}} = 0$, $(1 - x_{\mathsf{R}})\Lambda + x_{\mathsf{R}}x_{\mathsf{L}}\frac{\Lambda}{2} - K$ if $x_{\mathsf{L}} \in (0,1)$, or $(1 - x_{\mathsf{R}})\Lambda + x_{\mathsf{R}}\frac{\Lambda}{2} - K$ if $x_{\mathsf{L}} = 1$. Thus, $\Psi_{\mathrm{L}}(m,m) = I$, $\Psi_{\mathrm{R}}(m,m) = NI$ implies either $K \leq x_{\mathsf{R}}\frac{\Lambda}{2}$, $x_{\mathsf{L}} \in \{0,1\}$, or $x_{\mathsf{L}}x_{\mathsf{R}}\frac{\Lambda}{2} \leq K \leq x_{\mathsf{R}}\Lambda$, $x_{\mathsf{L}} \in (0,1)$. Analogously, we obtain that $\Psi_{\mathrm{L}}(m,m) = NI$, $\Psi_{\mathrm{R}}(m,m) = I$ implies either $K \leq x_{\mathsf{L}}\frac{\Lambda}{2}$, $x_{\mathsf{R}} \in \{0,1\}$, or $x_{\mathsf{L}}x_{\mathsf{R}}\frac{\Lambda}{2} \leq K \leq x_{\mathsf{L}}\Lambda$, $x_{\mathsf{R}} \in (0,1)$. Finally, let us consider $\Psi_{\mathrm{L}}(m,m) = NI$, $\Psi_{\mathrm{R}}(m,m) = NI$. Voters' beliefs are $\gamma^{mm}_{mm} = (x_{\mathsf{L}}, x_{\mathsf{R}})$ and $\gamma^{ml}_{mr} = (1^{(TM)}, 1^{(TM)})$. Here, $\Psi_{\mathrm{L}}(m,m) = NI$, $\Psi_{\mathrm{R}}(m,m) = NI$ implies either $x_{\mathsf{L}} = x_{\mathsf{R}} = 1$; $x_{\mathsf{L}} = x_{\mathsf{R}} < 1$, $K \geq x_{\mathsf{L}}\frac{\Lambda}{2}$; $x_{\mathsf{L}} < x_{\mathsf{R}} = 1$, $K \geq \frac{\Lambda}{2}x_{\mathsf{L}}$; $x_{\mathsf{R}} < x_{\mathsf{L}} = 1$, $K \geq \frac{\Lambda}{2}x_{\mathsf{R}}$; $x_{\mathsf{L}} < x_{\mathsf{R}} < 1$, $K \geq \Lambda x_{\mathsf{L}}$; or $x_{\mathsf{R}} < x_{\mathsf{L}} < 1$, $K \geq \Lambda x_{\mathsf{R}}$.

Now, we analyze the candidates' behavior.

(*iii*.1) Let us consider the hypothetical equilibrium strategy profile (ll, rr), $\Psi_j(l,r) = NI$, $\Psi_j(l,m) = NI$, $\Psi_j(m,r) = NI$, $\Psi_j(m,m) = I$, with $j \in \{\mathrm{L}, \mathrm{R}\}$. We observe that either politician gains $\frac{n_{\mathcal{C}}}{2}$ in equilibrium, whereas if one, let us say candidate j, with $j \in \{\mathsf{L}, \mathsf{R}\}$, deviates, he gains either $n_{\mathcal{C}}$ if $x_j < q$, $\frac{n_{\mathcal{C}}}{2}$ if $x_j = q$, or 0 if $x_j > q$. Hence, $q \leq \min\{x_{\mathsf{L}}, x_{\mathsf{R}}\}$. Thus, this strategy profile conforms an equilibrium when parameters and beliefs satisfy either $K = \frac{\Lambda}{2}q$, $q = \min\{x_{\mathsf{L}}, x_{\mathsf{R}}\}$; or $K \leq \frac{\Lambda}{2}\min\{x_{\mathsf{L}}, x_{\mathsf{R}}\}$, $q < \min\{x_{\mathsf{L}}, x_{\mathsf{R}}\}$.

(*iii*.2) Let us now consider the hypothetical equilibrium strategy profile (ll, rr), $\Psi_j(l,r) = NI$, $\Psi_j(l,m) = NI$, $\Psi_j(m,r) = NI$, $\Psi_j(m,m) = NI$, for $j \in \{\mathrm{L}, \mathrm{R}\}$. The payoffs are as in the previous case, therefore $q \leq \min\{x_{\mathsf{L}}, x_{\mathsf{R}}\}$. Then, this strategy profile conforms an equilibrium when parameters and beliefs satisfy either

$x_L = x_R = 1$; $q \leq x_L = x_R < 1$, $K \geq \frac{\Lambda}{2}x_L$; $q \leq x_L < x_R = 1$, $K \geq \frac{\Lambda}{2}x_L$; $q \leq x_R < x_L = 1$, $K \geq \frac{\Lambda}{2}x_R$; $q \leq x_L < x_R < 1$, $K \geq \Lambda x_L$; or $q \leq x_R < x_L < 1$, $K \geq \Lambda x_R$.

(*iii*.3) Let us now consider the hypothetical equilibrium strategy profile (ll, rr), $\Psi_j(l,r) = NI$, $\Psi_j(l,m) = NI$, $\Psi_j(m,r) = NI$, $\Psi_L(m,m) = I$, $\Psi_R(m,m) = NI$, for $j \in \{L, R\}$. Proceeding as previously, we obtain that this strategy profile conforms an equilibrium when either $q = x_R < x_L = 1$, $K = q\frac{\Lambda}{2}$; $q = x_R < x_L < 1$, $q\frac{\Lambda}{2} \leq K \leq q\Lambda$; $q = x_R = x_L$, $q\frac{\Lambda}{2} \leq K \leq q\Lambda$; $q = x_L < x_R$, $q\frac{\Lambda}{2} \leq K \leq x_R\Lambda$; $q < x_L < 1$, $q < x_R$, $x_L x_R\frac{\Lambda}{2} \leq K \leq x_R\Lambda$; or $q < x_R$, $x_L = 1$, $K \leq x_R\frac{\Lambda}{2}$.

(*iii*.4) In a similar way, we obtain that there is an equilibrium such as (ll, rr), $\Psi_j(l,r) = NI$, $\Psi_j(l,m) = NI$, $\Psi_j(m,r) = NI$, $\Psi_L(m,m) = NI$, $\Psi_R(m,m) = I$, for $j \in \{L, R\}$, when either $q = x_L < x_R = 1$, $K = q\frac{\Lambda}{2}$; $q = x_L < x_R < 1$, $q\frac{\Lambda}{2} \leq K \leq q\Lambda$; $q = x_R = x_L$, $q\frac{\Lambda}{2} \leq K \leq q\Lambda$; $q = x_R < x_L$, $q\frac{\Lambda}{2} \leq K \leq x_L\Lambda$; $q < x_R < 1$, $q < x_L$, $x_L x_R\frac{\Lambda}{2} \leq K \leq x_L\Lambda$; or $q < x_L$, $x_R = 1$, $K \leq x_L\frac{\Lambda}{2}$.

Finally, note that when the candidates are not investigated when they send the equilibrium messages (l,r), but it is the candidate who deviates, no equilibrium exists. The reason is that the moderate candidate who off the equilibrium path is investigated gains $\frac{n_C}{2}$ in equilibrium, whereas by deviating he gets n_C. Thus, no equilibrium of this type exists.

(*iv*) Last, let us consider a hypothetical equilibrium in which one candidate pools at the moderate policy, and the other does so at the extreme policy. Without loss of generality, we analyze the case $\Upsilon_L^*(L) = \Upsilon_L^*(M) = l$, $\Upsilon_R^*(R) = \Upsilon_R^*(M) = m$.[42] Here, the messages the media can observe are four: the equilibrium messages (l,m), and the off the equilibrium messages (l,r), (m,m) and (m,r). As previously, we start analyzing the media's behavior.

Case (1). Let us start with the equilibrium platform profile (l,m). Let us suppose $\Psi_L(l,m) = NI$, $\Psi_R(l,m) = NI$. Voters' beliefs are $\gamma_{mm}^{ll} = (q,q)$ and $\gamma_{mr}^{lm} = (0^{(TM)}, 1^{(TM)})$. The payoff of either outlet is $\frac{\Lambda}{2}$. Therefore, media R does not have an incentive to deviate, since it gains $q\frac{\Lambda}{2} - K$ by deviating. In contrast, the outlet L gains $(1-q)\frac{\Lambda}{2} + q\Lambda - K$ by deviating. Hence, $\Psi_L(l,m) = NI$, $\Psi_R(l,m) = NI$ implies $K \geq \frac{\Lambda}{2}q$. Now, let us consider $\Psi_L(l,m) = I$, $\Psi_R(l,m) = NI$. Voters' beliefs are $\gamma_{mm}^{ll} = (q,0)$ and $\gamma_{mr}^{lm} = (0^{(TM)}, 1)$. The payoff of the left-wing outlet is $q\Lambda - K$, whereas if it deviates it gains 0. On the other hand, the payoff of R is $(1-q)\Lambda$, whereas if it deviates it gains $(1-q)\Lambda - K$. Therefore, $\Psi_L(l,m) = I$, $\Psi_R(l,m) = NI$ implies $q\Lambda \geq K$. Finally, note that neither $\Psi_L(l,m) = NI$, $\Psi_R(l,m) = I$, nor $\Psi_L(l,m) = I$, $\Psi_R(l,m) = I$ holds in equilibrium. The reason is that media R always finds it profitable to deviate and choose not to investigate.

Case (2). The reader can easily check that only $\Psi_j(l,r) = NI$, for $j \in \{L, R\}$, can hold in equilibrium.

Case (3). Now, let us consider the platform profile (m,m), and let us suppose $\Psi_L(m,m) = I$, $\Psi_R(m,m) = I$. Voters' beliefs are $\gamma_{mm}^{mm} = (0^{(TM)}, 0)$ and $\gamma_{mr}^{ml} = (1^{(TM)}, 1)$. The payoff of media L is $(1-x_L)(1-q)\frac{\Lambda}{2} + q(1-x_L)\Lambda + x_L q\frac{\Lambda}{2} - K$,

[42] The analysis for the case $\Upsilon_L^*(L) = \Upsilon_L^*(M) = m$, $\Upsilon_R^*(R) = \Upsilon_R^*(M) = r$, is analogous to the one we present.

whereas if it deviates its payoff is $(1-x_{\mathsf{L}})\frac{\Lambda}{2}$. The analysis is analogous for media R. Thus $\Psi_{\mathrm{L}}(m,m)=I$, $\Psi_{\mathrm{R}}(m,m)=I$ implies $K\leq\frac{\Lambda}{2}\min\{q,x_{\mathsf{L}}\}$. Now, let us suppose $\Psi_{\mathrm{L}}(m,m)=I$, $\Psi_{\mathrm{R}}(m,m)=NI$. Voters' beliefs are $\gamma_{mm}^{mm}=(x_{\mathsf{L}},0)$ and $\gamma_{mr}^{ml}=(1^{(TM)},1)$. The payoff of L is either $(1-q)\frac{\Lambda}{2}+q\Lambda-K$ if $x_{\mathsf{L}}=0$, $q\Lambda-K$ if $x_{\mathsf{L}}\in(0,1)$, or $q\frac{\Lambda}{2}-K$ if $x_{\mathsf{L}}=1$, whereas if it deviates it gets either 0 if $x_{\mathsf{L}}>0$, or $\frac{\Lambda}{2}$ if $x_{\mathsf{L}}=0$. The payoff of R is either $(1-q)\frac{\Lambda}{2}$ if $x_{\mathsf{L}}=0$, $(1-q)\Lambda$ if $x_{\mathsf{L}}\in(0,1)$, or $(1-q)\Lambda+q\frac{\Lambda}{2}$ if $x_{\mathsf{L}}=1$, whereas if it deviates it gains either $(1-q)\frac{\Lambda}{2}-K$ if $x_{\mathsf{L}}=0$, $(1-q)\Lambda+x_{\mathsf{L}}q\frac{\Lambda}{2}-K$ if $x_{\mathsf{L}}\in(0,1)$, or $(1-q)\Lambda+q\frac{\Lambda}{2}-K$ if $x_{\mathsf{L}}=1$. Thus, $\Psi_{\mathrm{L}}(m,m)=I$, $\Psi_{\mathrm{R}}(m,m)=NI$ implies either $K\leq q\frac{\Lambda}{2}$ if $x_{\mathsf{L}}=0$, $x_{\mathsf{L}}q\frac{\Lambda}{2}\leq K\leq q\Lambda$ if $x_{\mathsf{L}}\in(0,1)$, or $K\leq q\frac{\Lambda}{2}$ if $x_{\mathsf{L}}=1$. In a similar way, we obtain that $\Psi_{\mathrm{L}}(m,m)=NI$, $\Psi_{\mathrm{R}}(m,m)=I$ implies $x_{\mathsf{L}}q\frac{\Lambda}{2}\leq K\leq x_{\mathsf{L}}\Lambda$. Finally, let us suppose $\Psi_{\mathrm{L}}(m,m)=NI$, $\Psi_{\mathrm{R}}(m,m)=NI$. In such a case, voters' beliefs are $\gamma_{mm}^{mm}=(x_{\mathsf{L}},q)$ and $\gamma_{mr}^{ml}=(1^{(TM)},1^{(TM)})$. The payoff of outlet L is either Λ if $x_{\mathsf{L}}<q$, $\frac{\Lambda}{2}$ if $x_{\mathsf{L}}=q$, or 0 if $x_{\mathsf{L}}>q$, whereas if it deviates its payoff is either $\Lambda-K$ if $x_{\mathsf{L}}<q$, $(1-q)\frac{\Lambda}{2}+q\Lambda-K$ if $x_{\mathsf{L}}=q$, $q\Lambda-K$ if $q<x_{\mathsf{L}}<1$, or $q\frac{\Lambda}{2}-K$ if $x_{\mathsf{L}}=1$. In contrast, the payoff of media R is either 0 if $x_{\mathsf{L}}<q$, $\frac{\Lambda}{2}$ if $x_{\mathsf{L}}=q$, or Λ if $x_{\mathsf{L}}>q$, whereas if it deviates its payoff is either $x_{\mathsf{L}}\Lambda-K$ if $x_{\mathsf{L}}<q$, $(1-x_{\mathsf{L}})\frac{\Lambda}{2}+x_{\mathsf{L}}\Lambda-K$ if $x_{\mathsf{L}}=q$, or $\Lambda-K$ if $q<x_{\mathsf{L}}$. Thus, $\Psi_{\mathrm{L}}(m,m)=NI$, $\Psi_{\mathrm{R}}(m,m)=NI$ implies either $K\geq x_{\mathsf{L}}\Lambda$ if $q>x_{\mathsf{L}}$; $K\geq\frac{\Lambda}{2}q$ if $q=x_{\mathsf{L}}$; $K\geq q\frac{\Lambda}{2}$ if $x_{\mathsf{L}}=1$; or $K\geq q\Lambda$ if $q<x_{\mathsf{L}}<1$.

Case (4). Proceeding as usual we obtain that either $\Psi_{\mathrm{L}}(m,r)=NI$, $\Psi_{\mathrm{R}}(m,r)=NI$, $K\geq\Lambda x_{\mathsf{L}}$, $x_{\mathsf{L}}<x_{\mathsf{R}}$; $\Psi_{\mathrm{L}}(m,r)=NI$, $\Psi_{\mathrm{R}}(m,r)=NI$, $K\geq\Lambda x_{\mathsf{L}}$, $x_{\mathsf{L}}=x_{\mathsf{R}}=0$; $\Psi_{\mathrm{L}}(m,r)=NI$, $\Psi_{\mathrm{R}}(m,r)=NI$, $K\geq\frac{\Lambda}{2}x_{\mathsf{L}}$, $x_{\mathsf{L}}=x_{\mathsf{R}}\in(0,1)$; $\Psi_{\mathrm{L}}(m,r)=NI$, $\Psi_{\mathrm{R}}(m,r)=NI$, $x_{\mathsf{L}}>x_{\mathsf{R}}$; $\Psi_{\mathrm{L}}(m,r)=NI$, $\Psi_{\mathrm{R}}(m,r)=NI$, $x_{\mathsf{L}}=x_{\mathsf{R}}=1$; or $\Psi_{\mathrm{L}}(m,r)=NI$, $\Psi_{\mathrm{R}}(m,r)=I$, $K\leq x_{\mathsf{L}}\Lambda$ can be part of an equilibrium.

We now analyze the candidates' behavior.

(iv.1) Let us consider the hypothetical equilibrium strategy profile (ll,mm), $\Psi_j(l,m)=NI$, $\Psi_j(l,r)=NI$, $\Psi_{\mathrm{L}}(m,m)=I$, $\Psi_{\mathrm{R}}(m,m)=NI$, $\Psi_j(m,r)=NI$, for $j\in\{\mathrm{L},\mathrm{R}\}$. Either candidate gains $\frac{n_{\mathcal{C}}}{2}$ in equilibrium. If L deviates, he gains either $\frac{1+q}{2}n_{\mathcal{C}}$ if $x_{\mathsf{L}}=0$, $qn_{\mathcal{C}}$ if $x_{\mathsf{L}}\in(0,1)$, or $q\frac{n_{\mathcal{C}}}{2}$ if $x_{\mathsf{L}}=1$. If R does, he gains either $n_{\mathcal{C}}$ if $x_{\mathsf{R}}<q$, $\frac{n_{\mathcal{C}}}{2}$ if $x_{\mathsf{R}}=q$, or 0 if $x_{\mathsf{R}}>q$. Hence, for the equilibrium to hold we need either $q\leq x_{\mathsf{R}}$, $x_{\mathsf{L}}=1$ or $q\leq\min\{\frac{1}{2},x_{\mathsf{R}}\}$, $x_{\mathsf{L}}\in(0,1)$. Thus, this strategy profile conforms an equilibrium when parameters and beliefs satisfy either $K=q\frac{\Lambda}{2}$, $q\leq x_{\mathsf{R}}\leq x_{\mathsf{L}}=1$; $q\frac{\Lambda}{2}\leq K\leq q\Lambda$, $q\leq x_{\mathsf{R}}<x_{\mathsf{L}}<1$, $q\leq\frac{1}{2}$; $x_{\mathsf{L}}\frac{\Lambda}{2}\leq K\leq q\Lambda$, $q\leq x_{\mathsf{R}}=x_{\mathsf{L}}<1$, $q\leq\frac{1}{2}$; or $\max\{\frac{q}{2},x_{\mathsf{L}}\}\Lambda\leq K\leq\min\{q,x_{\mathsf{L}}\}\Lambda$, $q\leq x_{\mathsf{R}}$, $0<x_{\mathsf{L}}<x_{\mathsf{R}}$, $q\leq\frac{1}{2}$.

(iv.2) Analogously, there is an equilibrium (ll,mm), $\Psi_j(l,m)=NI$, $\Psi_j(l,r)=NI$, $\Psi_{\mathrm{L}}(m,m)=I$, $\Psi_{\mathrm{R}}(m,m)=NI$, $\Psi_{\mathrm{L}}(m,r)=NI$, $\Psi_{\mathrm{R}}(m,r)=I$, for $j\in\{\mathrm{L},\mathrm{R}\}$, when either $q\frac{\Lambda}{2}\leq K\leq\min\{q,x_{\mathsf{L}}\}\Lambda$, $q\leq\min\{\frac{1}{2},x_{\mathsf{R}}\}$, $x_{\mathsf{L}}\in(0,1)$; or $K=q\frac{\Lambda}{2}$, $q\leq x_{\mathsf{R}}$, $x_{\mathsf{L}}=1$.

(iv.3) Let us now consider the hypothetical equilibrium strategy profile (ll,mm), $\Psi_j(l,m)=NI$, $\Psi_j(l,r)=NI$, $\Psi_j(m,m)=NI$, $\Psi_j(m,r)=NI$, for $j\in\{\mathrm{L},\mathrm{R}\}$. For this equilibrium to exist, $q\leq\min\{x_{\mathsf{L}},x_{\mathsf{R}}\}$. Thus, this strategy profile conforms an equilibrium when parameters and beliefs satisfy either $K\geq q\frac{\Lambda}{2}$, $q\leq x_{\mathsf{R}}\leq x_{\mathsf{L}}=1$; $K\geq q\Lambda$, $q\leq x_{\mathsf{R}}<x_{\mathsf{L}}<1$; $K\geq q\Lambda$, $q=x_{\mathsf{L}}<x_{\mathsf{R}}$; $K\geq q\frac{\Lambda}{2}$, $q=x_{\mathsf{L}}=x_{\mathsf{R}}$; $K\geq x_{\mathsf{L}}\Lambda$, $q<x_{\mathsf{L}}<x_{\mathsf{R}}$; or $K\geq\max\{q,x_{\mathsf{L}}\frac{1}{2}\}\Lambda$, $q<x_{\mathsf{L}}=x_{\mathsf{R}}<1$.

(iv.4) Analogously, there is an equilibrium (ll, mm), $\Psi_j(l,m) = NI$, $\Psi_j(l,r) = NI$, $\Psi_j(m,m) = NI$, $\Psi_{\rm L}(m,r) = NI$, $\Psi_{\rm R}(m,r) = I$, for $j \in \{\rm L, R\}$, when either $q\frac{\Lambda}{2} \leq K \leq \Lambda$, $q \leq x_{\sf R}$, $x_{\sf L} = 1$; $q\Lambda \leq K \leq x_{\sf L}\Lambda$, $q \leq x_{\sf R}$, $q < x_{\sf L} < 1$; or $q\frac{\Lambda}{2} \leq K \leq q\Lambda$, $q = x_{\sf L} \leq x_{\sf R}$.

(iv.5) Let us now consider the hypothetical equilibrium strategy profile (ll, mm), $\Psi_{\rm L}(l,m) = I$, $\Psi_{\rm R}(l,m) = NI$, $\Psi_j(l,r) = NI$, $\Psi_{\rm L}(m,m) = I$, $\Psi_{\rm R}(m,m) = NI$, $\Psi_j(m,r) = NI$, for $j \in \{\rm L, R\}$. For candidates being in equilibrium, we need $q < x_{\sf R}$ and $x_{\sf L} \in (0,1]$. Thus, this strategy profile conforms an equilibrium when either $K \leq q\frac{\Lambda}{2}$, $q < x_{\sf R} \leq x_{\sf L} = 1$; $x_{\sf L}q\frac{\Lambda}{2} \leq K \leq q\Lambda$, $q < x_{\sf R} < x_{\sf L} < 1$; $x_{\sf L}\frac{\Lambda}{2} \leq K \leq q\Lambda$, $q < x_{\sf R} = x_{\sf L} < 1$; or $x_{\sf L}\Lambda \leq K \leq q\Lambda$, $0 < x_{\sf L} < x_{\sf R}$, $q < x_{\sf R}$.

(iv.6) Analogously, there is an equilibrium (ll, mm), $\Psi_{\rm L}(l,m) = I$, $\Psi_{\rm R}(l,m) = NI$, $\Psi_j(l,r) = NI$, $\Psi_{\rm L}(m,m) = I$, $\Psi_{\rm R}(m,m) = NI$, $\Psi_{\rm L}(m,r) = NI$, $\Psi_{\rm R}(m,r) = I$, for $j \in \{\rm L, R\}$, when either $x_{\sf L}q\frac{\Lambda}{2} \leq K \leq \min\{q, x_{\sf L}\}\Lambda$, $q < x_{\sf R}$, $x_{\sf L} \in (0,1)$, or $K \leq q\frac{\Lambda}{2}$, $q < x_{\sf R} \leq x_{\sf L} = 1$.

(iv.7) Let us now consider the hypothetical equilibrium strategy profile (ll, mm), $\Psi_{\rm L}(l,m) = I$, $\Psi_{\rm R}(l,m) = NI$, $\Psi_j(l,r) = NI$, $\Psi_j(m,m) = NI$, $\Psi_j(m,r) = NI$, for $j \in \{\rm L, R\}$. For this equilibrium to exist we need $q < x_{\sf R}$ and either $q < x_{\sf L}$ or $q = x_{\sf L}$, $q \geq \frac{1}{2}$. Thus, this strategy profile conforms an equilibrium when parameters and beliefs satisfy either $q\frac{\Lambda}{2} \leq K \leq q\Lambda$, $q < x_{\sf R} \leq x_{\sf L} = 1$; $K = q\Lambda$, $q < x_{\sf R} < x_{\sf L} < 1$; $K = q\Lambda$, $\frac{1}{2} \leq q = x_{\sf L} < x_{\sf R}$; or $K = q\Lambda$, $\frac{x_{\sf L}}{2} \leq q < x_{\sf L} = x_{\sf R} < 1$.

(iv.8) Analogously, there is an equilibrium (ll, mm), $\Psi_{\rm L}(l,m) = I$, $\Psi_{\rm R}(l,m) = NI$, $\Psi_j(l,r) = NI$, $\Psi_j(m,m) = NI$, $\Psi_{\rm L}(m,r) = NI$, $\Psi_{\rm R}(m,r) = I$, for $j \in \{\rm L, R\}$, when $q < x_{\sf R}$ and either $q\frac{\Lambda}{2} \leq K \leq q\Lambda$, $q < x_{\sf L} = 1$; $q\frac{\Lambda}{2} \leq K \leq q\Lambda$, $q = x_{\sf L} \geq \frac{1}{2}$; or $K = q\Lambda$, $q < x_{\sf L} < 1$.

Finally, note that there are no equilibria in which the right-wing media investigates when the candidates send the messages (m, m). The reason is that in such a case, the moderate type in the left-wing candidate gains by deviating, as the deviation allows him to reveal his "good" type. Thus, no equilibrium of this sort exists.

This completes the proof. ■

Chapter 3

Political Competition when Media Create Candidates' Charisma.

"Men judge generally more by the eye than by the hand, because it belongs to everybody to see you, but to few to come in touch with you. Every one sees what you appear to be, few really know what you are".

Machiavelli.

3.1 Introduction

The legend says that Harun Arrashid, the great calif in "The Thousand and One Nights", used to walk about the crowded streets of Bagdad at night, to find out whether his people loved or hated him. In doing so, he was reacting to the need of knowing what people think about him. Nowadays, this same impulse is what drives politicians to be concerned with their images in public opinion polls or in the media.

The candidate's image is an important asset that usually plays an important role in the voter's decision on whom to vote for. This is so because people do not simply base their votes on ideological aspects, but rather take the professional qualifications, honesty, integrity or charisma of the candidates into account, when deciding for whom to cast their votes. This means that politicians should be aware of their public images, and in fact, they are. The concern of the candidates for their public images goes back to the US elections of 1936, when the republican candidate, Landon, appointed a director for public relations for the first time in electoral history. The aim of this director was obviously to improve the public image of the republican candidate, which turned out not to be sufficient to win the elections, as Roosevelt won a second term. Despite this, it was the first step in the official career of creating a public image for a politician. Another important reference in the history, is the 1960 first match-up on television, between the republican candidate, Nixon, and the democrat, Kennedy. In this regard, many political experts have stated that the sickly-looking Nixon juxtaposed with the handsome Kennedy, providing the latter a crucial point when people come to decide for whom to vote.

The interesting point is that image does not depend solely on the real skills of a candidate, nor even on how public image experts decide to bring him before the voters. To a great extend, it depends on the way media presents him,[1] i.e. giving more exposure to one candidate than to the other, projecting the positive skills of a politician while hiding his faults, etc., can make the picture that voters have of a candidate different from the real one or the pretended one. In this context, it is the recent start of Al-Hurra (The Free One, in English), the new Arabic-language American satellite TV channel, currently being broadcast all over the Arab world. Dubbed as the American answer to Al Jazeera, Al-Hurra aims to be the visual Voice of America, and so, is the new attempt of the American government to change Arab opinions about the US.[2]

Media outlets usually have underlying political preferences, which may also play a role in the decision of who is their favorite candidate and who is not. These ideological preferences may therefore be translated into different levels of support for different candidates. In other words, the image of a candidate may differ across different outlets. Thus, left-wing outlets will usually project much better pictures of left-wing candidates than of right-wing ones, and the other way round for the right-wing media. Hence, the valence of a candidate a voter will perceive will sharply depend on the media outlet/s the voter is exposed to. In this respect, we present some evidence for Spain, where we observe how readers of three different major newspapers have very different perceptions of the political situation of the country. The data is for 1993, which corresponds to the third term in office of the Social Democratic party, PSOE. This period was characterized by a series of scandals involving financial and other corrupt practices by the governing party. The newspapers we consider are "El País", which is a center-left daily, "El Mundo", which is center-right, and "ABC", which is monarchist and extremely conservative.

[1] McCombs (2002) states: "In the US, a day-by-day observation of the final three months in the 1992 and 1996 presidential elections found that the tone of television news coverage about key campaign events influenced voters' preferences for the candidates. Favorable coverage of Republican campaign events on four national television networks increased support for the Republican candidate".

[2] "El País". February 22, 2004.

Table 3.1: **Opinions of Readers of Three Major Newspapers (Spain)**

	Newspaper Read Most Frequently		
	El País	*ABC*	*El Mundo*
Believe that there is much corruption in Spanish public life	34%	58%	55%
Believe PSOE is more corrupt than the other parties	28%	42%	60%
Believe that Felipe González (Prime Minister) is honest	66%	32%	26%

Source: Gunther and Mughan (2000).

As we would have expected, the readers of "El País" have better opinions about PSOE than the readers of "El Mundo" or "ABC", which are more critical about this party. We also observe that the first readers have a better image of Felipe González than the rest. This shows how important the selective exposure to the media is in the evaluation of a government.

Yet, the existence of ideological media should not have any important effect on the political competition if people attended to all the media. In such a case, voters would receive a variety of opinions, would weigh them according to some rule, and would form a particular image of the candidates' valences based on all the information they have received. However, empirical evidence shows that people tend to select information that largely conforms to their own partisan preferences ("self-selection of audience").[3] Thus, neither do left-wing voters purchase right-wing newspapers, nor do right-wing voters buy left-wing dailies. The same argument could be applied to television viewers, although here, we guess that this sort of self selection of audience is not so extreme. This attendance to different outlets, together with the ideological tendencies of most of the media, implies that the image voters have of a candidate will be determined by the outlets the voter is exposed to, and therefore, may be biased. In our model, we consider this possibility of "self-selection of audience", as well as the possibility of voters being exposed to all the media, and we analyze how deeply our results depend on such exposure, in a model in which politicians compete for votes through ideology and valence, and where valence is set by mass media.

To this aim, we propose a game where two downsian candidates compete for votes. One is left-wing and the other right-wing. Candidates choose policy platforms that maximize their vote shares. They also compete through the valence, which is endogenously determined in our model. We consider two media outlets in the economy, with locations exogenously given. The media publish information on politicians, in particular, on their charisma.[4] We assume that an outlet prefers the

[3] Some evidence to this respect is given in Gunther and Mughan (2000), page 63; or in Hovland (1959).

[4] In the paper, we refer to valence and charisma as being equivalent.

candidate with the ideology closest to its own. It therefore presents a much better picture of this candidate than of his opponent. In particular, we assume that the image of a politician that an outlet projects is a measure of the distance between the position of the outlet and that of the candidate. Given this structure, our aim is to study how politicians compete when the candidates' valences are endogenously determined in the model. More precisely, we analyze political competition under two different set-ups. The first one is the case in which voters are exposed to both outlets. We consider them to be non-selective voters. The second set-up is the case in which voters are only exposed to the most affine media. We call them selective voters. Our findings show that, depending on the way the voters attend to the media, the equilibrium location of candidates may differ. Thus, when voters are exposed to both outlets, candidates tend more to moderate their platforms, in an attempt to win the favor of both media. In contrast, when voters select among the outlets, candidates may differentiate their platforms. The lesson we draw from this, is that situations in which voters attend to the outlets that suit them better may result in political polarization. On the other hand, situations in which voters make more balanced judgments should better foster political moderation.

This result may explain the radicalization of some nationalist parties in Spain. Our point is that the rise of nationalist newspapers in Spain since the death of dictator Franco in 1975, together with the fact that these dailies reach mainly nationalists, could explain the continuous increase in the competencies requested by nationalist parties, and more particularly, issues like the controversial Nationalist Plan by Ibarretxe (Prime Minister of the Basque Country). The intuition behind all this is that if nationalist voters receive most of their information from nationalist sources, then nationalist parties will find it even more profitable to radicalize their platforms, as this guarantees them more favorable coverage from such media and, therefore, a higher support from the nationalist voters.[5]

There is little literature on the role of media in politics. On the one hand, Andina Díaz (2004a) analyzes media competition when the outlets have either economic or political aims. She introduces the idea that voters do channel hopping, and shows how results depend on this assumption. Andina Díaz (2004b) also studies the monitoring role of media in a model in which candidates can either signal their types or propose uninformative platforms. She shows that the existence of a media industry drives politicians to discard the use of pooling strategies, and that this result is more likely to occur as the number of swing voters, or the competition among the media, increases. On the other hand, Besley and Prat (2001) use an adverse selection model to capture the possible influencing effects of a bad type government on the media industry. They establish the conditions under which media play no

[5]Pérez Nievas and Fraile (2000), in a study for Catalonia for the period 1980-1999, find that the probability of voting for nationalist parties in general elections is 0.07 for people that only feel Spanish, whereas it is 0.63 for people that only feel Catalan. They also find that these percentages are 0.37 and 0.83 respectively, when elections are for the Catalan government. This data shows that the main share of votes of nationalist parties is quite well defined: nationalist people, what may explain why the radicalization of the nationalist life.

monitoring role, showing that the higher the number of media outlets in the economy, the more difficult the government can silence the media. Finally, Strömberg has a series of papers (2001) and (2004a), where he studies the influence media have on the determination of policy outcomes. In particular, he shows that due to the increasing returns to scale of the media industry, a political bias appears, hurting small groups of voters while benefiting big groups. This could somehow offset the bias introduced by interest groups, which usually favor these small groups, leading to more desirable policies.

The second strand of literature our paper is related to, is that on the valence issue. Most of this literature has consider candidates' valences as something exogenously given in the models. Here, we find the papers of Aragonés and Palfrey (2002) and Groseclose (1999) among others, which study political competition when one of the candidates has an given valence advantage. Differently, Carrillo and Castanheira (2002) have endogenized the valence in a game where candidates can invest costly resources that increase their images. They show that when voters either always or never observe the valence, the Median Voter Theorem holds. However, for the case of imperfect observability of valence, parties may deviate from the median voter's bliss point, as an implicit commitment to high investment in valence. Finally, Moon (2001) proposes a model where the valence is interpreted as the monetary resources of a candidate. In this set-up, he shows that the incentive to converge is greater for the candidate with more resources, and that two politicians converge to the median voter only under very limited conditions.

Finally, our paper is also related to the socio-psychological literature on mass media influence, in that regarding the selective behavior of voters when exposed to media. To this respect, we remit the reader to Hovland (1959) and Mutz and Martin (2001) for a discussion on the matter.

In the analysis that follows, we present the model and some basic ideas in Section 3.2. In Section 3.3, we analyze the case of non-selective voters, and establish the conditions under which an equilibrium exists in such a case. In Section 3.4, we deal with the case of selective voters, and study the equilibrium existence and its location. We then discuss some of the results in Section 3.5. Finally, Section 3.6 concludes.

3.2 The model

Two downsian candidates compete for votes. The left-wing candidate is labelled L, and the right-wing candidate R. Candidates choose policy platforms x_L and x_R that belong to the policy space $\mathsf{X} = [0,1]$, so that they maximize their vote shares. They also compete through their valence characteristics, v_L and $v_\mathsf{R} \in \mathbb{R}$. Voters prefer a high valence to a low valence candidate. Thus, *ceteris paribus*, the greater v_j is, for $\mathsf{j} \in \{\mathsf{L},\mathsf{R}\}$, the higher the probability of candidate j winning the election is. Unlike the policy platforms that are determined by candidates, valence characteristics are set by mass media.

We consider two media outlets, A and B, which publish information on politicians. Media outlets are exogenously located at a and b, with a, b $\in [0,1]$. Once the candidates establish their platforms, the media outlets project the pictures of the two candidates. We assume that an outlet prefers the candidate with the ideology that is closest to its own. Therefore, it presents a much better picture of this candidate than of the opponent. In particular, we assume that the quality of the valence an outlet gives to a particular candidate is a measure of the distance between the position of the outlet and that of the politician. That is to say,

$$\begin{aligned} v_j^A &= -(x_j - a)^2 \text{ is the valence outlet A assign to politician j} \\ v_j^B &= -(x_j - b)^2 \text{ is the valence outlet B assign to politician j} \end{aligned}$$

with $j \in \{L, R\}$.

The idea we are modelling is that the valence that the voters perceive of the candidates does not depend on the real skills of the politicians, but rather on the pictures of them that the media project. This means that the favor of the media is as important as the candidate's ideology in attracting votes. Note also that implicit in this approach is the idea that media are ideological, and as such are not fair in their coverages of the candidates, but rather favor the one with a closer ideology.

Finally, there is a continuum of voters of measure one. Voters have preferences regarding the candidates' policies and valences. Here, however, we characterize them according to their policy preferences, θ.[6] We assume that θ is distributed on the closed interval zero-one, according to a generic distribution function $F(\cdot)$, with a positive density function $f(\cdot)$. Voters observe candidates' valences, but do not realize how valences are formed. In other words, voters are not conscious of the fact that media's ideological preferences may play a role when projecting a better picture of one candidate than of the other, and therefore do not discount for it. The utility of a voter θ in voting for candidate j, with $j \in \{L, R\}$, is

$$u_\theta^j(x_j, v_j) = \gamma v_j - (x_j - \theta)^2$$

or substituting

$$u_\theta^j(x_j, a, b) = -\gamma\left[\omega(x_j - a)^2 + (1-\omega)(x_j - b)^2\right] - (x_j - \theta)^2 \tag{3.1}$$

where $\omega \in [0,1]$, is the time voter θ is exposed to media A, therefore $1-\omega$ is the time she is exposed to media B. Here, $\gamma > 0$ is the salience of the valence dimension, that is to say, the parameter that captures the voters' sensitivity to the valence issue relative to the ideological issue. Note that when γ is zero we are in the classical downsian model, where agents base their votes solely on ideological aspects. As γ increases, the weight of valence raises and the candidates therefore take this other way of attracting votes into account.

In our model, a voter θ votes for L when

$$\gamma v_L - (x_L - \theta)^2 > \gamma v_R - (x_R - \theta)^2$$

[6] Voters agree on the valence issue, therefore we cannot base the order on this dimension.

and votes for R when

$$\gamma v_{\mathsf{L}} - (x_{\mathsf{L}} - \theta)^2 < \gamma v_{\mathsf{R}} - (x_{\mathsf{R}} - \theta)^2.$$

A voter θ is indifferent to voting for either candidate L or R when

$$\gamma v_{\mathsf{L}} - (x_{\mathsf{L}} - \theta)^2 = \gamma v_{\mathsf{R}} - (x_{\mathsf{R}} - \theta)^2.$$

Solving for θ we get,

$$\theta_I = \frac{x_{\mathsf{L}} + x_{\mathsf{R}}}{2} + \frac{\gamma(v_{\mathsf{R}} - v_{\mathsf{L}})}{2(x_{\mathsf{L}} - x_{\mathsf{R}})} \tag{3.2}$$

which defines the expression for the indifferent voter, denoted by θ_I. Note that in the case in which we do not consider the valence problem, the indifferent voter is located at the same distance from both L and R. In our case, however, this does not hold, as there is another issue, valence, that matters.

We next define the utility or payoff of a candidate. As mentioned previously, candidates seek to maximize their vote shares. One possible explanation for this type of maximizing behavior is that, the larger the vote share of a party is, the larger its influence in the parliament will be, and therefore, the larger the number of jobs in and around the government that the party can offer to its core members (Grossman and Helpman (1996)). Alternatively, one may think that candidates seek to maximize their vote shares because the policy implemented is a convex combination of the two policies proposed, where the weights are the shares of votes of each party (Alesina and Rosenthal (1995), and Ortuño-Ortín (1997)). For whatever reason they might have, we assume that the payoff of a candidate is his vote share. Additionally, we assume that in the case the candidates tie, each politician gets one half of the votes. Summarizing,

$$\Pi_{\mathsf{j}}(x_{\mathsf{L}}, x_{\mathsf{R}}, \mathsf{a}, \mathsf{b}) = \begin{cases} F(\theta_I) & \text{if } x_{\mathsf{j}} < x_{\mathsf{k}} \\ \frac{1}{2} & \text{if } x_{\mathsf{j}} = x_{\mathsf{k}} \\ 1 - F(\theta_I) & \text{if } x_{\mathsf{j}} > x_{\mathsf{k}} \end{cases}$$

where j, $\mathsf{k} \in \{\mathsf{L}, \mathsf{R}\}$ and $\mathsf{k} \neq \mathsf{j}$.

3.3 Non-selective voters

We begin by considering the case in which all the voters are exposed to both media outlets. This means that voters are homogeneous, in the sense that independently of their positions, they attend to the two media outlets in the same proportion of time. Thus, there are no differences in the information they receive, but all of them observe the same news. The valence of the two candidates that the citizens perceive do not therefore differ from one voter to another.

The interest of this set-up is more theoretical than applied, as it does not fit very well the empirical evidence. The reason is that voters usually suffer from confirmatory bias, and thus, choose to attend to the outlets that better fit their prior opinions. It is therefore difficult that all the voters of a country receive exactly the same information, which is the case in this first set-up. We however analyze such a case as a benchmark, which will allow us to compare the results in this case with the findings of a set-up in which the voters are selective.

The utility of a voter θ in voting for j, with $\mathsf{j} \in \{\mathsf{L}, \mathsf{R}\}$, is given by expression (3.1). That is to say,

$$u_\theta^{\mathsf{j}}(x_{\mathsf{j}}, \mathsf{a}, \mathsf{b}) = -\gamma\left[\omega(x_{\mathsf{j}} - \mathsf{a})^2 + (1-\omega)(x_{\mathsf{j}} - \mathsf{b})^2\right] - (x_{\mathsf{j}} - \theta)^2$$

where $v_{\mathsf{j}} = -\left[\omega(x_{\mathsf{j}} - \mathsf{a})^2 + (1-\omega)(x_{\mathsf{j}} - \mathsf{b})^2\right]$ is the image that voter θ perceives about candidate j, given that he receives information from the two outlets.

We next obtain the expression for the indifferent voter. From equation (3.2), we know

$$\theta_I = \frac{x_{\mathsf{L}} + x_{\mathsf{R}}}{2} + \frac{\gamma(v_{\mathsf{R}} - v_{\mathsf{L}})}{2(x_{\mathsf{L}} - x_{\mathsf{R}})}$$

with

$$v_{\mathsf{R}} - v_{\mathsf{L}} = (x_{\mathsf{L}} - x_{\mathsf{R}})\left[\omega(x_{\mathsf{L}} + x_{\mathsf{R}} - 2\mathsf{a}) + (1-\omega)(x_{\mathsf{L}} + x_{\mathsf{R}} - 2\mathsf{b})\right].$$

Then, we can rewrite the expression for this voter as

$$\theta_I = \frac{x_{\mathsf{L}} + x_{\mathsf{R}}}{2} + \frac{\gamma\left[\omega(x_{\mathsf{L}} + x_{\mathsf{R}} - 2\mathsf{a}) + (1-\omega)(x_{\mathsf{L}} + x_{\mathsf{R}} - 2\mathsf{b})\right]}{2}$$

or simplifying,

$$\theta_I = x_{\mathsf{m}} + \gamma(x_{\mathsf{m}} - \mathsf{p}) \qquad (3.3)$$

where $x_{\mathsf{m}} = \frac{x_{\mathsf{L}} + x_{\mathsf{R}}}{2}$, and $\mathsf{p} = \omega\mathsf{a} + (1-\omega)\mathsf{b}$, with $x_{\mathsf{m}}, \mathsf{p} \in [0,1]$. That is to say, x_{m} is the mean of the locations of the two candidates, and p the mean of the information that the voters receive from the two media outlets. From equation (3.3) we observe that ideology and valence jointly determine the location of the indifferent voter, and so, candidates have to take account of both issues when deciding their platforms.

Previous to the analysis of the equilibrium location of candidates, we prove the existence of the indifferent voter.

■ Existence and uniqueness of the indifferent voter

The existence of this voter is not always guaranteed. Indeed, the indifferent voter will not exist when either all the voters vote for candidate L, or all they vote for candidate R. Hence, our first aim is to set up the conditions under which θ_I exists. This is what we do now.

Proposition 3.1 *There is a unique indifferent voter, whose expression is* $\theta_I = x_{\mathsf{m}} + \gamma(x_{\mathsf{m}} - \mathsf{p})$, *whenever*

$$\frac{\gamma\mathsf{p}}{1+\gamma} \leq x_{\mathsf{m}} \leq \frac{1+\gamma\mathsf{p}}{1+\gamma}. \qquad (3.4)$$

In any other case, there is no θ_I *such that* $u_{\theta_I}^{\mathsf{L}}(x_{\mathsf{L}}, v_{\mathsf{L}}) = u_{\theta_I}^{\mathsf{R}}(x_{\mathsf{R}}, v_{\mathsf{R}})$.

Proof. Let us suppose $x_{\mathsf{L}} \neq x_{\mathsf{R}}$. In such a case, the expression for the indifferent voter is well defined. We observe that $\theta_I < 0 \Leftrightarrow x_{\mathsf{m}} < \mathsf{p}$ and $x_{\mathsf{m}} + \gamma(x_{\mathsf{m}} - \mathsf{p}) < 0 \Leftrightarrow x_{\mathsf{m}} < \mathsf{p}$ and $\gamma > \frac{x_{\mathsf{m}}}{\mathsf{p}-x_{\mathsf{m}}} \Leftrightarrow x_{\mathsf{m}} < \mathsf{p}$ and $x_{\mathsf{m}} < \frac{\gamma \mathsf{p}}{1+\gamma} \Leftrightarrow x_{\mathsf{m}} < \frac{\gamma \mathsf{p}}{1+\gamma}$.

Analogously, $\theta_I > 1 \Leftrightarrow x_{\mathsf{m}} > \mathsf{p}$ and $x_{\mathsf{m}} + \gamma(x_{\mathsf{m}} - \mathsf{p}) > 1 \Leftrightarrow x_{\mathsf{m}} > \mathsf{p}$ and $\gamma > \frac{1-x_{\mathsf{m}}}{x_{\mathsf{m}}-\mathsf{p}} \Leftrightarrow x_{\mathsf{m}} > \mathsf{p}$ and $x_{\mathsf{m}} > \frac{1+\gamma \mathsf{p}}{1+\gamma} \Leftrightarrow x_{\mathsf{m}} > \frac{1+\gamma \mathsf{p}}{1+\gamma}$.

Therefore, $\theta_I \in [0,1] \Leftrightarrow \left(x_{\mathsf{m}} \geq \mathsf{p} \text{ or } \gamma \leq \frac{x_{\mathsf{m}}}{\mathsf{p}-x_{\mathsf{m}}}\right)$ and $\left(x_{\mathsf{m}} \leq \mathsf{p} \text{ or } \gamma \leq \frac{1-x_{\mathsf{m}}}{x_{\mathsf{m}}-\mathsf{p}}\right) \Leftrightarrow \left(x_{\mathsf{m}} > \mathsf{p} \text{ and } \gamma \leq \frac{1-x_{\mathsf{m}}}{x_{\mathsf{m}}-\mathsf{p}}\right)$, or $\left(x_{\mathsf{m}} < \mathsf{p} \text{ and } \gamma \leq \frac{x_{\mathsf{m}}}{\mathsf{p}-x_{\mathsf{m}}}\right)$, or $(x_{\mathsf{m}} = \mathsf{p})$.

That is to say, $\theta_I \in [0,1]$ if and only if

$$\frac{\gamma \mathsf{p}}{1+\gamma} \leq x_{\mathsf{m}} \leq \frac{1+\gamma \mathsf{p}}{1+\gamma}.$$

To prove the uniqueness of θ_I, note that $\theta_I = x_{\mathsf{m}} + \gamma(x_{\mathsf{m}} - \mathsf{p})$ is a strictly increasing function in x_{m}. Thus, any pair $(x_{\mathsf{L}}, x_{\mathsf{R}})$ implies a particular value of x_{m}, which is associated to a single value of θ_I. Thus, the uniqueness of θ_I. ■

We shall now illustrate the share of votes of the two candidates, for any situation $x_{\mathsf{L}} \neq x_{\mathsf{R}}$. We know that for the case in which (3.4) holds, the indifferent voter does exist. In such a case, all $\theta < \theta_I$ vote for the leftist located candidate, and all $\theta > \theta_I$ do for the rightist one. Let us denote the leftist candidate by $c_0 = \arg\min_{\mathsf{j}\in\{\mathsf{L},\mathsf{R}\}}\{x_{\mathsf{j}}\}$, and the rightist one by $c_1 = \arg\max_{\mathsf{j}\in\{\mathsf{L},\mathsf{R}\}}\{x_{\mathsf{j}}\}$. We can then represent the share of votes of the two candidates for the cases in which θ_I exists. It could be, however, that this voter does not exists. In such cases, the share of votes of the two candidates is, despite the existence problems, well defined. Thus, in the case $x_{\mathsf{m}} < \frac{\mathsf{p}\gamma}{1+\gamma}$, we obtain $\theta_I < 0$, then all the voters vote for candidate c_1. In contrast, in the case $x_{\mathsf{m}} > \frac{1+\mathsf{p}\gamma}{1+\gamma}$, we obtain $\theta_I > 1$, thus all they vote for candidate c_0. Hence, there are no problems in determining who gains the election and who not, even in the cases in which θ_I does not exist.

We now define the pseudo-indifferent voter as the value of θ_I which gives the two candidates the share of votes that they get, for a given pair $(x_{\mathsf{L}}, x_{\mathsf{R}})$.

$$\widehat{\theta}_I(x_{\mathsf{m}}) = \begin{cases} 0 \text{ if } x_{\mathsf{m}} < \frac{\mathsf{p}\gamma}{1+\gamma} \\ x_{\mathsf{m}} + \gamma(x_{\mathsf{m}} - \mathsf{p}) \text{ if } \frac{1+\mathsf{p}\gamma}{1+\gamma} \leq x_{\mathsf{m}} \leq \frac{\mathsf{p}\gamma}{1+\gamma} \\ 1 \text{ if } x_{\mathsf{m}} > \frac{1+\mathsf{p}\gamma}{1+\gamma}. \end{cases}$$

We shall now represent these shares of votes,

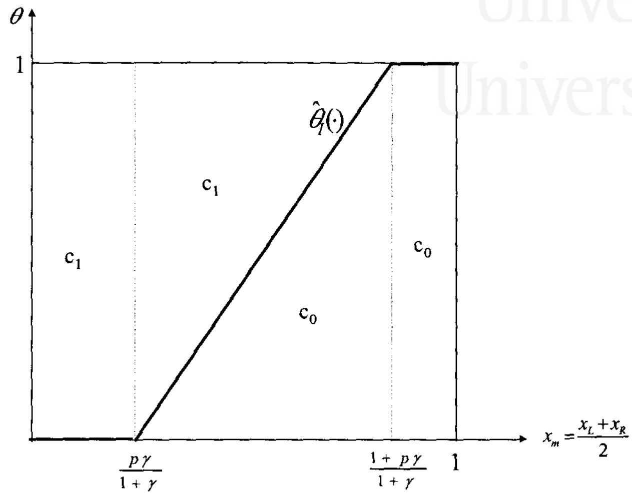

Figure 3.1: **Share of votes of the two candidates, when $x_L \neq x_R$.**

■ Equilibrium

We now characterize the equilibrium location of candidates.

Proposition 3.2 *If voters are non-selective, the only equilibrium in pure strategies is* $x_L = x_R = \frac{\theta_m + \gamma p}{1+\gamma}$, *where* θ_m *is the location of the median voter.*

Proof. We first prove that $x_L < x_R$ cannot hold in equilibrium. Let us consider such a situation, and let us suppose $\Pi_L(x_L, x_R) > \Pi_R(x_L, x_R)$, i.e. the payoff of candidate L is greater than that of candidate R. In such a case, candidate R gets less than one half of the votes, whereas if he deviates to $x_R = x_L$ he gets exactly one half (by assumption). Thus, candidate R deviates. Analogously, let us suppose that $\Pi_L(x_L, x_R) < \Pi_R(x_L, x_R)$. Here, it is candidate L who has a profitable deviation. Then, this situation can neither hold in equilibrium. Finally, let us suppose $\Pi_L(x_L, x_R) = \Pi_R(x_L, x_R)$. In such a case, the indifferent voter exists, and therefore $\Pi_L(x_L, x_R) = \frac{1}{2} = F\left(\widehat{\theta}_I\right)$. Then, $\widehat{\theta}_I = \theta_m$. Let us now consider that candidate L deviates to $x'_L \in (x_L, x_R)$, with the new indifferent voter being $\widehat{\theta}'_I = (1+\gamma)x'_m - \gamma p \in (\theta_m, 1]$. In such a case, the payoff of candidate L is $\Pi_L(x'_L, x_R) = F\left(\widehat{\theta}'_I\right) > \frac{1}{2} = \Pi_L(x_L, x_R)$, and thus, he finds it strictly profitable to deviate. Hence, $x_L < x_R$ cannot hold in equilibrium.

Analogously, we prove that neither $x_L > x_R$ holds in equilibrium.

Let us finally consider the case $x_L = x_R$. In such a case, voters are indifferent to voting for either L or R. Therefore $\Pi_L(x_L, x_R) = \Pi_R(x_L, x_R) = \frac{1}{2}$, by assumption.

Let us first suppose $x_L = x_R < \frac{\gamma p}{1+\gamma}$. In such a case, either candidate has a profitable deviation. Let us suppose that candidate R deviates to $x'_R \in \left(x_L, \frac{\gamma p}{1+\gamma}\right)$. Here, $\Pi_R(x_L, x'_R) = 1 > \Pi_R(x_L, x_R) = \frac{1}{2}$. Thus, $x_L = x_R < \frac{\gamma p}{1+\gamma}$ cannot occur in equilibrium.

Let us now suppose $\frac{\gamma p+1}{1+\gamma} < x_L = x_R$. Here also, either candidate has a profitable deviation. Let us suppose that candidate L deviates to $x'_L \in \left(\frac{\gamma p+1}{1+\gamma}, x_R\right)$, and therefore $\Pi_L(x'_L, x_R) = 1$. Thus, $\frac{\gamma p+1}{1+\gamma} < x_L = x_R$ can neither occur in equilibrium.

Let $x_L = x_R \in \left[\frac{\gamma p}{1+\gamma}, \frac{\gamma p+1}{1+\gamma}\right]$. We now define $\widehat{x}_m \in \left(\frac{\gamma p}{1+\gamma}, \frac{\gamma p+1}{1+\gamma}\right)$, as the single value of x_m such that $\widehat{\theta}_I(\widehat{x}_m) = (1+\gamma)\widehat{x}_m - \gamma p = \theta_m \in (0,1)$.

Let us first consider the case $\widehat{x}_m < x_L = x_R$, and let us suppose that candidate L deviates to $x'_L \in (\widehat{x}_m, x_R)$. In such a case, $\widehat{\theta}'_I = (1+\gamma)x'_m - \gamma p > (1+\gamma)\widehat{x}_m - \gamma p = \theta_m$, with $x'_m = \frac{x'_L + x_R}{2}$. Therefore, $\Pi_L(x'_L, x_R) = F\left(\widehat{\theta}'_I\right) > \frac{1}{2}$, and thus candidate L finds it strictly profitable to deviate.

Let us now consider the case $x_L = x_R < \widehat{x}_m$, and let us suppose that candidate R deviates to $x'_R \in (x_L, \widehat{x}_m)$. In such a case, $\widehat{\theta}'_I = (1+\gamma)x'_m - \gamma p < (1+\gamma)\widehat{x}_m - \gamma p = \theta_m$. Then $\Pi_R(x_L, x'_R) = 1 - F\left(\widehat{\theta}'_I\right) > \frac{1}{2}$, and therefore candidate R finds it strictly profitable to deviate.

Let us finally consider the case $x_L = x_R = \widehat{x}_m$.

Let us suppose that candidate L deviates to $x'_L < x_L = x_R$. In such a case, $\widehat{\theta}'_I < \theta_m$, and therefore $\Pi_L(x'_L, x_R) = F\left(\widehat{\theta}'_I\right) < \frac{1}{2}$.

Let us suppose that candidate L deviates to $x'_L > x_L = x_R$. In such a case, $\widehat{\theta}'_I > \theta_m$, and therefore $\Pi_L(x'_L, x_R) = 1 - F\left(\widehat{\theta}'_I\right) < \frac{1}{2}$.

Analogously, we analyze the deviations of candidate R.

Thus, the only equilibrium is $x_L = x_R = \widehat{x}_m$, with $\widehat{x}_m \in \left(\frac{\gamma p}{1+\gamma}, \frac{1+\gamma p}{1+\gamma}\right)$ and $\widehat{x}_m(1+\gamma) - \gamma p = \theta_m$. That is to say, $x_L = x_R = \frac{\theta_m + \gamma p}{1+\gamma}$ is the unique equilibrium. ∎

We observe that candidates do not differentiate in equilibrium, but rather locate at the same point, being this point a convex combination of the location of the median voter and that of the media. This is so because ideology and valence are in this model relevant issues for voters. Hence, the idea summarizing this result is that, the fact that voters do not discriminate when attending to media, makes that candidates do neither discriminate. Politicians will therefore want to moderate their platforms, in an attempt to get the favor of both outlets.[7]

3.4 Selective voters

We next consider the case of voters that are just exposed to their closest positioned media outlet. Note that this set-up is opposite to the previous one, in which all the voters receive the same information. The idea we formalize here could fit, for example, with newspaper readers, who usually buy the ideologically closest

[7] Candidates want to reach consensus between voters and media outlets. This is here the idea of moderation, where we do not mean that candidates locate at the center of the ideological space, but rather that aim to achieve agreement between the ideology of the median voter and that of the media.

newspaper, or with agents who just watch one tv channel or listen to one radio station.

In such cases, different voters may perceive different candidates' valences. Thus, the utility of a voter θ in voting for j, with $\mathsf{j} \in \{\mathsf{L}, \mathsf{R}\}$, will depend on the media outlet she is exposed to. In this way,

$u_\theta^{\mathsf{j}}(x_{\mathsf{j}}, \mathsf{a}) = -\gamma(x_{\mathsf{j}} - \mathsf{a})^2 - (x_{\mathsf{j}} - \theta)^2$ when θ attends to media A
$u_\theta^{\mathsf{j}}(x_{\mathsf{j}}, \mathsf{b}) = -\gamma(x_{\mathsf{j}} - \mathsf{b})^2 - (x_{\mathsf{j}} - \theta)^2$ when θ attends to media B
$u_\theta^{\mathsf{j}}(x_{\mathsf{j}}, \mathsf{a}, \mathsf{b}) = -\gamma\left[\omega(x_{\mathsf{j}} - \mathsf{a})^2 + (1-\omega)(x_{\mathsf{j}} - \mathsf{b})^2\right] - (x_{\mathsf{j}} - \theta)^2$ when θ attends to both, A and B

Given that the voters attend to their closest positioned media outlet, and given a particular $\mathsf{a}, \mathsf{b} \in [0,1]$, those voters to the left of $\frac{\mathsf{a}+\mathsf{b}}{2}$ will attend to outlet A (resp. B), if $\mathsf{a} < \mathsf{b}$ (resp. $\mathsf{b} < \mathsf{a}$). Analogously, those voters to the right of $\frac{\mathsf{a}+\mathsf{b}}{2}$ will attend to outlet B (resp. A), if $\mathsf{a} < \mathsf{b}$ (resp. $\mathsf{b} < \mathsf{a}$). Finally, those voters at $\frac{\mathsf{a}+\mathsf{b}}{2}$ will attend to both outlets.[8] We further assume that in the case $\mathsf{a} = \mathsf{b}$, the voters attend to each media one half of their times.[9]

Following the schedule we used in the case of non-selective voters, we obtain the expression for the indifferent voter. From equation (3.3) , we know

$$\theta_I = x_{\mathsf{m}} + \gamma\left(x_{\mathsf{m}} - \mathsf{p}\right)$$

where p is now different depending on the location of the indifferent voter. Thus, in the case the indifferent voter is to left of $\frac{\mathsf{a}+\mathsf{b}}{2}$, we have

$$\theta_I = x_{\mathsf{m}} + \gamma\left(x_{\mathsf{m}} - \mathsf{p}_0\right)$$

with $\mathsf{p}_0 = \min\{\mathsf{a}, \mathsf{b}\}$.

On the other hand, in the case the indifferent voter is to right of $\frac{\mathsf{a}+\mathsf{b}}{2}$, we have

$$\theta_I = x_{\mathsf{m}} + \gamma\left(x_{\mathsf{m}} - \mathsf{p}_1\right)$$

with $\mathsf{p}_1 = \max\{\mathsf{a}, \mathsf{b}\}$.

Finally, it can be that the indifferent voter is also the indifferent reader. In such a case, $\theta_I = \frac{\mathsf{a}+\mathsf{b}}{2} = \mathsf{p}$, therefore

$$\theta_I = x_{\mathsf{m}}$$

what occurs when candidates and media outlets locate symmetrically about the indifferent voter.

Here also, we study the conditions for the existence of the indifferent voter. The analysis is now a bit more complex, as the discontinuity in the way the viewers attend to the two media outlets entails additional problems for the existence of θ_I.

[8]Here we assume that they spend one half of their times attending to each media, that is to say, $\omega = \frac{1}{2}$.

[9]Or, equivalently in terms of results, one half of the voters attend to each outlet.

■ Existence and uniqueness of the indifferent voter

We perform the analysis just for the case $\mathsf{a} \neq \mathsf{b}$. The reason is that whenever $\mathsf{a} = \mathsf{b}$, the voters behave as if they were non-selective. In fact, they are non-selective because selecting or not does not imply a difference. Hence, we remit the reader to the analysis carried out in the previous section, as it directly applies here.

Let us then go into the case $\mathsf{a} \neq \mathsf{b}$. In such a case, the indifferent voter exists when either $\theta_I \in \left[0, \frac{\mathsf{a}+\mathsf{b}}{2}\right)$, $\theta_I = \frac{\mathsf{a}+\mathsf{b}}{2}$, or $\theta_I \in \left(\frac{\mathsf{a}+\mathsf{b}}{2}, 1\right]$. We observe that $\theta_I = \frac{\mathsf{a}+\mathsf{b}}{2}$ occurs with probability zero, and thus, we can skip the analysis of this case as it will not change the outcome of the election. We then focus on the other two cases, for which we next establish the conditions under which θ_I exists.

Proposition 3.3 *There is a unique indifferent voter, whose expression is*
(i) either $\theta_I = x_\mathsf{m} + \gamma\left(x_\mathsf{m} - \mathsf{p}_0\right)$, *whenever*

$$\frac{\gamma \mathsf{p}_0}{1+\gamma} \leq x_\mathsf{m} \leq \frac{\mathsf{p} + \gamma \mathsf{p}_0}{1+\gamma}, \tag{3.5}$$

(ii) or $\theta_I = x_\mathsf{m} + \gamma\left(x_\mathsf{m} - \mathsf{p}_1\right)$, *whenever*

$$\frac{\mathsf{p} + \gamma \mathsf{p}_1}{1+\gamma} \leq x_\mathsf{m} \leq \frac{1 + \gamma \mathsf{p}_1}{1+\gamma}. \tag{3.6}$$

In any other case, there is no θ_I *such that* $u^{\mathsf{L}}_{\theta_I}(x_\mathsf{L}, v_\mathsf{L}) = u^{\mathsf{R}}_{\theta_I}(x_\mathsf{R}, v_\mathsf{R})$.

Proof. Let us suppose $x_\mathsf{L} \neq x_\mathsf{R}$.

Let us start analyzing point (i), in which the indifferent voter attends to the leftist located media outlet. This occurs when $\theta_I \in [0, \mathsf{p}]$, with $p = \frac{a+b}{2}$.

In such a case, $\theta_I < 0 \Leftrightarrow x_\mathsf{m} < \frac{\gamma \mathsf{p}_0}{1+\gamma}$; and $\theta_I > \mathsf{p} \Leftrightarrow x_\mathsf{m} > \frac{\mathsf{p}+\gamma \mathsf{p}_0}{1+\gamma}$. Thus, $\theta_I \in [0, \mathsf{p}] \Leftrightarrow \frac{\gamma \mathsf{p}_0}{1+\gamma} \leq x_\mathsf{m} \leq \frac{\mathsf{p}+\gamma \mathsf{p}_0}{1+\gamma}$.

Analogously, we analyze point (ii), in which the indifferent voter attends to the rightist located media outlet. This occurs when $\theta_I \in [\mathsf{p}, 1]$.

In such a case, $\theta_I < \mathsf{p} \Leftrightarrow x_\mathsf{m} < \frac{\mathsf{p}+\gamma \mathsf{p}_1}{1+\gamma}$; and $\theta_I > 1 \Leftrightarrow x_\mathsf{m} > \frac{1+\gamma \mathsf{p}_1}{1+\gamma}$. Thus, $\theta_I \in [\mathsf{p}, 1] \Leftrightarrow \frac{\mathsf{p}+\gamma \mathsf{p}_1}{1+\gamma} \leq x_\mathsf{m} \leq \frac{1+\gamma \mathsf{p}_1}{1+\gamma}$.

To prove the uniqueness of θ_I, note that both, $\theta_I = x_\mathsf{m} + \gamma\left(x_\mathsf{m} - \mathsf{p}_0\right)$ and $\theta_I = x_\mathsf{m} + \gamma\left(x_\mathsf{m} - \mathsf{p}_1\right)$ are strictly increasing functions in x_m. Additionally, note also that

$$\frac{\gamma \mathsf{p}_0}{1+\gamma} < \frac{\mathsf{p} + \gamma \mathsf{p}_0}{1+\gamma} < \frac{\mathsf{p} + \gamma \mathsf{p}_1}{1+\gamma} < \frac{1 + \gamma \mathsf{p}_1}{1+\gamma}$$

since $\mathsf{a} \neq \mathsf{b}$, and then $\mathsf{p} \in (0, 1)$. Thus, any pair $(x_\mathsf{L}, x_\mathsf{R})$ implies a particular value of x_m, which is associated to a single value of θ_I. Hence, the uniqueness of θ_I. ■

We shall now illustrate the share of votes of the two candidates, for any situation $x_\mathsf{L} \neq x_\mathsf{R}$. We know that the indifferent voter, if exists, is unique. Thus, all $\theta < \theta_I$ vote for the leftist candidate, and all $\theta > \theta_I$ do for the rightist one. We have therefore a clear representation of the vote shares for the cases in which θ_I exists. It could be, however, that the indifferent voter does not exist. In such cases, and despite the existence problems, the share of votes of the two candidates is well defined. Thus, in the case $\theta_I < \frac{\gamma \mathsf{p}_0}{1+\gamma}$, all the voters vote for candidate c_1. Additionally, in the case $\theta_I > \frac{1+\gamma \mathsf{p}_1}{1+\gamma}$, all they vote for candidate c_0.[10] Finally, in the case $\theta_I \in \left[\frac{\mathsf{p}+\gamma \mathsf{p}_0}{1+\gamma}, \frac{\mathsf{p}+\gamma \mathsf{p}_1}{1+\gamma}\right]$, all $\theta < \mathsf{p}$ vote for c_0 and all $\theta > \mathsf{p}$ vote for c_1. Hence, there are no problems in determining the vote shares, even in the cases in which θ_I does not exist.

We shall now define the pseudo-indifferent voter as the value of θ_I which gives the two candidates the share of votes that they really get, for a given pair $(x_{\mathsf{L}}, x_{\mathsf{R}})$.

$$\widehat{\theta}_I(x_{\mathsf{m}}) = \begin{cases} 0 \text{ if } x_{\mathsf{m}} < \frac{\gamma \mathsf{p}_0}{1+\gamma} \\ x_{\mathsf{m}} + \gamma(x_{\mathsf{m}} - \mathsf{p}_0) \text{ if } \frac{\gamma \mathsf{p}_0}{1+\gamma} \leq x_{\mathsf{m}} \leq \frac{\mathsf{p}+\gamma \mathsf{p}_0}{1+\gamma} \\ \mathsf{p} \text{ if } \frac{\mathsf{p}+\gamma \mathsf{p}_0}{1+\gamma} \leq x_{\mathsf{m}} \leq \frac{\mathsf{p}+\gamma \mathsf{p}_1}{1+\gamma} \\ x_{\mathsf{m}} + \gamma(x_{\mathsf{m}} - \mathsf{p}_1) \text{ if } \frac{\mathsf{p}+\gamma \mathsf{p}_1}{1+\gamma} \leq x_{\mathsf{m}} \leq \frac{1+\gamma \mathsf{p}_1}{1+\gamma} \\ 1 \text{ if } x_{\mathsf{m}} > \frac{1+\gamma \mathsf{p}_1}{1+\gamma}. \end{cases}$$

We shall now represent these shares of votes,

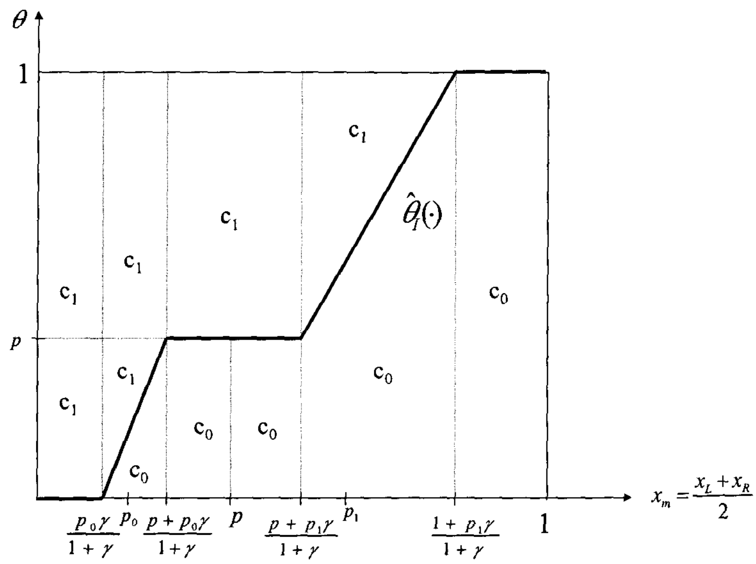

Figure 3.2: **Share of votes of the two candidates, when $x_{\mathsf{L}} \neq x_{\mathsf{R}}$.**

■ Equilibrium

We next analyze the equilibria that arise for the game in which the voters select between the outlets and may therefore have different perceptions about the candidates' valences. Remember that we have two different set-ups, depending on the location of the media outlets. The first set-up is when the two media outlets locate at the same point, $\mathsf{a} = \mathsf{b}$. The second one is when the two media differentiate, $\mathsf{a} \neq \mathsf{b}$.

Let us first consider that both media outlets locate at $\mathsf{a} = \mathsf{b}$. The equilibrium location for candidates in such a case is the same as the one we obtained in the case

[10] As previously, we denote $c_0 = \arg\min_{j \in \{\mathsf{L},\mathsf{R}\}}\{x_j\}$, and $c_1 = \arg\max_{j \in \{\mathsf{L},\mathsf{R}\}}\{x_j\}$.

of non selective voters, with $\omega = \frac{1}{2}$. Thus, we remit the reader to Proposition 3.2 in Section 3.3.

We then consider the case in which $\mathsf{a} \neq \mathsf{b}$. Here, we show that there are equilibria in which the candidates locate at the same point, as well as equilibria in which the candidates differentiate. The last result deserves more attention, as the existence of equilibria in which the candidates do not propose the same platform is not the classical result in a downsian model. The differentiation is here due to the fact that the voters select between outlets. Thus, the fact that voters receive all the information from one outlet makes politicians being only concerned with that media. In other words, that left-wing (resp. right-wing) voters receive all the information from the leftist (resp. rightist) media, makes candidate L (resp. R) being aware just of the leftist (resp. rightist) media. In contrast, if voters receive information from the two outlets, candidates should not forget about their pictures in the other media. In such a case, politicians would find it profitable to moderate their lines, in an attempt to aim the agreement of both media. The following proposition formalizes these ideas.

Proposition 3.4 *Suppose* $\mathsf{a} \neq \mathsf{b}$. *Then,*

(*i*) *If* $\theta_{\mathsf{m}} < \frac{\mathsf{a}+\mathsf{b}}{2}$, *the only equilibrium is* $x_{\mathsf{L}} = x_{\mathsf{R}} = \frac{\theta_{\mathsf{m}}+\gamma \mathsf{p}_0}{1+\gamma}$.

(*ii*) *If* $\theta_{\mathsf{m}} > \frac{\mathsf{a}+\mathsf{b}}{2}$, *the only equilibrium is* $x_{\mathsf{L}} = x_{\mathsf{R}} = \frac{\theta_{\mathsf{m}}+\gamma \mathsf{p}_1}{1+\gamma}$.

(*iii*) *If* $\theta_{\mathsf{m}} = \frac{\mathsf{a}+\mathsf{b}}{2}$, *the pairs* $(x_{\mathsf{L}}, x_{\mathsf{R}})$ *such that* $x_{\mathsf{L}}, x_{\mathsf{R}} \in \left[\frac{\theta_{\mathsf{m}}+\gamma \mathsf{p}_0}{1+\gamma}, \frac{\theta_{\mathsf{m}}+\gamma \mathsf{p}_1}{1+\gamma}\right]$, *are the only equilibria.*

Proof. We first show that $x_{\mathsf{L}} \neq x_{\mathsf{R}}$ and $\Pi_{\mathsf{L}}(x_{\mathsf{L}}, x_{\mathsf{R}}) \neq \Pi_{\mathsf{R}}(x_{\mathsf{L}}, x_{\mathsf{R}})$, cannot hold in equilibrium. The reason is that the candidate with less votes has an incentive to deviate and locate at $x_{\mathsf{L}} = x_{\mathsf{R}}$, where he gets by assumption one half of the votes. Thus, such a situation cannot hold in equilibrium.

Let us then consider a hypothetical equilibrium in which $x_{\mathsf{L}} \neq x_{\mathsf{R}}$ and $\Pi_{\mathsf{L}}(x_{\mathsf{L}}, x_{\mathsf{R}}) = \Pi_{\mathsf{R}}(x_{\mathsf{L}}, x_{\mathsf{R}}) = \frac{1}{2}$. Without lose of generality, let us assume $x_{\mathsf{L}} < x_{\mathsf{R}}$.

Let us suppose $x_{\mathsf{m}} < \frac{\gamma \mathsf{p}_0}{1+\gamma}$. In such a case, $\Pi_{\mathsf{L}}(x_{\mathsf{L}}, x_{\mathsf{R}}) = 0$. Thus, this situation cannot hold in equilibrium, as candidate L would find it strictly profitable to deviate and locate at $x_{\mathsf{L}} = x_{\mathsf{R}}$.

Analogously, $x_{\mathsf{m}} > \frac{1+\gamma \mathsf{p}_1}{1+\gamma}$, can neither hold in equilibrium.

Let us now suppose $\frac{\gamma \mathsf{p}_0}{1+\gamma} \leq x_{\mathsf{m}} < \frac{\mathsf{p}+\gamma \mathsf{p}_0}{1+\gamma}$. In such a case, $\widehat{\theta}_I = (1+\gamma)x_{\mathsf{m}} - \gamma \mathsf{p}_0$, with $\Pi_{\mathsf{L}}(x_{\mathsf{L}}, x_{\mathsf{R}}) = F\left(\widehat{\theta}_I\right) = \frac{1}{2}$, therefore $\widehat{\theta}_I = \theta_{\mathsf{m}}$. Let us suppose that candidate L deviates to $x'_{\mathsf{L}} \in (x_{\mathsf{L}}, x_{\mathsf{R}})$, with $x'_{\mathsf{m}} = \frac{x'_{\mathsf{L}}+x_{\mathsf{R}}}{2}$ and $\frac{\gamma \mathsf{p}_0}{1+\gamma} < x'_{\mathsf{m}} < \frac{\mathsf{p}+\gamma \mathsf{p}_0}{1+\gamma}$. In such a case, $\widehat{\theta}'_I = (1+\gamma)x'_{\mathsf{m}} - \gamma \mathsf{p}_0 > \theta_{\mathsf{m}}$ and therefore $\Pi_{\mathsf{L}}(x'_{\mathsf{L}}, x_{\mathsf{R}}) = F\left(\widehat{\theta}'_I\right) > \frac{1}{2}$. It is therefore not possible an equilibrium in which $\frac{\gamma \mathsf{p}_0}{1+\gamma} \leq x_{\mathsf{m}} < \frac{\mathsf{p}+\gamma \mathsf{p}_0}{1+\gamma}$.

Analogously, we prove that $\frac{\mathsf{p}+\gamma \mathsf{p}_1}{1+\gamma} < x_{\mathsf{m}} \leq \frac{1+\gamma \mathsf{p}_1}{1+\gamma}$ neither holds in equilibrium.

Let us then consider $\frac{\mathsf{p}+\gamma \mathsf{p}_0}{1+\gamma} \leq x_{\mathsf{m}} \leq \frac{\mathsf{p}+\gamma \mathsf{p}_1}{1+\gamma}$, with $\widehat{\theta}_I = \mathsf{p}$. In such a case, $\Pi_{\mathsf{L}}(x_{\mathsf{L}}, x_{\mathsf{R}}) = F\left(\widehat{\theta}_I\right) = F(\mathsf{p}) = \frac{1}{2}$, and therefore $\mathsf{p} = \theta_{\mathsf{m}}$.

Let us suppose $\frac{\mathsf{p}+\gamma\mathsf{p}_1}{1+\gamma} < x_\mathsf{R}$. Here, candidate L could deviate to $x'_\mathsf{L} \in \left(\frac{\mathsf{p}+\gamma\mathsf{p}_1}{1+\gamma}, x_\mathsf{R}\right)$, with $\widehat{\theta}'_I = \min\{(1+\gamma)x'_\mathsf{m} - \gamma\mathsf{p}_1, 1\} > \mathsf{p} = \theta_\mathsf{m}$, in which case $\Pi_\mathsf{L}(x'_\mathsf{L}, x_\mathsf{R}) = F\left(\widehat{\theta}'_I\right) > \frac{1}{2}$. Hence, $x_\mathsf{R} > \frac{\mathsf{p}+\gamma\mathsf{p}_1}{1+\gamma}$ cannot occur in equilibrium.

Analogously, let us suppose $x_\mathsf{L} < \frac{\mathsf{p}+\gamma\mathsf{p}_0}{1+\gamma}$. Here, candidate R could deviate to $x'_\mathsf{R} \in \left(x_\mathsf{L}, \frac{\mathsf{p}+\gamma\mathsf{p}_0}{1+\gamma}\right)$, with $\widehat{\theta}'_I = \max\{(1+\gamma)x'_\mathsf{m} - \gamma\mathsf{p}_0, 0\} < \mathsf{p} = \theta_\mathsf{m}$, in which case $\Pi_\mathsf{R}(x_\mathsf{L}, x'_\mathsf{R}) = 1 - F\left(\widehat{\theta}'_I\right) > \frac{1}{2}$. Hence, $x_\mathsf{L} < \frac{\mathsf{p}+\gamma\mathsf{p}_0}{1+\gamma}$ can neither occur in equilibrium.

Thus, we have shown that in the case there is an equilibrium of the sort $x_\mathsf{L} \neq x_\mathsf{R}$, it must be such that $\frac{\mathsf{p}+\gamma\mathsf{p}_0}{1+\gamma} \leq x_\mathsf{L} < x_\mathsf{m} < x_\mathsf{R} \leq \frac{\mathsf{p}+\gamma\mathsf{p}_1}{1+\gamma}$, with $\mathsf{p} = x_\mathsf{m}$. We next show that this configuration constitutes an equilibrium.

Let us consider that candidate L deviates to $x'_\mathsf{L} < x_\mathsf{L}$. In such a case, $\widehat{\theta}'_I \leq \mathsf{p} = \theta_\mathsf{m}$, therefore $\Pi_\mathsf{L}(x'_\mathsf{L}, x_\mathsf{R}) = F\left(\widehat{\theta}'_I\right) \leq \frac{1}{2}$. Thus, candidate L does not find it strictly profitable to deviate.

Let us consider that candidate L deviates to $x'_\mathsf{L} \in (x_\mathsf{L}, x_\mathsf{R})$. In such a case, $\widehat{\theta}'_I = \mathsf{p} = \theta_\mathsf{m}$, therefore $\Pi_\mathsf{L}(x'_\mathsf{L}, x_\mathsf{R}) = F\left(\widehat{\theta}'_I\right) = \frac{1}{2}$. Thus, candidate L does neither find it strictly profitable to deviate.

Let us consider that candidate L deviates to $x'_\mathsf{L} = x_\mathsf{R}$. In such a case, $\Pi_\mathsf{L}(x'_\mathsf{L}, x_\mathsf{R}) = \frac{1}{2}$ by assumption. Thus, candidate L does not find it strictly profitable to deviate.

Finally, let us consider that candidate L deviates to $x'_\mathsf{L} > x_\mathsf{R}$. In such a case, $\widehat{\theta}'_I \geq \mathsf{p} = \theta_\mathsf{m}$, therefore $\Pi_\mathsf{L}(x'_\mathsf{L}, x_\mathsf{R}) = 1 - F\left(\widehat{\theta}'_I\right) \leq \frac{1}{2}$. Thus, candidate L does neither find it strictly profitable to deviate.

We now consider a hypothetical equilibrium in which $x_\mathsf{L} = x_\mathsf{R}$. In such a case, $\Pi_\mathsf{L}(x_\mathsf{L}, x_\mathsf{R}) = \Pi_\mathsf{R}(x_\mathsf{L}, x_\mathsf{R}) = \frac{1}{2}$ by assumption.

Let us first suppose $x_\mathsf{L} = x_\mathsf{R} < \frac{\mathsf{p}+\gamma\mathsf{p}_0}{1+\gamma}$, and $\theta_\mathsf{m} \geq \mathsf{p}$. In such a case, either of the two candidates has a profitable deviation. Let us suppose that candidate R deviates to $x'_\mathsf{R} \in \left(x_\mathsf{L}, \frac{\mathsf{p}+\gamma\mathsf{p}_0}{1+\gamma}\right)$, with $\widehat{\theta}'_I = \max\{(1+\gamma)x'_\mathsf{m} - \gamma\mathsf{p}_0, 0\} < \mathsf{p} \leq \theta_\mathsf{m}$. Here, $\Pi_\mathsf{R}(x_\mathsf{L}, x'_\mathsf{R}) = 1 - F\left(\widehat{\theta}'_I\right) > \frac{1}{2}$. Thus, $\mathsf{p} \leq \theta_\mathsf{m}$ cannot occur in equilibrium.

Let us now suppose $x_\mathsf{L} = x_\mathsf{R} < \frac{\mathsf{p}+\gamma\mathsf{p}_0}{1+\gamma}$, and $\mathsf{p} > \theta_\mathsf{m}$. Let $\widehat{x}_\mathsf{m} \in \left(\frac{\gamma\mathsf{p}_0}{1+\gamma}, \frac{\mathsf{p}+\gamma\mathsf{p}_0}{1+\gamma}\right)$, be the single value of x_m such that $\widehat{\theta}_I(\widehat{x}_\mathsf{m}) = (1+\gamma)\widehat{x}_\mathsf{m} - \gamma\mathsf{p}_0 = \theta_\mathsf{m} \in (0,1)$. There are three possibilities.

In the first case, $\widehat{x}_\mathsf{m} < x_\mathsf{L} = x_\mathsf{R}$, either of the two candidates has a profitable deviation. Let us suppose that candidate L deviates to $x'_\mathsf{L} \in (\widehat{x}_\mathsf{m}, x_\mathsf{R})$. In such a case, $\widehat{\theta}'_I = (1+\gamma)x'_\mathsf{m} - \gamma\mathsf{p}_0 > (1+\gamma)\widehat{x}_\mathsf{m} - \gamma\mathsf{p}_0 = \theta_\mathsf{m}$, therefore $\Pi_\mathsf{L}(x'_\mathsf{L}, x_\mathsf{R}) = F\left(\widehat{\theta}'_I\right) > \frac{1}{2}$.

In the second case, $x_\mathsf{L} = x_\mathsf{R} < \widehat{x}_\mathsf{m}$, either of the two candidates has also a profitable deviation. Let us suppose that candidate R deviates to $x'_\mathsf{R} \in (x_\mathsf{L}, \widehat{x}_\mathsf{m})$. In such a case, $\widehat{\theta}'_I = (1+\gamma)x'_\mathsf{m} - \gamma\mathsf{p}_0 < (1+\gamma)\widehat{x}_\mathsf{m} - \gamma\mathsf{p}_0 = \theta_\mathsf{m}$, therefore $\Pi_\mathsf{R}(x_\mathsf{L}, x'_\mathsf{R}) = 1 - F\left(\widehat{\theta}'_I\right) > \frac{1}{2}$.

We now show that the third case, $x_\mathsf{L} = x_\mathsf{R} = \widehat{x}_\mathsf{m}$, constitutes an equilibrium.

Let us suppose that candidate L deviates to $x'_{\mathsf{L}} < x_{\mathsf{L}} = x_{\mathsf{R}} = \widehat{x}_{\mathsf{m}}$. In such a case, $\widetilde{\theta}'_I < (1+\gamma)\widehat{x}_{\mathsf{m}} - \gamma \mathsf{p}_0 = \theta_{\mathsf{m}}$. Thus, $\Pi_{\mathsf{L}}(x'_{\mathsf{L}}, x_{\mathsf{R}}) = F\left(\widetilde{\theta}'_I\right) < \frac{1}{2}$.

Let us suppose that candidate L deviates to $x'_{\mathsf{L}} > x_{\mathsf{L}} = x_{\mathsf{R}} = \widehat{x}_{\mathsf{m}}$. In such a case, $\widetilde{\theta}'_I > (1+\gamma)\widehat{x}_{\mathsf{m}} - \gamma \mathsf{p}_0 = \theta_{\mathsf{m}}$. Thus, $\Pi_{\mathsf{L}}(x'_{\mathsf{L}}, x_{\mathsf{R}}) = 1 - F\left(\widetilde{\theta}'_I\right) < \frac{1}{2}$.

We have shown that candidate L does not have a profitable deviation, what also holds for candidate R. Thus, there is an equilibrium such that $x_{\mathsf{L}} = x_{\mathsf{R}} = \widehat{x}_{\mathsf{m}}$, with $\widehat{x}_{\mathsf{m}} \in \left(\frac{\gamma \mathsf{p}_0}{1+\gamma}, \frac{\mathsf{p}+\gamma \mathsf{p}_0}{1+\gamma}\right)$, $(1+\gamma)\widehat{x}_{\mathsf{m}} - \gamma \mathsf{p}_0 = \theta_{\mathsf{m}}$ and $\mathsf{p} > \theta_{\mathsf{m}}$. That is to say, there is an equilibrium $x_{\mathsf{L}} = x_{\mathsf{R}} = \frac{\theta_{\mathsf{m}}+\gamma \mathsf{p}_0}{1+\gamma}$, with $\theta_{\mathsf{m}} < \mathsf{p}$.

Analogously, we prove that there is an equilibrium $x_{\mathsf{L}} = x_{\mathsf{R}} = \frac{\theta_{\mathsf{m}}+\gamma \mathsf{p}_1}{1+\gamma}$, with $\theta_{\mathsf{m}} > \mathsf{p}$.

Finally, we consider those situations such that $x_{\mathsf{L}} = x_{\mathsf{R}} \in \left[\frac{\mathsf{p}+\gamma \mathsf{p}_0}{1+\gamma}, \frac{\mathsf{p}+\gamma \mathsf{p}_1}{1+\gamma}\right]$.

Let us suppose $\mathsf{p} < \theta_{\mathsf{m}}$. In such a case, either of the two candidates has a profitable deviation. Let us suppose that candidate R deviates to $x'_{\mathsf{R}} \in \left(x_{\mathsf{L}}, \frac{\mathsf{p}+\gamma \mathsf{p}_1}{1+\gamma}\right]$, with $\widetilde{\theta}'_I = \mathsf{p} < \theta_{\mathsf{m}}$. Then, $\Pi_{\mathsf{R}}(x_{\mathsf{L}}, x'_{\mathsf{R}}) = 1 - F\left(\widetilde{\theta}'_I\right) > \frac{1}{2}$.

Let us now suppose $\mathsf{p} > \theta_{\mathsf{m}}$. In such a case, either of the two candidates has also a profitable deviation. Let us suppose that candidate L deviates to $x'_{\mathsf{L}} \in \left[\frac{\mathsf{p}+\gamma \mathsf{p}_0}{1+\gamma}, x_{\mathsf{R}}\right)$, with $\widetilde{\theta}'_I = \mathsf{p} > \theta_{\mathsf{m}}$. Then, $\Pi_{\mathsf{L}}(x'_{\mathsf{L}}, x_{\mathsf{R}}) = F\left(\widetilde{\theta}'_I\right) > \frac{1}{2}$.

We now show that $x_{\mathsf{L}} = x_{\mathsf{R}} \in \left[\frac{\mathsf{p}+\gamma \mathsf{p}_0}{1+\gamma}, \frac{\mathsf{p}+\gamma \mathsf{p}_1}{1+\gamma}\right]$, with $\mathsf{p} = \theta_{\mathsf{m}}$ constitutes an equilibrium.

Let us suppose that candidate L deviates to $x'_{\mathsf{L}} < x_{\mathsf{L}} = x_{\mathsf{R}}$. In such a case, $\widetilde{\theta}'_I \leq \mathsf{p} = \theta_{\mathsf{m}}$. Then, $\Pi_{\mathsf{L}}(x'_{\mathsf{L}}, x_{\mathsf{R}}) = F\left(\widetilde{\theta}'_I\right) \leq \frac{1}{2}$.

Let us suppose that candidate L deviates to $x_{\mathsf{L}} = x_{\mathsf{R}} < x'_{\mathsf{L}}$. In such a case, $\widetilde{\theta}'_I \geq \mathsf{p} = \theta_{\mathsf{m}}$. Then, $\Pi_{\mathsf{L}}(x'_{\mathsf{L}}, x_{\mathsf{R}}) = 1 - F\left(\widetilde{\theta}'_I\right) \leq \frac{1}{2}$.

Hence, there is an equilibrium $x_{\mathsf{L}} = x_{\mathsf{R}} \in \left[\frac{\theta_{\mathsf{m}}+\gamma \mathsf{p}_0}{1+\gamma}, \frac{\theta_{\mathsf{m}}+\gamma \mathsf{p}_1}{1+\gamma}\right]$ with $\mathsf{p} = \theta_{\mathsf{m}}$. ∎

From Proposition 3.4 we learn that in the case $\theta_{\mathsf{m}} \neq \frac{\mathsf{a}+\mathsf{b}}{2}$, i.e., when the two media outlets are located in such a way that the median voter only attends to one outlet, both candidates locate themselves at the same point, which is a convex combination of the location of the median voter and that of the most popular outlet. In contrast, in the case $\theta_{\mathsf{m}} = \frac{\mathsf{a}+\mathsf{b}}{2}$, i.e., when the median voter is exposed to both media outlets, the candidates may well locate at the same point or differentiate in equilibrium. More precisely, with respect to the latter case, we observe that there are equilibria in which the candidates locate symmetrically about the center, i.e., the median voter, as well as equilibria in which the candidates do not position in such a way. That is to say, it is possible that there exists an equilibrium in which one candidate proposes a more moderate platform than the other, and despite this, they tie. We further observe that in the case of $\theta_{\mathsf{m}} = \frac{\mathsf{a}+\mathsf{b}}{2}$, the two media outlets polarize their ideologies more than the candidates differentiate their platforms.

To summarize then, whenever one outlet is more popular than the other, the candidates do not differentiate but rather locate at the same point, with the aim of getting the support of the most popular media outlet. On the other hand, whenever each media outlet has one half of the audience, the candidates may find it profitable to locate at any point in the interval $\left[\frac{\theta_m+\gamma p_0}{1+\gamma}, \frac{\theta_m+\gamma p_1}{1+\gamma}\right]$, as both media have now the same audience and thus, the support of any outlet is equally important.

Finally, the reader should also note that all the equilibria in the case $\theta_m = \frac{a+b}{2}$, are weak Nash Equilibria. This means that if a candidate deviates to some other location in the interval $\left[\frac{\theta_m+\gamma p_0}{1+\gamma}, \frac{\theta_m+\gamma p_1}{1+\gamma}\right]$, the new situation will also be an equilibrium. We guess that this might explain why minor changes in a candidate's platform from one election to another does not imply any great difference in election outcomes. Or in other words, the vote share of candidates does not change when their platforms do.

3.5 Discussion

Before concluding, we would like to stress some aspects that we think deserve more attention.

■ The results we present in Proposition 3.2 and 3.4 are much more general than what has been shown. In fact, these results hold whenever the utility function of the voters is such that we can write the expression for the indifferent voter as a function of x_m, with $\theta_I(x_m)$ being a monotone increasing function in x_m. In such cases, the arguments in the proof of both Propositions apply, and thus, we can generalize these results to any other function satisfying the specified requirements. With respect to this, we guess that any concave utility function for the voters could be expressed in such a way. We do not, however, have any proof for this, but we think it would be an interesting analysis for future research.

■ The result *(iii)* of Proposition 3.4, in which the candidates may differentiate their platforms, is not an exceptional result due to the particular way in which the voters expose themselves to the media. This result, however, can be obtained from any model in which a set of voters, of positive measure, attends to one outlet, and another set attends to the other media. Thus, whenever $\theta \in [p-\varepsilon, p+\varepsilon]$ with $\varepsilon > 0$, expose themselves to both media, and the rest of the voters solely attend to their closest media outlet, it is possible that candidates differentiate their platforms in equilibrium. In such a case, we obtain that whenever $\theta_m = p - \varepsilon$ or $\theta_m = p - \varepsilon$, candidates may differentiate in equilibrium. This means that for candidates to find it profitable to propose different policies, one media outlet must be more popular than the other, i.e., one of the outlets must reach more than fifty per cent of the voters. In such a case, we may have an equilibrium in which the candidates differentiate. In contrast, if only the voter who is equidistant from the two outlets attend to both media, the candidates may differentiate only when $\theta_m = p$, i.e., when the two outlets are equally popular. Finally, let us consider a set-up in which all the voters are exposed to both media outlets, even if in different proportions. In such a case, the only equilibrium that exists implies that the candidates locate at the same point. Hence, we observe that the platform differentiation result requires that a number of voters, of positive measure, receive all their information from just one media. This is the case, for example, of a model in which the extreme voters suffer from confirmatory bias, and thus, only attend to their closest located media outlet.

■ Finally, we briefly discuss the result in which the candidates differentiate their platforms, which might well be the most interesting result presented in this paper. We do so because the differentiation outcome is obtained in this model when $\theta_m = \frac{a+b}{2}$, which has zero measure relative to the set of parameters. Thus, in order to highlight this result that otherwise would not be very likely in equilibrium, we make an overview of the spatial models that have been proposed in the literature, in which the equilibrium implies that the agents locate symmetrically about the median agent. In this way, we propose a number of situations in which $\theta_m = \frac{a+b}{2}$, with $a \neq b$, would be the equilibrium, and so, we stress the result in which the candidates polarize their locations.

The seminal Hotelling (1929) model establishes the bases for the theory of spatial competition, in which it is well known that the firms locate at the same point in equilibrium only when they compete for profits and we restrict the analysis to non-price competition. In any other case, differentiation of locations can be obtained as the equilibrium outcome. D'Aspremont et al., (1979) show that we could get the opposite result to the one proposed by Hotelling with a very small change in the seminal model, namely by switching from linear to quadratic transportation costs. In such a case, the Hotelling model in which two firms choose first, where to locate, and then, the price to charge for their products, ends up in a polarization of the firms' locations. This is the case when the agents are distributed according to a uniform distribution function in a linear market and the transportation costs are quadratic.

This sort of structure can be easily applied to a model in which two newspapers compete in ideology and price, i.e., in the ideology they display in their news, and in the street price of their newspaper. Schulz and Weimann (1989) consider a model in which two newspapers compete in these two variables, and show that newspapers polarize their ideological orientations in equilibrium, such locations being symmetric about the median reader.[11] Gabszewicz et al., (2001) propose the same sort of model, but they add a third stage in which newspaper editors have to decide on the advertising tariff. They show that the final stage completely upsets the above prediction, inducing the softening of the newspapers' political opinions for the cases in which readers' political preferences are weak or advertising earnings are high. Otherwise, newspaper editors choose different ideologies.

On the other hand, Andina Díaz (2004a) analyzes a model in which two tv stations compete for political influence, either reinforcing viewers in their prior opinions, or modifying their opinions. She shows that in the case of viewers being uniformly

[11] They restrict their analysis to the study of symmetric equilibria, and so their results are always symmetric about the median viewer, which is $\frac{1}{2}$ as they assume a uniform distribution function.

distributed, and being exposed exclusively to the outlet that is closest to their ideological position, the location of the tv stations in equilibrium is symmetric about the center. This is a particular case of a more general result, which holds whenever firms aim to minimize the distance between their locations and that of their buyers. In Andina Díaz (2004a), to reinforce viewers in their prior attitudes means, for media outlets, to minimize their distance from the viewers. Hence the result. This equilibrium outcome can be obtained, however, in any model in which firms aim to minimize such a distance. Another case in which media outlets would have such an aim is in the case of two newspapers who know that readers only buy a newspaper if it is sufficiently close to their own ideology. In such a case, the newspaper editors would want to display the ideology that attracts the highest number of readers. To illustrate this idea, let us consider two newspapers, A and B, that choose locations $\mathsf{a}, \mathsf{b} \in [0,1]$ respectively. Let us also suppose that readers, who only buy one newspaper, are distributed according to a uniform distribution function, and that those readers located further than $\frac{1}{4}$ distance from either daily do not buy any press. In such a case, neither newspaper finds it optimal to locate at $\mathsf{a} = \mathsf{b} = \frac{1}{2}$, since any movement of one daily towards either extreme gives it a greater number of readers. To illustrate this, let us suppose that newspaper A moves to position $\frac{1}{4}$. In such a case, newspaper A sells to all of the readers from 0 to $\frac{1}{4}$, and also to all the people between A and B who are closer to A. As B has not moved, it gains all of the readers between $\frac{3}{8}$ and $\frac{3}{4}$. Newspaper B, however, has a profitable deviation, as by locating at $\frac{3}{4}$ it sells to all of the readers between $\frac{1}{2}$ and $\frac{3}{4}$. The unique equilibrium is therefore $\left(\mathsf{a}^* = \frac{1}{4}, \mathsf{b}^* = \frac{3}{4}\right)$, with $\frac{\mathsf{a}^*+\mathsf{b}^*}{2} = \theta_{\mathsf{m}}$.

3.6 Conclusion

The aim of this paper is to analyze political competition in a model in which voters vote according to ideology and valence, and valence is set by the media. By so doing, we contribute to the emerging literature on the valence issue, which considers the importance that image effects have on voters. Most of the papers in this literature consider valence as something exogenously given in the models. We, however, go further by proposing a model in which, as well as endogenizing the valence, we make it dependent on what the media say. The reason for this is that empirical evidence shows that people create the pictures of the politicians based on the information they receive, which mainly comes from the media. In McCombs's words: "To a considerable degree, the news media literally create in our heads the pictures of many public issues... Going beyond public issues, there is also good evidence that news coverage influences the pictures that people have of the candidates vying for political office".

In this paper, we study political competition under two different set-ups. First, we consider the case of voters who are exposed to the two media outlets of the economy. Second, we analyze the case of voters who are just exposed to the ideologically closest media. The results we obtain state that candidates realize the power

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of media, and therefore locate at some point between the position of the median voter and that of the media. The precise location, however, depends on the way the voters attend to the media. Hence, in the case of voters being exposed to both outlets, candidates tend to moderate their platforms, in an attempt to get the favor of both media. On the other hand, in the case of voters selecting between the outlets, candidates may differentiate. The reason for this is that in such a case, enjoying the loyalty of one outlet, may be more important than merely having good relations with both.

The lesson we draw is therefore that political competition may end up in polarization if voters suffer from confirmatory bias and therefore solely attend to the ideologically closest media. In contrast, political moderation is easily reached if voters get information from various sources and therefore make more balanced judgments.

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Reunido el Tribunal que suscribe en el día de la fecha acordó otorgar, por unanimidad a la Tesis Doctoral de Don/Dña. Ascensión Andina Díaz la calificación de SOBRESALIENTE CUM LAUDE (10)

Alicante 8 de Octubre de 2004.

El Secretario, El Presidente,

... tesis doctoral realizada por D/Dª Ascensión Andina Díaz ... en las siguientes lenguas: castellano e inglés, lo que unido al cumplimiento del resto de requisitos establecidos en la Normativa propia de la UA le otorga la mención de "Doctor Europeo"

Alicante, 8 de Octubre de 2004

EL SECRETARIO EL PRESIDENTE

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Comisión de Doctorado

La presente Tesis de D. Ascensión Andina Díaz ha sido registrada al Folio ... con el n.º 1029-129E del registro de entrada correspondiente.

Alicante 13 de octubre de 2004

El Encargado del Registro,