The economic advantage of "being the voice of the majority"
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Abstract

In this paper, we analyze the static interaction in prices between two newspapers that compete with each other in the circulation and in the advertising markets. We exploit the two-sided nature of the newspaper industry to analyze a demand-side effect that generates an endogenous mechanism of concentration in the press industry: "the circulation spiral" effect.

*I would like to thank Prof. Gabszewicz for his helpful and motivating comments

1 Introduction

In the last decades the newspaper industry has experienced significant structural changes. One of the most relevant changes is related to the important modifications in the newspaper ownership and market structures that lead to a continuous increase in the degree of concentration in this industry (Rosse (1967),Dertouzos and Trautman (1990), George and Waldfogel (2003) and Genesove (2004) provide some empirical evidence on this tendency). This phenomenon gave rise to exciting debates essentially focused on the impacts of concentration on the variety and pluralism of information. Given the relevant role played by newspapers on the diffusion of political, cultural and social information, it has been widely discussed whether such a reduction on the number of newspapers might have a detrimental effect on the pluralism of ideas and on the economic welfare (George, 2001). The concentration in the newspaper industry has also attracted the interest of the academic community and both theoretical and empirical studies have contributed to a better understanding about the desirability and the determinants for the concentration in the newspaper industry.

This paper provides a theoretical contribution to the literature on the determinants for the concentration in the newspaper industry. More precisely, we exploit the two-sided nature of the newspaper market to analyze a static demand-side mechanism that generates an endogenous tendency for concentration in this industry. Therefore, this paper is closely related to the recent literature on the two-sided nature of the media markets (Anderson and Coate (2005); Dukes and Gal-Or (2003) and Gabszewicz et al (2001)).

The two-sided nature of the newspaper industry comes from the mutual cross network effects that readers and advertisers exert over each other. On one hand, the newspaper's "eyeballs" (i.e. the dimension and the composition of the newspaper readership) exert a positive externality over advertisers. Everything else the same, when an ad reaches a larger readership, it is able to inform a higher number of readers about the product's characteristics and, consequently, the number of potential buyers is higher and so it is the expected profit from that ad.

On the other hand, the number of advertisements exhibited by newspapers also affects readers' utility. Nevertheless, the sign of these cross externalities (of advertisers over readers) is not as obvious as in the previous case. The majority of the papers about the two-sided nature of the media markets, like Anderson and Coate (2005) or Dukes and Gal-Or (2003), assume that advertising is a nuisance for consumers and, accordingly, advertisers exert negative externalities over readers. This assumption is quite reasonable in the case of media like television or radio, where ads actually require an interruption of the programme (therefore the nuisance). Nevertheless, in the case of newspapers (and in the case of the press in general), that assumption is not necessarily the most adequate one. The few empirical studies on the readers' attitudes towards advertising, namely Kaiser (2006) and Kaiser and Wright (2005), suggest that, contrarily to other media, in the case of press,[1] readers do love advertising (or at least, they do not dislike it). Two major reasons can be pointed out to justify the readers' positive attitude towards advertising.

Firstly, newspapers' ads cannot exert a strong nuisance over readers because, conversely to what happens in other media (like television or radio), readers can easily skip ads and go directly to the editorial content without incurring in any significant cost. Therefore, readers must be, at least, neutral to advertising. Even so, advertisers still spending significant amounts in newspapers' advertisements, which is only rational if a sufficient number of readers reads the ads (even when they could skip them) and, obviously, those readers' behavior is only rational when they exhibit positive attitudes towards advertising.

A second justification for the readers' positive attitude towards advertising comes from the significant proportion of newspaper's ads that corresponds to informative advertising, which usually has a positive impact in the readers' welfare. The newspaper's classified ads illustrates quite well this point. They constitute a privileged compilation of information on the availability and the characteristics of a wide range of goods/ services in numerous issues like housing, second-hand cars, employment and leisure.

For the reasons abovementioned, in this paper we consider that readers are "*ad-lovers*" and we show that, under those circumstances, even in a static context, the positive cross-network effects in the newspaper industry originate an endogenous mechanism of concentration: the "*circulation spiral*" mechanism.

To our knowledge, very few papers treated this question explicitly. Gustaffson (1978) provides a heuristic and informal explanation for the concentration mechanism aforementioned:

> *"The larger of the two competing newspapers is favored by a process of mutual reinforcement between circulation and advertising, as a larger circulation attracts advertisements, which in turn attracts more advertising and more readers. In contrast, the smaller of two competing newspapers is caught in a vicious circle; its circulation has less appeal for advertisers, and it loses readers if the newspaper does not contain attractive advertising."*

In this paper, we provide a formal and static analysis for the "*circulation spiral*" mechanism previously described. This static analysis constitutes a first but indispensable step towards the dynamic analysis of the "*circulation spiral*" mechanism.

More precisely, we consider an asymmetric duopolistic industry, where the asymmetry comes from the differences in the newspapers' political positioning: while one of the newspapers is the voice of the majority's ideology, the other newspaper shares the minority's political background and it has a small number of potential readers. Considering this exogenous asymmetry between the two

[1] More precisely in the case of German magazines.

newspapers, we carry on a static analysis to ascertain if the smaller of the newspapers can be forced to leave the market as a result of the mutual reinforcement between circulation and advertising.

To our knowledge, only two papers addressed this question formally. Gabszewicz et al (2002) present a static model where newspapers interact sequentially in the circulation and in the advertising market and they show that, when the fraction of readers that love advertising and the "*ad-love*" intensities are sufficiently high, only one of the newspapers is able to survive.

Gabszewicz et al (2006) analyze the interaction between the advertising and circulation markets in a dynamic model. They consider an asymmetric duopolistic industry where newspapers are politically differentiated and freely distributed and they show that, under certain circumstances, the "*circulation spiral*" mechanism will not be sufficient to force the smaller of the two newspapers to leave the market even when all the readers love advertising[2]. Gabszewicz et al (2006) point out a very interesting framework to carry on a dynamic analysis of the newspaper market. Unfortunately, their model does not take into account that newspapers can exploit multiple strategic instruments (like cover prices or advertising prices) in order to avoid or accelerate the "*circulation spiral*" effect. In this note, we provide a natural extension of the static model in Gabszewicz et al (2006), in order to investigate whether their conclusions still hold when newspapers are able to charge positive cover prices and use them as strategic instruments to accelerate or avoid the "*circulation spiral*" effect. This static analysis constitutes a first contribution to a more ambitious research project on the analysis of the dynamic competition between newspapers.

Our first main finding is that, in the context of an extended version of the model in Gabszewicz et al (2006), the static price equilibrium does not always exist and, thereby, a significant part of the paper is devoted to identify the necessary and sufficient conditions for the existence of the price equilibrium in the newspaper industry. Such an analysis is important for two reasons. Firstly, because if the price equilibrium does not exist, there is no point in arguing that newspapers can strategically employ their pricing policies to accelerate or avoid the "*circulation spiral*" mechanism; and secondly, because when there is no static price equilibrium, any dynamic analysis of the "*circulation spiral*" mechanism is useless.

Our second main finding is that, when the price equilibrium exists, it is still possible to point out a survival condition. Indeed, as long as the readers' "*ad-love*" intensities are below the maximal threshold pointed out afterwards, the larger of the two competing newspapers is not able to evict the smaller one from the market.

Finally, we also demonstrated that in this static framework, even when the survival condition is accomplished, the larger newspaper always has an economic advantage over the smaller one, meaning that being the voice of the majority's ideology is always strategically advantageous.

[2] To a certain extent, these results are in line with Furhoff (1973) who already argued that newspapers could employ a strategy of differentiation in order to avoid the "*circulation spiral*" effect.

The rest of the paper is organized as follows: section 2 presents the main ingredients of the model; section 3 encompasses the equilibrium analysis and, finally, section 4 concludes.

2 The model

We consider two competing newspapers (newspaper 1 and 2), which produce editorial content and, simultaneously, act as platforms between readers and advertisers. In addition, we consider that these newspapers have different political ideologies. Each newspaper is located at the opposite extreme of the spectrum of political ideologies that we represent by the interval $[0, 1]$. Newspaper 1 (”*left wing*”) is located at point 0 and newspaper 2 (”*right wing*”) is located at point 1. Given the distinct political positioning of each newspaper, they produce differentiated editorial content (horizontal differentiation). However, the newspaper's political background does not play any influence in the newspapers' advertising content and only the amount of advertising differentiates the two newspapers (vertical differentiation).

In the advertising market, we consider a number of advertisers, say A, willing to buy advertising space in order to inform readers about their products' characteristics (informative advertising). We assume that each of the advertisers budgets one monetary unit for advertising expenses and we consider that they always multi-home in order to reach the entire audience. More precisely, we assume that the advertisers allocate their advertising budget across newspapers according to the ideological distribution of readers. The demand for advertising faced by newspaper i , say a_i, is then given by $a_i = A\lambda_i$ (where λ_i is assumed to be the proportion of readers that share the newspaper's i $(i = 1, 2)$ political background, $\lambda_1, \lambda_2 \in]0, 1[$ and $\lambda_1 + \lambda_2 = 1$).

Conditional on the newspapers' political positioning and on the newspapers' demand for advertising, newspaper i $(i = 1, 2)$ maximizes its profits from the circulation market, where newspapers offer readers both politically differentiated news and informative advertising. We assume that all the readers have homogeneous attitudes towards advertising and they value positively the amount of advertising exhibited in each newspaper (*”ad-love” assumption*) .

Conversely, readers present heterogeneous preferences concerning the newspaper's editorial content. We distinguish two types of readers: readers type 1 (*”leftists”*) and readers type 2 (*”rightists”*); λ_1 and λ_2 respectively represent the mass of readers of type 1 and 2. Moreover, even readers from the same type have heterogeneous preferences over the newspapers' editorial content. We consider that each group of readers is uniformly distributed along the interval $[0, 1]$ according to the importance that each of them attributes to the political color of the newspaper. Accordingly, the complete description of a reader's preferences over editorial content requires the identification of the reader's type $(i = 1, 2)$ as well as the reader's position along the aforementioned interval, which we denote by $m \in [0, 1]$. Thus, for a reader of type i located at point m, the utility functions associated with reading newspaper i and j are given respectively by:

$$\begin{aligned} U_i(i,m) &= m + sa_i - p_i, \\ U_j(i,m) &= sa_j - p_j, \end{aligned}$$

where m measures the *"intensity"* of political preferences, s $(s > 0)$ indicates the *"ad-love" intensity,* a represents the amount of advertising and p is the newspaper's cover price. Finally, we assume that all the readers single-home and that the cover price domains are restricted to the combinations of (p_i, p_j) such that every reader in the population buys one newspaper (meaning that the market is always covered).

In this framework, readers of type i with $m - values$ such that $U_i(i,m) \geq U_j(i,m)$ buy newspaper i, which is equivalent to say that all the readers with $m - values$ higher than $s(a_j - a_i) - (p_j - p_i)$ buy newspaper i. Accordingly, the reader of type i located at $\overline{m} = s(a_j - a_i) - (p_j - p_i)$ divides the readers of type i into two mutually exclusive groups: those who buy newspaper i and those who switch to newspaper j. Notice that, if the reader of type i located at $\overline{m}$ switches to newspaper j,the utility's gain originated by the superior advertising level and/or the inferior cover price of newspaper j, given by $s(a_j - a_i) - (p_j - p_i)$, exactly offsets the loss in utility caused by the dissimilarity between the reader's i political ideology and the political content of newspaper's j news (scored by $\overline{m}$). Therefore, readers of type i with more moderate political preferences $(m < \overline{m})$ buy newspaper j because their opportunity costs of switching are relatively low. Conversely, readers of type i with more radical political positions $(m > \overline{m})$ buy newspaper i despite its lower advertising level and/or higher cover prices.

Furthermore, given that $m \in [0,1]$, if $\overline{m} \leq 0$ all the readers of type i buy newspaper i, if $\overline{m} \geq 1$ all the readers of type i switch to newspaper j, and finally, if $0 < \overline{m} < 1$, some of the readers of type i buy newspaper i while others switch to the rival newspaper. Analogously, it is possible to disclose the behavior of readers of type j. Figure 1 illustrates the behavior of the readers of both types.

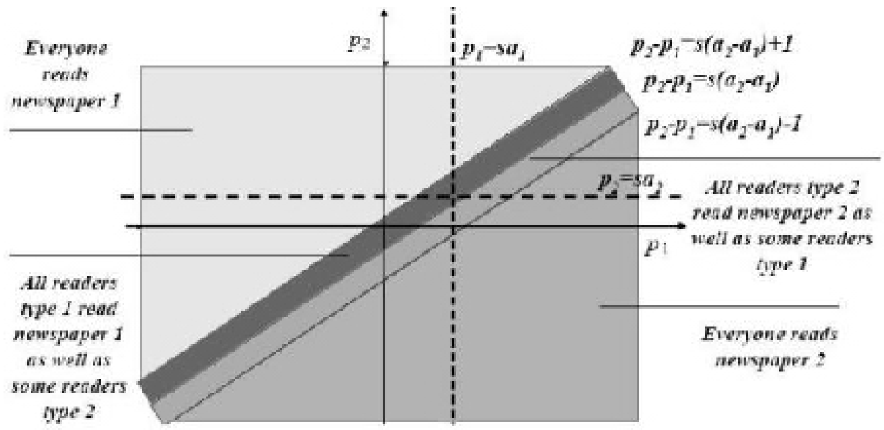

Figure 1: Analysis of the readers behavior ($s = 2, \lambda_1 = 0.7; \lambda_2 = 0.3; A = 0.9$ and $a_i = A\lambda_i$)

Given the behavior of both types of readers, it is straightforward to derive the circulation demand faced by each newspaper ($i = 1, 2$) conditional on their advertising levels and cover prices. For ease of exposition, from this point on, we employ the following notation to designate the price domains:

$$\begin{aligned}
D_1 &= \{(p_i, p_j) : p_j - p_i \geq s(a_j - a_i) + 1\}\,; \\
D_2 &= \{(p_i, p_j) : s(a_j - a_i) < p_j - p_i < s(a_j - a_i) + 1\}\,; \\
D_3 &= \{(p_i, p_j) : s(a_j - a_i) - 1 < p_j - p_i \leq s(a_j - a_i)\}\,; \\
D_4 &= \{(p_i, p_j) : p_j - p_i \leq s(a_j - a_i) - 1\}\,.
\end{aligned}$$

And, the circulation demand faced by each newspaper ($i = 1, 2$) is given by:

$$\begin{aligned}
d_i(p_i, p_j) &= \begin{cases} 1 & if \quad (p_i, p_j) \in D_1 \\ \lambda_i + \lambda_j[s(a_i - a_j) - (p_i - p_j)] & if \quad (p_i, p_j) \in D_2 \\ \lambda_i[1 - (s(a_j - a_i) - (p_j - p_i))] & if \quad (p_i, p_j) \in D_3 \\ 0 & if \quad (p_i, p_j) \in D_4 \end{cases} \\
with\ p_i &\leq sa_i\ and\ p_j \leq sa_j.
\end{aligned}$$

Given the newspaper's i demand for circulation and normalizing the newspapers' costs to zero[3], the profits from circulation are expressed as:

[3] The assumption of null costs simplifies substantially the analysis and it does not change the qualitative nature of our results. Moreover, in this paper, we are exclusively focused on

$$
\pi_i(p_i,p_j) = \begin{cases} p_i & if \quad (p_i,p_j) \in D_1 \\ \lambda_i p_i + \lambda_j p_i \left(s(a_i - a_j) + p_j\right) - \lambda_j p_i^2 & if \quad (p_i,p_j) \in D_2 \\ \lambda_i p_i + \lambda_i p_i (s(a_i - a_j) + p_j) - \lambda_i p_i^2 & if \quad (p_i,p_j) \in D_3 \\ 0 & if \quad (p_i,p_j) \in D_4 \end{cases}
$$

$$
with\ p_i \leq sa_i\ and\ p_j \leq sa_j.
$$

Notice that both the profit function and the demand for circulation are continuous functions of prices. Nevertheless, they are not necessarily concave in prices. Actually, in case of asymmetric distribution of political ideologies across readers ($\lambda_i > \lambda_j, i = 1, 2$), the majority's newspaper demand is concave in prices, but the minority's newspaper demand is not. [4] Figure 2 illustrates this point.

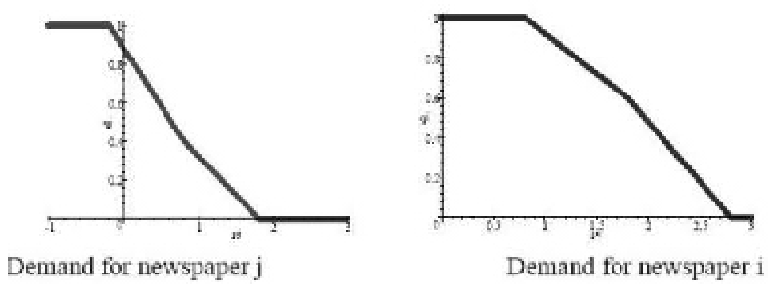

Figure 2: Newspapers' demands for circulation when $\lambda_i > \lambda_j$ ($\lambda_i = 0.6; \lambda_j = 0.4; s = 5;\ A = 0.9; p_i = 1.7$ (in newspaper's j demand) and $p_j = 0.9$ (in newspapers's i demand), $a_i = A\lambda_i$).

Likewise, when $\lambda_i > \lambda_j$ ($i = 1, 2$), the minority's newspaper profit function is not concave in prices (due to the non-concavity of the demand for circulation) and, consequently, it is not clear that an equilibrium in prices will always exist. More precisely, the existence problems will occur for the parameters' values such that the profit function of the minority's newspaper have two local maxima, say $p_j^*$and p_j' (with p_i^* being the optimal pricing policy of newspaper i with respect to p_j^* but not to p_j'), and the profit obtained by the minority's newspaper is

the pure demand-side determinants for the concentration in the newspaper industry. Consequently, the assumption of null costs allows us to control for the supply-side determinants. Those determinantes are already widely studied in the literature, namely in the body of literature that studies the effects of fixed and sunk costs in the market structure.

[4] Conversely, in case of symmetric distribution of political ideologies across readers ($\lambda_i = \lambda_j = \frac{1}{2}$), both newspapers present concave demand functions in prices.

higher for $p_j = p'_j$. Accordingly, the equilibrium in prices does not exist because the minority's newspaper have incentives to deviate from the pricing strategy associated with the pair of prices candidate to equilibrium (p_i^*, p_j^*). Figure 3 illustrates this point.

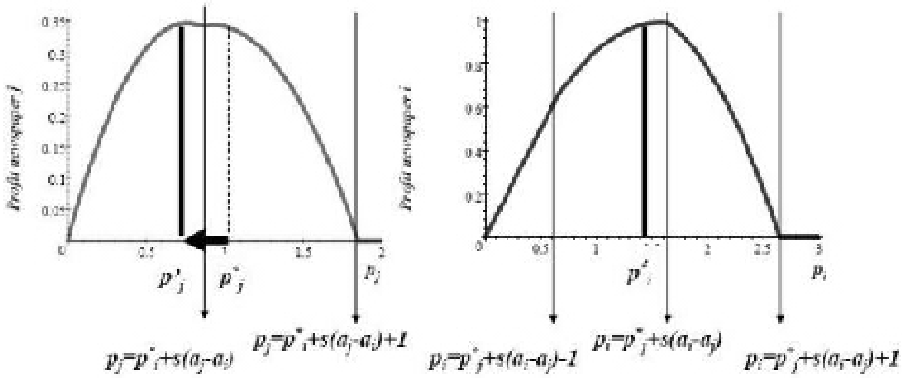

Figure 3: Inexistence of equilibrium in the newspaper industry

In the next section, we deal with the problem of existence and we provide the necessary and sufficient conditions for the existence of equilibrium in cover prices. In addition, when equilibrium exists, we present a full description of its possible configurations.

3 Equilibrium

The newspapers' industry reaches an equilibrium state when none of the newspapers has incentives to change unilaterally its cover price, given the rival's pricing strategy (Nash equilibrium). Nevertheless, as it was illustrated at the end of the previous section, this equilibrium state does not necessarily exist. In proposition 1, we point out the necessary and sufficient conditions for the existence of equilibrium in the newspaper market in case of an asymmetric distribution of readers' political ideologies $(\lambda_i > \lambda_j)$[5]. These conditions bear on the values of the parameters s and $\lambda_j, j = 2, 1$. Without loss of generality, we

[5] In the symmetric case $\lambda_i = \lambda_j = \frac{1}{2}$, the equilibrium always exists and it corresponds to the perfectly symmetric equilibrium that can be easily deduced. Nevertheless, we do not address that case, because, in those circumstances, the *"circulation spiral"* mechanisms are completely absent.

consider $\lambda_i > \lambda_j$ and we define $V = \frac{1}{A(1-\lambda_j)}$ and $W = \frac{3\lambda_j - \lambda_j^2 - 2 + 3\lambda_j \sqrt{\lambda_j - \lambda_j^2}}{2(1-\lambda_j)A(2\lambda_j - 1)\lambda_j}$, with $V \leq W$ for all the possible values of the parameters.[6]

Proposition 1 *A price equilibrium exists in the newspaper market if and only if the "ad-love" intensity* $s \in]0, V] \cup [W, +\infty[$

Proof. *In appendix.* ■

Proposition 1 shows that when $\lambda_i > \lambda_j$ and readers exhibit intermediary "*ad-love*" intensities, $s \in]V, W[$, there is no equilibrium in the newspaper industry. In that case, the minority's newspaper is able to offset the majority's newspaper advantage in the advertising market through a more aggressive pricing policy and consequently, as illustrated in figure 3, this newspaper has incentives to deviate from the pricing strategy that is associated with the pair of prices candidate to equilibrium.

Conversely, when readers have more extreme "*ad-love*" intensities there will always exist an equilibrium in prices, even when one of the ideologies prevails over the other (this is, $\lambda_i > \lambda_j, i = 1, 2$). When the "*ad-love*" intensity is sufficiently high, the minority's newspaper does not have any interest in switching to a more aggressive pricing policy because this will not allow it to offset the advantage of the majority's newspaper in the advertising market. Similarly, when the "*ad-love*" intensity is sufficiently low (but positive) there always exists an equilibrium in prices.

In proposition 2, we provide a full characterization of the possible price equilibria conditional on the parameters values (s and $\lambda_j, j = 1, 2$). We assume $\lambda_i > \lambda_j$ and we define $Z = \frac{\lambda_j + 1}{\lambda_j A(1-2\lambda_j)}$, with $V \leq W \leq Z$[7]

Proposition 2 *Whenever it exists, the price equilibrium is unique and*

(i) When $s \in [0, V]$ *the equilibrium prices are* ($p_i^* = sa_i; p_j^* = sa_j$) *and the equilibrium market shares are* ($d_i^* = \lambda_i; d_j^* = \lambda_j$);

(ii) When $s \in [W, Z[$ *the equilibrium prices are* ($p_i^* = \frac{2}{3\lambda_j}\lambda_i + \frac{1}{3}sA(\lambda_i - \lambda_j) + \frac{1}{3}; p_j^* = \frac{1}{3\lambda_j}\lambda_i - \frac{1}{3}sA(\lambda_i - \lambda_j) + \frac{2}{3}$) *and the equilibrium market shares are* ($d_i^* = \frac{2}{3} - \frac{1}{3}\lambda_j + \frac{1}{3}sA\lambda_j - \frac{2}{3}sA\lambda_j^2\ ; d_j^* = \frac{1}{3}\lambda_j - \frac{1}{3}sA\lambda_j + \frac{2}{3}sA\lambda_j^2 + \frac{1}{3}$);

(iii) When $s \in [Z, +\infty[$ *the equilibrium prices are* ($p_i^* = sA(1-2\lambda_j) - 1$; $p_j^* = 0$) *and the equilibrium market shares are* ($d_i^* = 1\ ;\ d_j^* = 0$).

Proof. *In appendix.* ■

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[6] $V \leq W$ is equivalent to say that $\frac{3\lambda_j - \lambda_j^2 - 2 + 3\lambda_j \sqrt{\lambda_j - \lambda_j^2}}{2(2\lambda_j - 1)\lambda_j} > 1 \Leftrightarrow 3\lambda_j - \lambda_j^2 - 2 + 3\lambda_j \sqrt{\lambda_j - \lambda_j^2} < 2\,(2\lambda_j - 1)\,\lambda_j$, which is always true for $\lambda_j < \frac{1}{2}$.

[7] Since we already demonstrated that $V \leq W$, it is enough to show that $W \leq Z$, which is equivalent to say that
$3\lambda_j - \lambda_j^2 - 2 + 3\lambda_j \sqrt{\lambda_j - \lambda_j^2} \geq (\lambda_j + 1)\,(-2\,(1 - \lambda_j))$, which is always true.

Proposition 2 shows that, when the price equilibrium exists, it can assume one of the following configurations: the two newspapers share the circulation market in the exact proportion of the ideological distribution of readers (case *i*); the two newspapers share the circulation market but the majority's newspaper attracts some of the minority's readers (case *ii*); or, one of the newspapers is forced to leave the circulation market (case *iii*).

In case *i*, the "*ad-love*" intensities are relatively low, $s \in]0, V]$, and the newspapers are forced to move towards a corner equilibrium in order to accomplish with the full market coverage condition. In that case, the minority's newspaper adopts a more aggressive pricing policy that exactly compensates the advantage of the majority's newspaper in the advertising market. Both newspapers survive in equilibrium, they split the market according to the ideological distribution of readers and they get circulation profits equal to $\pi_i^* = sA(1-\lambda_j)^2$and $\pi_j^* = sA\lambda_j^2$,respectively.

In case *ii*, the "*ad-love*" intensities are relatively high, $s \in [W, Z[$.Both newspapers manage to survive in the circulation market but the majority's newspaper attracts some (although not all) readers of the minority's ideology. Thus, the equilibrium pair of prices corresponds to the interior solution of the maximization problem when the price domain is restricted to those pairs of prices that assure the attractiveness of newspaper i for some readers of type j, more precisely, $s(a_j - a_i) < p_j - p_i < s(a_j - a_i) + 1$. For that range of prices, both newspapers present concave profit functions and the equilibrium is constituted by the pair of prices such that both newspapers are choosing their prices according to their best reply functions[8] and they get profits equal to $\pi_i^* = +\frac{1}{9}\left(sa_j\lambda_j - \lambda_j - sa_i\lambda_j - 2\lambda_i\right)\frac{-2+\lambda_j - sA\lambda_j + 2sA\lambda_j^2}{\lambda_j}$ and

$\pi_j^* = \frac{1}{9}\left(1 - \lambda_j - sA(1-\lambda_j)\lambda_j + sA\lambda_j\lambda_j + 2\lambda_j\right)\frac{\lambda_j - sA\lambda_j + 2sA\lambda_j^2 + 1}{\lambda_j}$, respectively.

In case *iii*, the "*ad-love*" intensities are substantially high, $s \in [Z, +\infty]$ and, even when the minority's newspaper is freely distributed, the majority's newspaper attracts all the readers in the circulation market as a consequence of its superior advertising levels. In our framework, such an equilibrium necessarily corresponds to a corner solution where the minority's newspaper doesn't have the opportunity to guarantee its own survival through a more aggressive pricing policy, which only occurs when $p_j^* = 0$. Knowing of this, the majority's newspaper sets the highest price that guarantees it a monopoly in the circulation market even when the minority's newspaper is distributed for free. To a certain extent, in case *iii*, the pricing policy of the majority's newspaper can be considered a limit pricing strategy since this newspaper uses its price to eliminate the smaller newspaper from the circulation market. In those circumstances, the majority's

[8] Recall that the best reply function of a given newspaper expresses its optimal pricing strategy as a function of all the possible pricing strategies of the rival newspaper. Accordingly, the best reply function of newspaper i is obtained from $\frac{\partial \pi_i(p_i,p_j)}{\partial p_i} = 0$ and it corresponds to $p_i(p_j) = \frac{1}{2\lambda_j}\lambda_i + \frac{1}{2}sa_i - \frac{1}{2}sa_j + \frac{1}{2}p_j$ and the best reply function of newspaper j is obtained from $\frac{\partial \pi_j(p_i,p_j)}{\partial p_j} = 0$ and it corresponds to $p_j(p_i) = \frac{1}{2} + \frac{1}{2}sa_j - \frac{1}{2}sa_i + \frac{1}{2}p_i$.

newspaper obtains profits from circulation market equal to $\pi_i^* = s(a_i - a_j) - 1$ and the minority's newspaper only obtains profits from advertising, getting a zero profit in the circulation market ($\pi_j^* = 0$). In this context, one period is sufficient to generate the highest possible degree of concentration in the newspaper market.

The previous points show that, in our static framework, the pure-demand side effects under analysis will originate the elimination of the smaller newspaper when readers exhibit very extremist "*ad-love*" intensities. Otherwise, both newspapers survive in the newspaper market. More precisely, as long as $s \in]0, V] \cup [W, Z[$ (survival condition), both newspapers manage to survive in the newspaper market. Nonetheless, the fact that newspapers compete in prices turns the survival condition less restrictive comparatively to the case when newspapers do not compete in prices. Comparing the survival condition previously stated with the one pointed out in Gabszewicz et al (2006), $s > \frac{1}{A}$,we realize that $Z > \frac{1}{A}$ and consequently, when newspapers compete in prices, readers must exhibit more extreme "*ad-love*" intensities in order to originate the eviction of the smaller newspaper from the circulation market. As a result, one of our most important findings is that, up to a certain extent, the minority's newspaper can use its pricing policy as a strategic instrument in order to avoid being evicted from the circulation market.

In any case, it should also be noticed that, even when the minority's newspaper does survive, the newspaper that gives rise to the voice of the majority's ideology always gets an economic advantage over its rival. The intuition for this result is simple: the majority's newspaper attracts higher advertising levels (because it has a higher number of potential readers) and obtains higher advertising profits (direct effect). Moreover, when readers like advertising, the higher advertising levels make the majority's newspaper more attractive to readers and this newspaper also gets higher revenues from the circulation market (indirect effect).

The exact magnitude of such strategic advantage depends on the value of the readers' "*ad-love*" intensities. In case i, the majority's newspaper is not able to attract readers from the opposite ideology but simply because this newspaper gives voice to the ideology of the majority of readers, it gets higher profits in the advertising market ($\lambda_i > \lambda_j$) as well as in the circulation market (it charges a higher price ($sa_i > sa_j$) and it obtains a higher market share ($\lambda_i > \lambda_j$)). In case ii this advantage is even more substantial because the majority's newspaper is still attracting higher advertising levels (and consequently higher advertising profits) and it gets a more significant advantage in the circulation market (because the s parameter is higher). Finally, in case iii , the majority's newspaper will get higher profits in the advertising market and, moreover, it will be the only newspaper to get profits from the circulation market, gaining an even more significant economic advantage over the minority's newspaper.

Therefore, one of our main findings is that "being the voice of the majority" constitutes an important strategic advantage. This advantage can even be more important when we account for the dynamic impact of the *"circulation spiral"* mechanism, namely under case *ii*. In case *ii*, the majority's strategic advantage does not evict the smaller newspaper in our static framework, but when the dynamic effects are considered, period after period, the majority's newspaper becomes stronger and stronger and it is possible that the smaller newspaper would be forced to leave the market after some periods of interaction. Conversely, in case *i* and *iii*, accounting for the dynamic nature of the "*circulation spiral*" mechanism should not substantially affect our results. In case *i*, the majority's newspaper has an economic advantage over the smaller newspaper but this advantage does not strengthen with time and, in case *iii*, the eviction of the smaller newspaper only takes one single period of interaction and it is always taken into account, even from a static perspective.

4 Conclusion and future research

In the present paper, we have analyzed the static interaction in cover prices between two newspapers that compete with each other both in the circulation and in the advertising markets. We have addressed the problem of existence of price equilibrium and, when equilibrium exists, we have analyzed the influence of the "*circulation spiral*" mechanism over the market structure.

Firstly, we show that the static price equilibrium does not necessarily exist and we provide the necessary and sufficient conditions for the existence of equilibrium, $s \in]0;V] \cup [W,+\infty[$. For $s \in]V,W[$ the static price equilibrium does not exist and consequently there is no point in proceeding with a dynamic analysis of the "*circulation spiral*" mechanism and, even in a static context, any analysis of the influence of the"*circulation spiral"* mechanism over the market structure is useless.

Secondly, when the price equilibrium exists, we show that the pure demand side mechanism of the *"circulation spiral"* is not always sufficient to eliminate the smallest of the newspapers. As long as $s \in]0;V] \cup [W,Z[$ (survival condition), both newspapers survive in the newspaper market. When $s \in]0;V]$, the newspapers' market shares coincides with the percentage of readers that shares their political background and when $s \in]W,Z[$, the majority's newspaper will attract readers from the opposite ideology but both newspapers survive in equilibrium. Conversely, when $s \in [Z,+\infty[$ only the largest newspaper participates in the circulation market.

Therefore, when newspapers interact in cover prices, the qualitative results pointed out in Gabszewicz et al (2006) do not change, but the upper threshold of the survival condition becomes less restrictive, meaning that in a static context and to a certain extent, the smaller newspaper can strategically use its pricing policy in order to avoid being evicted from the newspaper market.

Nevertheless, even when both newspapers survive, the majority's newspaper will always get an economic advantage over its rival, because its larger potential readership attracts more advertising, which attracts more readers due to the mutual reinforcement between circulation and advertising. The magnitude of such an advantage depends on the *"ad-love"* parameter as well as on the relative importance of the dominant ideology (λ_i, λ_j).

Considering the conclusions abovementioned, we point out some directions for our research agenda in this field. Firstly, it would be interesting to ascertain to what extent the price of the advertising space could also be strategically employed in order to avoid the "*circulation spiral*" mechanism. Secondly, it would also be interesting to study the impact of the *"circulation spiral"* mechanism over the market structure of the newspaper industry when advertisers formulate rational expectations about the future value of the relevant variables. Finally, a dynamic version of this model should be developed, in order to take into account the full impact of the inter-temporal effects that are subjacent to the *"circulation spiral"* mechanism.

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5 Appendix

In this appendix, we prove proposition 1 and 2. For ease of exposition, the propositions are proved jointly and the proof is organized as follows: firstly, we identify the possible price equilibria candidates. Secondly, we determine under which conditions each of these candidates is in fact an equilibrium (proposition 2 is proved) and we set up the necessary and sufficient conditions for the existence of an equilibrium in prices (proposition 1 is proved). Finally, we prove the uniqueness of price equilibrium (when it exists).

5.1 Proof

5.1.1 Candidates to equilibrium

When $\lambda_i > \lambda_j, i = 1, 2$, the equilibrium in the circulation market (when it exists) is necessarily given by one of the following pair of prices:

(i) $p_i^* = sa_i$ and $p_j^* = sa_j$,when $s \in]0, V]$;

(ii) $p_i^* = \frac{2}{3\lambda_j}\lambda_i + \frac{1}{3}sA(\lambda_i - \lambda_j) + \frac{1}{3}$ and $p_j^* = \frac{1}{3\lambda_j}\lambda_i - \frac{1}{3}sA(\lambda_i - \lambda_j) + \frac{2}{3}$, when $s \in [W, Z[$;

(iii) $p_i^* = sA(1 - 2\lambda_j) - 1$ and $p_j^* = 0$,when $s \in [Z, +\infty[$.

5.2 Existence

In this section, we determine the conditions under which, each of the pairs of prices aforementioned becomes an equilibrium. Such analysis allows us to derive the necessary and sufficient conditions for the existence of equilibrium (at the end of the section).

5.2.1 Case (i)

Given $\lambda_i > \lambda_j$, the pair of prices $p_i^* = sa_i$ and $p_j^* = sa_j$ constitutes a price equilibrium in the newspaper market if and only if $s \leq V$. This constraint on the "$ad - love$" intensity come from conditions (1)-(6) subsequently described in detail.

(1) Non-negativity of p_i^*
$p_i^* \geq 0$ (Always met).

(2) Non-negativity of p_j^*
$p_j^* \geq 0$ (Always met).

(3) Attractiveness of the majority's newspaper - lower threshold
$p_j^* - p_i^* \geq s(a_j - a_i)$ (Always met in equality).

(4) Attractiveness of the majority's newspaper - upper threshold
$p_j^* - p_i^* < s(a_j - a_i) + 1$(Always met).

(5) Full market coverage
(5.1) $p_i^* \leq sa_i$ (Always met in equality).
(5.2) $p_j^* \leq sa_j$ (Always met in equality).

(6) "No-deviation"
The "no-deviation" conditions require that none of the newspapers have incentives to change its price unilaterally, given the rival's price decision. In case i, newspapers are forced to move to a corner solution where they are not able to raise their prices. Consequently, the "no-deviation" conditions only require the inexistence of incentives to reduce prices.

(6.1) Given $p_i^* = sa_i$, newspaper j does not have an advantage to lower its price

If $p_i^* = sa_i$ and newspaper j decides to lower its price, it originates a switch from D_2 to D_3,where it adopts a more aggressive pricing policy. When the pair of prices pointed out in case i constitutes an equilibrium, the minority's newspaper (j) should not have any incentives to lower its price, which occurs if and only if:

For $p_j = sa_j$, we observe that $\frac{\partial}{\partial p_j}\ \pi_j(p_i^*, p_j)\rceil_{D_3} \geq 0$.

Such condition states that newspaper j does not benefit from price reductions and it is equivalent to

$\lambda_j + \lambda_i sa_j - \lambda_i sa_i + \lambda_i sa_i - 2\lambda_i sa_j \geq 0 \Leftrightarrow s \leq V$.

(6.2) Given $p_j^* = sa_j$, newspaper i does not have an advantage to lower its price

When $p_j^* = sa_j$, if newspaper i decides to make a slight reduction in its price, it will not be able to induce a switch in the pricing regime. Thus, as long as $(p_i, p_j) \in D_2$, both newspapers have concave profit functions and newspaper i does not benefit from any price reduction. Nevertheless, this newspaper could have incentives to reduce more drastically its price, charging a price equal to $p_i^{'} = sa_i - 1$ and inducing a switch from D_2 to D_1. Such incentives cannot exist in equilibrium, meaning that:

$\pi_i(p_i^{'}, p_j^*) \leq \pi_i(p_i^*, p_j^*) \Leftrightarrow sa_i - 1 \leq sa_i\lambda_i \Leftrightarrow s \leq \frac{1}{A(1-\lambda_j)\lambda_j}$,

which is not binding, given that $V \leq \frac{1}{A(1-\lambda_j)\lambda_j} \forall \lambda_j \leq 1$.

5.2.2 Case (ii)

Given $\lambda_i > \lambda_j$, the pair of prices $p_i^* = \frac{1}{3} - \frac{1}{3}sa_j + \frac{1}{3}sa_i + \frac{2}{3\lambda_j}\lambda_i$ and $p_j^* = \frac{2}{3} + \frac{1}{3}sa_j - \frac{1}{3}sa_i + \frac{1}{3\lambda_j}\lambda_i$ constitutes a price equilibrium in the newspaper market if and only if $W \leq s < Z$. These conditions imposed over the "$ad - love$" intensity come from conditions (1)-(6) subsequently described in detail.

(1) Non-negativity of p_i^*

$p_i^* \geq 0 \Leftrightarrow s \geq -\frac{\lambda_j - 2}{\lambda_j A(-1+2\lambda_j)}$ (non-binding, since $s > 0$)

(2) Non-negativity of p_j^*

$p_j^* \geq 0 \Longleftrightarrow s \leq Z$

(3) Attractiveness of the majority's newspaper - lower threshold

$p_j^* - p_i^* \geq s(a_j - a_i) \Longleftrightarrow s \geq \frac{1}{\lambda_j A}$ (non-binding because of condition (6.1))

(4) Attractiveness of the majority's newspaper - upper threshold

$p_j^* - p_i^* < s(a_j - a_i) + 1 \Longleftrightarrow s < Z$

(5) Full market coverage

(5.1) $p_i^* \leq sa_i \Leftrightarrow s \geq \frac{1}{\lambda_j A}$ (non-binding because of condition (6.1))

(5.2) $p_j^* \leq sa_j \Leftrightarrow s \geq \frac{1}{\lambda_j A}$ (non-binding because of condition (6.1))

(6) "No-deviation"

The no-deviation conditions guarantee that none of the newspapers has advantages to change unilaterally its cover price. The following table summarizes the four no-deviation conditions.

	Condition
(6.1) Newspaper j has no advantage to lower its price	$W \leq s$
(6.2) Newspaper j has no advantage to increase its price	Always met
(6.3) Newspaper i has no advantage to lower its price	$s < Z$
(6.4) Newspaper i has no advantage to increase its price	$\frac{1}{A\lambda_j} \leq s$ (not binding)
No-deviation condition	$W \leq s < Z$

(6.1) Given $p_i^* = \frac{1}{3} - \frac{1}{3}sa_j + \frac{1}{3}sa_i + \frac{2}{3\lambda_j}\lambda_i$, newspaper j does not have an advantage to lower its price

As long as $(p_i^*, p_j) \in D_2$, newspaper j is never interested in charge a price lower than p_j^*because the profit function of newspaper j is concave over D_2. Nevertheless, newspaper j might have incentives to reduce more drastically its price, originating a switch in the price regime from D_2 to D_3 and, in that case, the pair of prices (p_i^*, p_j^*) would not be an equilibrium. Therefore, such incentives must be ruled out when determining the necessary and sufficient conditions for the existence of the equilibrium pointed out in *ii*. In order to do that, we analyzed the impact of the own-price variations over the profit of newspaper j $\left(\frac{\partial \pi_j(p_i^*, p_j)}{\partial p_j}\right)$ along the two relevant price regimes (D_2 and D_3).

When newspaper j reduces slightly its price, D_2 stills the relevant price domain and the impact of the own-price variations on the profit of newspaper j is given by:

$\frac{\partial}{\partial p_j}\ \pi_j(p_i^*, p_j)\rceil D_2 = \lambda_j + \lambda_j sa_j - \lambda_j sa_i + \lambda_j p_i^* - 2\lambda_j p_j$

In this case, the optimal price is $p_j^* = \frac{2}{3} + \frac{1}{3}sa_j - \frac{1}{3}sa_i + \frac{1}{3\lambda_j}\lambda_i$. Moreover, $\frac{\partial}{\partial p_j}\ \pi_j(p_i^*, p_j)\rceil D_2 > 0$ for $p_j < p_j^*$ and $\frac{\partial}{\partial p_j}\ \pi_j(p_i^*, p_j)\rceil D_2 < 0$ for $p_j > p_j^*$.

When newspaper j reduces its price drastically, more precisely, when it charges a price below $\overline{p}_j = \frac{2}{3}sa_j - \frac{2}{3}sa_i + \frac{2}{3\lambda_j}\lambda_i + \frac{1}{3}$[9], newspaper j induces a switch from D_2 to D_3 . In those circumstances, the impact of own-price variations on the profit of newspaper j becomes given by:

$$\frac{\partial}{\partial p_j}\ \pi_j(p_i^*, p_j)\rceil D_3 = \lambda_j + \lambda_i sa_j - \lambda_i sa_i + \lambda_i p_i^* - 2\lambda_i p_j$$

[9] Given $p_i = p_i^*$, for $\overline{p}_j$ the following equality holds $s(a_j - a_i) = \overline{p}_j - p_i^*$. Moreover, notice that $\overline{p}_j < p_j^*$ as long as $s > \frac{1}{\lambda_j A}$.

Therefore, given $p_i = p_i^*$, the optimal price along D_3 is no longer p_j^* but the price level that guarantees $\frac{\partial}{\partial p_j}\ \pi_j(p_i^*, p_j)\rceil D_3 = 0$, which corresponds to $p_j^{'} = \frac{1}{2\lambda_i}\lambda_j + \frac{1}{3}sa_j - \frac{1}{3}sa_i + \frac{1}{6} + \frac{1}{3\lambda_j}\lambda_i$, with $p_j^{'} < p_j^*$ and $p_j^{'} \lesseqgtr p_j^*$. Moreover, $\frac{\partial}{\partial p_j}\ \pi_j(p_i^*, p_j)\rceil D_3 > 0$ for $p_j < p_j'$ and $\frac{\partial}{\partial p_j}\ \pi_j(p_i^*, p_j)\rceil D_3 < 0$ for $p_j > p_j'$.

The previous results allow us to define the circumstances under which the "no-deviation" conditions are accomplished. More precisely, the analysis of $\frac{\partial}{\partial p_j}\ \pi_j(p_i^*, p_j)\rceil D_2$ and $\frac{\partial}{\partial p_j}\ \pi_j(p_i^*, p_j)\rceil D_3$ reveals that such conditions will be accomplished in two cases: (a) when $p_j^{'} \geq \overline{p}_j$ and (b) when $\overline{p}_j > p_j^{'}$ and $\pi_j(p_i^*, p_j^*) > \pi_j(p_i^*, p_j^{'})$. Subsequently, we analyze each case separately. For ease of exposition, we define $Y = \frac{1}{2}\frac{\lambda_j+2}{A\lambda_j(1-\lambda_j)}$, with $W \leq Y \leq Z$ for any $\lambda_j < \lambda_i$.

Case (a): $p_j^{'} > \overline{p}_j \Leftrightarrow s \geq Y$

In this case, when $p_j = \overline{p}_j$, we have that $\frac{\partial}{\partial p_j}\ \pi_j(p_i^*, p_j)\rceil D_3 > 0$ and $\frac{\partial}{\partial p_j}\ \pi_j(p_i^*, p_j)\rceil D_2 > 0$, which means that increasing the cover price above $\overline{p}_j$ is always a profitable strategy for newspaper j (because the impact in price is always positive[10]). Consequently, under such circumstances, newspaper j has no advantage in lowering its price below p_j^* and the no-deviation condition (6.1) is met.

Case (b): $\overline{p}_j > p_j^{'}$ and $\pi_j(p_i^*, p_j^*) > \pi_j(p_i^*, p_j^{'}) \Longleftrightarrow W \leq s < Y$

In this case, when $p_j = \overline{p}_j$, we have that $\frac{\partial}{\partial p_j}\ \pi_j(p_i^*, p_j)\rceil D_3 > 0$ but

$\frac{\partial}{\partial p_j}\ \pi_j(p_i^*, p_j)\rceil D_2 < 0$, which means that, when $p_j = \overline{p}_j$, both slight reductions and increases in p_j have a positive impact on the profit of newspaper j . In this case, the profit function of newspaper j has two local maxima (located in D_2 and D_3, respectively) and the no-deviation condition (6.1) is accomplished if and only if $\Delta\pi_j(p_i^*, p_j) = \pi_j(p_i^*, p_j^*) - \pi_j(p_i^*, p_j^{'}) > 0$. Thus, case (b) will be observed if and only if $W \leq s < Y$, where $\overline{p}_j > p_j^{'}$ and, simultaneously, $\Delta\pi_j(p_i^*, p_j) > 0$[11].

[10] In fact, in this case, even if the profit function of newspaper j is not concave, it has only one local maximum (p_j^*) that is located along D_2. Consequently, p_j^* is also the global maximum of the newspaper j profit and the non-deviation condition is accomplished.

[11] More precisely:

(1) the condition $\overline{p}_j > p_j^{'}$ requires that $s < Y$ and,

(2) the condition $\Delta\pi_j(p_i^*, p_j) > 0$, requires that $[W; X]$, with $X = \frac{3\lambda_j - \lambda_j^2 - 2 + 3\lambda_j\sqrt{(\lambda_j(1-\lambda_j))}}{2A(2\lambda_j - 1)\lambda_j(1-\lambda_j)}$ and $W \leq Y \leq X$ for $\lambda_i > \lambda_j$.

Gathering (1) and (2), we have that case (b) occurs if and only if $W \leq s < Y$

Finally, notice that the conditions pointed out in case (a) and case (b), can be gathered into an unique condition. Actually, given $p_i = p_i^*$, the newspaper j has no advantage in lowering its price, as long as $s \geq W$.

(6.2) Given $p_i^* = \frac{1}{3} - \frac{1}{3}sa_j + \frac{1}{3}sa_i + \frac{2}{3\lambda_j}\lambda_i$, newspaper j has no advantage to raise its price

As before, as long as $(p_i^*, p_j) \in D_2$, the newspaper j has no advantage in raising its price above p_j^* due to the concavity of its profit function. Similarly, this newspaper is never interested in softening its pricing policy in order to induce a switch in the price domain from D_2 to D_1. In that case, the newspaper i would attract the entire universe of readers and the newspaper j would not participate in the circulation market, loosing its circulation profit without any benefit.

(6.3) Given $p_j^* = \frac{2}{3} + \frac{1}{3}sa_j - \frac{1}{3}sa_i + \frac{1}{3\lambda_j}\lambda_i$, newspaper i has no advantage to lower its price

As long as $(p_i, p_j^*) \in D_2$, newspaper i has never advantage in charging a price lower than p_i^*because the profit function of newspaper i is concave over D_2. Nevertheless, it might be willing to lower its price more drastically, inducing a switch from D_2 to D_1, where newspaper i would attract all the readers in the market. Obviously, for (p_i^*, p_j^*) to be an equilibrium, such type of incentives

cannot exist.

When newspaper i reduces slightly its price, D_2 remains the relevant price domain and the impact of the own-price variations on the profit of newspaper i is given by:

$$\frac{\partial}{\partial p_i}\ \pi_i(p_i, p_j^*)\rceil D_2 = \lambda_i + \lambda_j sa_i - \lambda_j sa_j + \lambda_j p_j - 2\lambda_j p_i$$

In this case, the optimal price is $p_i^* = \frac{2}{3\lambda_j}\lambda_i + \frac{1}{3}sa_i - \frac{1}{3}sa_j + \frac{1}{3}$. Moreover, $\frac{\partial}{\partial p_i}\ \pi_i(p_i, p_j^*)\rceil D_2 > 0$ for $p_i < p_i^*$ and $\frac{\partial}{\partial p_i}\ \pi_i(p_i, p_j^*)\rceil D_2 < 0$ for $p_i > p_i^*$.

When newspaper i reduces its price drastically, more precisely, when it charges a price below $\overline{p}_i = -\frac{1}{3} - \frac{2}{3}sa_j + \frac{2}{3}sa_i + \frac{1}{3\lambda_j}\lambda_i$, newspaper i induces a switch from the current price regime (D_2) to the "monopoly in circulation" regime (D_1). In that case, the optimal pricing strategy for newspaper i would be to charge a price equal to $p_i' = \overline{p}_i$, which, given p_j^*, is the highest price that allows it to attract the entire population of readers.[12]

Therefore, newspaper i will never have an advantage in lowering its price as long as $\frac{\partial}{\partial p_i}\ \pi_i(p_i, p_j^*)\rceil D_2 > 0$, , for $p_i' = \overline{p}_i$.Such condition holds if and only if $\overline{p} < p_i^*$,or equivalently, $s < Z$.

[12] Indeed, in the "circulation monopoly regime" $\frac{\partial}{\partial p_i}\ \pi_i(p_i, p_j^*)\rceil D_1$ is constant and equal to 1 and consequently, newspaper i has incentives to raise its price untill the switching price level.

(6.4) Given $p_j^* = \frac{2}{3} + \frac{1}{3}sa_j - \frac{1}{3}sa_i + \frac{1}{3\lambda_j}\lambda_i$, newspaper i does not have an advantage to raise its price

Like in the previous cases, when $(p_i, p_j^*) \in D_2$, newspaper i has never advantage in charging a price higher than p_i^*. Thus, the relevant question is to know whether newspaper i is interested in raising more drastically its price, originating a switch from D_2 to D_3.

When newspaper i raises its price slightly, D_2 remains the relevant domain and the impact of own-price variations in the profit of newspaper i was already derived in condition (6.3).

When newspaper i raises its price more drastically, more precisely it charges a price higher than $\overline{p}_i = \frac{2}{3} - \frac{2}{3}sa_j + \frac{2}{3}sa_i + \frac{1}{3\lambda_j}\lambda_i$, D_3 becomes the relevant domain and the impact of own-price variations in the profit of newspaper i is given by:

$\frac{\partial}{\partial p_i}\ \pi_i(p_i, p_j^*)\rceil D_3 = \lambda_i + \lambda_i sa_i - \lambda_i sa_j + \lambda_i p_j - 2\lambda_i p_i$

The maximum profit would be achieved for $p_i^{'} = \frac{5}{6} + \frac{1}{3}sa_i - \frac{1}{3}sa_j + \frac{1}{6\lambda_j}\lambda_i$ (lower than p_i^*). Moreover, $\frac{\partial}{\partial p_i}\ \pi_i(p_i, p_j^*)\rceil D_3 > 0$ for $p_i < p_i^{'}$ and $\frac{\partial}{\partial p_i}\ \pi_i(p_i, p_j^*)\rceil D_3 < 0$ for $p_i > p_i^{'}$.

Clearly, newspaper i will not benefit from raising its price if and only, at the switching price level ($\overline{p}_i$), we observe $\frac{\partial}{\partial p_i}\ \pi_i(p_i, p_j^*)\rceil D_3 < 0$. Given that $p_i^{'}$ is always lower than p_i^*, the previous condition just requires that $\overline{p}_i > p_i^*$, which will always hold as long as $s > \frac{1}{\lambda_j A}$.

5.2.3 Case (iii)

Given $\lambda_i > \lambda_j$, the pair of prices $p_i^* = s(a_i - a_j) - 1$ and $p_j^* = 0$ constitutes a price equilibrium in the newspaper market if and only if $s > Z$. This restriction on the "$ad - love$" intensity comes from conditions (1)-(6) subsequently described in detail.

(1) Non-negativity of p_i^*
$p_i^* \geq 0 \Leftrightarrow s \geq \frac{1}{A(1-2\lambda_j)}$ (Not binding, given condition (5.4))

(2) Non-negativity of p_j^*
$p_j^* \geq 0$ (Always met in equality).

(3) Attractiveness of the majority's newspaper - lower threshold
$p_j^* - p_i^* \geq s(a_j - a_i) + 1$ (Always met in equality).

(4) Full market coverage
(4.1) $p_i^* \leq sa_i \Longleftrightarrow s \geq -\frac{1}{\lambda_j A}$ (Not binding, given $s > 0$).

(4.2) $p_j^* \leq sa_j$ (Always met).

(5) "No-deviation"

The "no-deviation" conditions require that none of the newspapers have unilateral incentives to change its price given the rival's price decision. The following table summarizes the "no-deviation" conditions.

	Condition
(5.1) Newspaper j has no advantage to lower its price	Always met
(5.2) Newspaper j has no advantage to increase its price	Always met
(5.3) Newspaper i has no advantage to lower its price	Always met
(5.4) Newspaper i has no advantage to increase its price	$s > Z$

(5.1) Given $p_i^* = s(a_i - a_j) - 1$, newspaper j does not have an advantage to lower its price

Since $p_j^* = 0$, and negative prices are not considered, newspaper j will never lower its price (corner solution).

(5.2) Given $p_i^* = s(a_i - a_j) - 1$, newspaper j does not have an advantage to raise its price

When $p_i^* = s(a_i - a_j) - 1$, even when $p_j^* = 0$, newspaper j is not able to capture any reader. Consequently even when $p_j^* = 0$, newspaper j gets null profits from the circulation market. Obviously, the increases in the price of newspaper j do not make this newspaper more attractive (they have the opposite effect) and, consequently, newspaper j is not able to make any profit in the circulation market.

(5.3) Given $p_j^* = 0$, newspaper i does not have an advantage to lower its price

When $p_j^* = 0$ and $p_i^* = s(a_i - a_j) - 1$, newspaper i is charging the highest price that allows it to capture all the readers in the market. This means, that a decrease in price does not originate an increase in demand and, consequently, charging a price below p_i^* would only originate a loss in profits, which is never advantageous in the perspective of newspaper i.

(5.4) Given $p_j^* = 0$, newspaper i does not have an advantage to raise its price

Given $p_j^* = 0$, if newspaper i increases its price above $p_i^* = s(a_i - a_j) - 1$, it originates a switch in the price regime from D_1 to D_2. In that case, newspaper i is faced with the trade-off between the loss of profits associated with a smaller demand and the increase in profits originated by an increase in the unit price.

When (p_i^*, p_j^*) is an equilibrium, the first effect always dominate the second and the newspaper i is never interested in raising its price. This is equivalent to say that, when $p_i = p_i^* = \overline{p}_i$,we must observe $\frac{\partial}{\partial p_i} \pi_i(p_i, p_j^*)\rceil D_2 < 0$, which only occurs for "*ad-love*" intensities such that $s > Z$.

Summary 3 *When $\lambda_i > \lambda_j (i = 1, 2)$ there exists an equilibrium in the newspaper market if and only if $s \in \left]0; V\right] \cup \left[W; +\infty\right[$. In addition:*

(i) when $s \in \left]0; V\right]$ the newspapers share the market according to the ideological division of the population of readers;

(ii) when $s \in \left[W; Z\right[$,the newspapers share the market but the majority's newspaper attracts readers from the opposite ideology;

(iii) when $s \in \left[Z; +\infty\right[$ the majority's newspaper attracts all the readers in the market and the minority's newspaper is evicted from the circulation market.

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5.3 Uniqueness

When the equilibrium exists, its uniqueness follows directly from the fact that when newspapers maximize their profits from circulation, they are optimizing continuous functions (their own profit functions) over compact sets (since $0 \leq p_i \leq sa_i, i = 1, 2$).