Newspapers' market shares and the theory of the circulation spiral

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Abstract

We consider a model of daily newspapers' competition to test the validity of the so called "theory of the circulation spiral". According to it, the interaction between the newspapers and the advertising markets drives the newspaper with the smaller readership into a vicious circle, finally leading it to death. In a model with two newspapers, we show that, contrary to this conjecture, the dynamics envisaged by the proposers of the theory, does not always lead to the elimination of one of them.

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1 Introduction

The daily newspaper industry has been the object of several empirical studies documenting a dramatic tendency to concentration (see, for instance, Bagdikian (1980), Dertouzos, J.N and W.B. Trautman (1990), Gesenove (2003), Kaitatzi-Witlock, S.(1996), or Rosse (1980)). One possible explanation of this phenomenon is called the *theory of the circulation spiral,* originally proposed by the media scholar Furhoff (1973). The main point of this theory is well synthesized by the following quotation:

> "the larger of two competing newspapers is favoured by a process of mutual reinforcement between circulation and advertising, as a larger circulation attracts advertisements, which in turn attracts more advertising and again more readers. In contrast, the smaller of two competing newspapers is caught in a vicious circle; its circulation has less appeal for the advertisers, and it loses readers if the newspaper does not contain attractive advertising. A decreasing circulation again aggravates the problems of selling advertising space, so that finally the smaller newspaper will have to close down" (Gustafsson (1978), p. 1)[1].

In this note we provide a simple duopoly model of the daily press market in order to test whether the dynamics implicit into the circulation spiral leads indeed to the elimination of one of the competitors, as predicted by the theory. The circulation spiral argument for elimination rests crucially on the implicit assumption that readers are not only interested in reading the news, but also into canvassing advertisements in newspapers, in particular classified ads. While the reader's taste for one or the other newspaper clearly depends upon the way news are represented, e.g. by the political view patronized by the newspaper, the utility of reading an ad is rather independent of the political color of the newspaper reporting it. Notice further that a reader can always ignore the ads if he wants to do so. Thus, contrary to what happens

[1]Several other elements have been proposed to explain this tendency to concentration in the daily press industry, like the existence of large economies of scale (Rosse 1967)or the two-sided market structure of the press and advertising industries (Gabszewicz *et al.* 2004).

for medias like television and radio, ads may not diminish the utility of reading, somewhat supporting the assumption of this theory. The combination of political and commercial information makes of a newspaper a good with two main characteristics. Buyers are interested in consuming these characteristics rather than the good itself. Thus, it is natural to represent a typical reader as endowed with some political opinion, "leftist" or "rightist", say, and with a desire to learn about buying and selling opportunities through reading commercials. The importance attached to the political color of the newspaper, however, varies across readers of both camps. To some extent a reader should be willing to accept to read a newspaper of a different political orientation, provided he gets enough benefit from the amount of commercials to be canvassed in it. Our model tries to reflect the above elements in the simplest possible way, keeping its ingredients as close as possible to the informal set-up of the theory initially proposed by Furhoff.

We find that the conclusions drawn from this informal proposal must be qualified. It is not always true that the circulation spiral leads to the elimination of one of the competitors. Several elements play a role in driving the dynamics of the competitors' market shares, like the intensity of readers' preferences for ads, or the number of leftists in the readership, compared with the one of rightists. We find a necessary and sufficient condition on these magnitudes that governs whether the minority newspaper is able to survive when the circulation spiral evolves, granting that elimination never occurs and that the market shares stabilize at a long-run equilibrium level.

2 The model

Consider a population of readers split into two types; the first (respectively second) type consists of all leftist (respectively, rightist) readers and is uniformly distributed on the interval $[0, 1]$ with mass of readers λ_1 (respectively, $\lambda_2 = 1 - \lambda_1$): at each point m in $[0, 1]$,there corresponds a number λ_i, with $i = 1, 2$, of similar readers. Accordingly, the total mass of the readership is equal to $\lambda_1 + \lambda_2 = 1$. Readers choose their newspaper in accordance with their political preferences and the amount of commercials included in it. We denote by a_i the amount of commercials included in a copy of newspaper i. For readers of type 1, represented by the point m in $[0, 1]$,the utility for

reading newspaper 1 is equal to

$$u_1(1, m) = m + sa_1, \tag{1}$$

while their utility for reading newspaper 2 is equal to

$$u_1(2, m) = sa_2, \tag{2}$$

and similarly for the readers of type 2 represented by the same point m, with the appropriate change of indices. The parameter s, identical for all readers, measures the intensity of readers' attraction for advertising. The total number of advertisers is equal to A, $A < 1$, and each of them has a one unit advertising budget to be allocated between the two newspapers. We assume that each of them allocates this unit in proportion to the size of their readership[2]. Therefore we get

$$a_i = \lambda_i A, \text{ for } i = 1, 2. \tag{3}$$

Readers represented by point m and belonging to type 2 buy newspaper 2 if, and only if,

$$u_2(2, m) = m + sa_2 \geq sa_1 = u_2(1, m),$$

or else,

$$m \geq s(a_1 - a_2). \tag{4}$$

Accordingly, when the number of commercials in the leftist newspaper exceeds that in the rightist one, the fraction of rightist readers who switch to newspaper 1 has measure $s(a_1 - a_2)$, while their mass is equal to $\lambda_2 s(a_1 - a_2)$. Obviously, when $a_2 > a_1$, this measure is equal to zero and the switch occurs from left to right.

3 Dynamics

Now we analyze how the readership sizes evolve over time as a consequence of an initial asymmetry in their relative sizes. Without loss of generality,assume

[2]This behavior corresponds, for instance, to the choice by an advertiser maximizing the utility of money spent in advertising, when the utility function is given by $a_1^{\lambda_1} a_2^{\lambda_2}$ subject to the budget constraint $a_1 + a_2 = 1$. In that case the solution implies that the ratio a_1/a_2 is equal to λ_1/λ_2. Therefore the total advertising amount in paper i is equal to $\lambda_i A$.

that initially the leftist readership exceeds the rightist one, namely, $\lambda_1 > \lambda_2$. We shall denote by $n_1(t)$ and $n_2(t)$ the readership sizes at time t, so that λ_1 and λ_2 are the readership sizes $n_1(0)$ and $n_2(0)$ of the two newspapers at time 0.

We suppose that advertisers know these sizes at date 0 and send, before the first issues are printed, their commercials to the two newspapers, according to the corresponding proportions, namely, $a_i(0) = \lambda_i A$. This implies that $a_1(0) > a_2(0)$. Due to the insertion of these commercials into the newspapers, the utility from buying newspaper 1 is increased for both types of readers and some readers decide to switch at date 1 from the rightist to the leftist one, which determines a first change in the readership sizes, namely

$$\begin{aligned} n_1(1) &= \lambda_1 + s\lambda_2 \left[a_1(0) - a_2(0)\right] \\ n_2(1) &= \lambda_2 - s\lambda_2 \left[a_1(0) - a_2(0)\right]. \end{aligned}$$

Clearly, $n_1(1)$ is larger than $n_1(0)$, while the readership of newspaper 2 gets smaller of the same amount (namely $s\lambda_2 \left[a_1(0) - a_2(0)\right]$).

At date 1, advertisers react, before a new issue goes to print, to these new readership sizes so that we get $a_1(1) = n_1(1)A$. This engenders again a new switch from rightist readers to the leftist newspaper, at date 2, which determines new readership sizes at time 2 given by the equation

$$\begin{aligned} n_1(2) &= \lambda_1 + s\lambda_2 \left[a_1(1) - a_2(1)\right] \\ &= \lambda_1 + s\lambda_2 A \left[n_1(1) - n_2(1)\right] \end{aligned}$$

and, obviously, $n_2(2) = 1 - n_1(1)$.

More generally, we have

$$a_1(t) = n_1(t)A,$$

so that

$$n_1(t+1) = \lambda_1 + s\lambda_2 A \left[n_1(t) - n_2(t)\right].$$

Since $n_2(t) = 1 - n_1(t)$, we get

$$n_1(t+1) = \lambda_1 + s\lambda_2 A \left[2n_1(t) - 1\right].$$

This first-order linear difference equation has, as unique solution, the expression

$$n_1(t) = \frac{s\lambda_2 A(2\lambda_1 - 1)}{2s\lambda_2 A - 1} \left(2s\lambda_2 A\right)^t + \frac{\lambda_1 - s\lambda_2 A}{1 - 2s\lambda_2 A}. \tag{5}$$

When $\beta = 2s\lambda_2 A > 1$ holds, the coefficient of the term $(2s\lambda_2 A)^t$ in (5) is strictly positive (recalling that it has been supposed that $\lambda_1 > \lambda_2$). Moreover, $\beta > 1$ implies that the expression β^t tends to $+\infty$ when t tends to $+\infty$. Consequently, the trajectory corresponding to the above difference equation diverges to $+\infty$ when t goes to $+\infty$: the leftist newspaper attracts more and more readers over time, and at an increasing speed, due to the increase in the number of commercials; at some date, the rightist newspaper readership collapses to zero and the newspaper is eliminated. Now, suppose that $\beta < 1$ holds instead. Then we have $2s\lambda_2 A < 1$ and the coefficient of the term $(2s\lambda_2 A)^t$ is now negative. Moreover, since β is smaller than one, the expression β^t is decreasing with t and tends to 0 when t goes to $+\infty$, so that the sequence corresponding to the first term in the difference equation approaches 0 by negative values when t tends to $+\infty$.[3] Finally, the whole expression is increasing with t and converges to the constant n_1^*, namely

$$\lim_{t\to\infty} n_1(t) = n_1^* \equiv \frac{\lambda_1 - s\lambda_2 A}{1 - 2s\lambda_2 A} \text{ and } \lim_{t\to\infty} n_2(t) = n_2^* = 1 - \frac{\lambda_1 - s\lambda_2 A}{1 - 2s\lambda_2 A}. \quad (6)$$

where we notice that n_2^* is always positive, however small is $\lambda_2 > 0$, so that there is no minimal initial readership needed to obtain survival. We may summarize the above discussion in the following way. Either $\beta > 1$ and the rightist newspaper is necessarily eliminated after some period of time, or $\beta < 1$ and the market share of the leftist newspaper necessarily converges to the value n_1^*. Then a natural question arises: can this limit n_1^* be larger than the total readership size? If the answer is yes, it means that the leftist newspaper becomes a monopolist after some period of time, as conjectured by the theory of the circulation spiral. If, on the contrary, this limit is smaller than the total readership size, then some room is left for the minority newspaper to survive for ever. The next proposition answers this question without any ambiguity.

Proposition 1 *Both newspapers keep strictly positive market shares over all periods if and only if the "survival condition"*

$$2s\lambda_2 A < 1$$

is satisfied.

[3]It is easy to check that all terms in the sequence $\{n_1(t)\}$ are strictly positive because the sequence itself is increasing, so that $n_1(t) > n_1(0)$.

Proof : The necessary part of the proposition has already been proved above: the survival condition has to be satisfied for otherwise the trajectory of $n_1(t)$ diverges and leads to the elimination of the rightist newspaper. Now let us show that this condition is also sufficient. Suppose on the contrary that the survival condition holds and that the rightist newspaper is eliminated. Under the survival condition,we know that the whole expression in (5) is increasing with t and converges to the constant n_1^* in (6) when $t \to \infty$. Since we have assumed that the rightist newspaper is eliminated at the limit, we must have $n_1^* > 1$. It is easy to check that this inequality contradicts the survival condition $\beta < 1$. Q.E.D.

Notice that, for avoiding the elimination of newspaper 2, the larger is the ad-attraction intensity s, the lower must be the number of advertisers, A, all other things being equal. Further, since newspaper 2 is the minority one, we know that $2\lambda_2 < 1$, and therefore the inequality $s < 1/A$ is a sufficient condition for survival.

Figure 1 depicts the trajectory of $n_1(t)$ in both cases, $\beta > 1$ and $\beta < 1$. The elimination date, denoted by t^*, is also depicted in figure 1. The exact expression for t^* can be recovered by setting $n_1(t) = 1$ in (5) above (letting $R = (sA - 1) / (sA(2\lambda_2 - 1))$ one has $t^* = \ln \beta / \ln R$). It can be seen, that t^* is increasing in λ_2, which indicates that the larger the minority, the longer the life period for the minority newspaper, even if, finally, elimination is to be the end of the process.[4]

4 Conclusion

We have outlined a bare-bones model of the circulation spiral where, according to the corresponding theory, only the crude forces put in motion by pure demand-side effects are analyzed. Our main conclusion is that the elimination of daily newspapers cannot be explained only by these effects when the survival condition is satisfied. This hinges upon the importance of advertising in the utility function of the readers, and upon the size of the minority readership, lower minorities being better apt to survive, all other

[4]To be precise, the partial derivative of t^* with respect to λ_2 is found to be equal to $\left[\ln(R)\frac{1}{\lambda_2} + \left(\frac{2(As-1)\ln(2s\lambda_2 A)}{As(1-2\lambda_2)^2}\right)\right](\ln(R))^{-2}$.

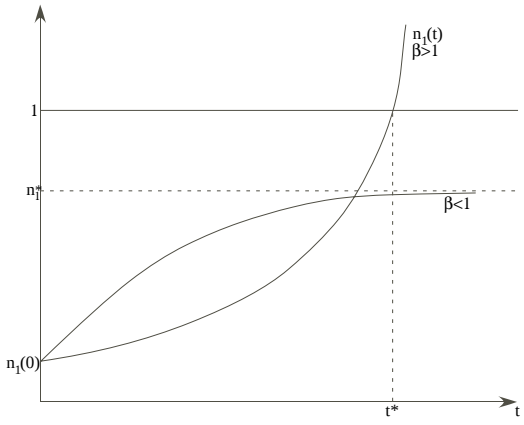

Figure 1:

things equal. However, when the survival condition is violated, the larger the minority the longer the life of the newspaper representing it. In conclusion, other elements should necessarily be taken into account to ground the circulation spiral theory on firmer roots, and improve the understanding of the concentration phenomena in the daily newspaper markets.

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