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The Market for News: a Demand-Oriented Analysis

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Abstract

This paper proposes a framework for the analysis of the demand-side in the market for news, whereas the existing literature has mainly focused on the supply side. We modeled explicitly the value of information and the demand for news. In particular, the relationship between the level of education and the individual's reading behaviour is stressed. In our framework, education makes the individuals more efficient in processing information and therefore allows them to save on the opportunity cost of time. We obtain the standard prediction of a positive relationship between education and reading. Moreover the choice of reading one versus more reports is explained by the relationship between education and the reading cost.

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1 Introduction

Media largely affect the set of private allocation decisions, of individuals' political choices and therefore the operation of the whole political and social system. More precisely, in market societies a substantial part of the relevant-choice information is traded in specific markets, called the markets for news. Firms specialized in gathering and transferring information (which we call the sources of information) provide news to an audience, who either pay a fee for this service, or implicitly let themselves be exposed to messages issued by advertisers; these, in turn, pay a fee to the sources in exchange for this opportunity to contact the audience.

A recent stream of economic literature has focused on the supply-side conditions for the provision of unbiased and reliable information: the number of sources (Besley and Prat (2005)) , the independency of concentrated economic power (Corneo (2006)), proper journalist incentives (Baron (2006)) have been examined. Empirical analyses of the supply side in media markets, with a specific concern about the implications for the health of the social and political system, can be found in Brunetti-Weder, B. (2003) and Djankov, S. et al.. (2003), Gentkow and Shapiro (2004).

Conversely, demand-side issues have so far attracted less attention than those related to the supply side. The relevance of demand side issues is a matter of intuition: in fact, if individuals show little propensity to resort to sources of information, or attach little value to the quality of information, the performance of a market for news can still be a poor one, even if sources are many, independent and unbiased. Analogously, if individuals are willing to resort to just one source of information, there will be little incentive for different sources to treat the same issues, and therefore there will be little opportunity to compare alternative news, which seems to be an essential attribute of pluralism (see Battaggion and Vaglio (2007)).

One prominent paper which takes into account the demand side issue is the work by Mullainathan and Shleifer (2005). In their paper the audience's attitude towards information is explicitly modeled, by assuming individuals have preferences over the news they receive (in other words, they like to be told some things more than others); moreover, the authors explicitly analyze the role and the behavior of "conscientious readers", i.e. those who compare different sources of information.

The demand side of the market for news is also the object of the present paper. We probe into the same field as Mullainathan and Shleifer 's, although in a different direction. We are interested in "how much" individuals resort to information provided by sources. In principle, individuals may completely neglect such an information, or instead resort to it to some larger or smaller extent. On any issue of interest, the individual can look at one or more sources of information. Unlike Mullainathan and Shleifer, the value of information is explicitly modeled, under the assumption that readers evaluate information according to Bayes rule, as well as the cost of getting information from the existing sources, as it will become clearer in what follows.[1] Moreover, while Mullainathan and Shleifer assume the existence of a population of

[1] Mullainathan and Shleifer's assumption on readers behavior could be rationalized as an optimal behaviour, following for instance Brandenburger-Polak (1996), but we do not pursue this path.

"conscientious" readers, we model endogenously the reading behavior of the individual, who can choose to be a "non-reader", to be a "simple minded" reader who relies on one source of information only, or to be a "conscientious" reader who benefits from the existence of many sources.[2]

As our paper focuses on demand, about supply we make the simplifying assumption that there exist at least two sources independently dealing with any issue of potential interest to the reader, and that the accuracy of the information provided is the same across all sources. Then we take as given what the mentioned literature instead analyzes, i.e. the sources of information, while we focus on what the existing literature takes as given, i.e. the size and the behavior of the audience. We shall discuss in a slightly deeper detail the supply side in Section 5.

A key feature of our paper is the focus on individual reading skills. By "reading" we mean a complex operation, including understanding of the text, evaluation of the contents, reflection, and not simply the mechanical act of translating alphabetical signs into sounds and words. Reading skills determine the time required to process a given piece of news, whose opportunity cost represents the main component of the total reading cost, and therefore affect the most important of costs attached to reading.

In this paper we assume that the reading skills increase with the level of education. This relationship is evident as regards the achievement of the basic reading skills. However, the relationship holds also if we refer to higher-level reading skills as described above. Tables 1 and 2 illustrate the relationship between education and newspaper readering, in US and in Italy respectively.[3]

Our final goal is to analyze how the level education and the distribution of the population across education levels influences the propensity to read news and, therefore, the performance of the media system.

As our main result we build a taxonomy of "patterns of reading". A pattern of reading is a relationship between the level of education and the reading behavior, which in turn is described by the range of issues actually covered by the individual and the number of sources read.

The paper is organized as follows: Section 2 presents the basic set up, while Section 3 analyzes the reader's behavior. Section 4 shows the

[2] In the last few lines we have shifted from generic denominations like "audience" or "resorting to sources of information" to more specific terms like "readers" and "reading", which are more intuitive than technical and abstract terms. We shall stick to this convention troughout the paper.

[3] For an historical account of the relationship between education and newspaper reading see Altick (1983).

Table 1 US		
Education	*Daily readership*	*Sunday readership*
Post graduate	67%	74%
College graduate	59%	68%
Some college	55%	64%
High school graduate	50%	59%
Not H.S. graduate	33%	38%

Source: Newspaper Association of America, 2004

Table 2 Italy	
Education	*Daily readership*
College graduate	65,7%
High school graduate	53,9%
Secondary school	39,7%
Primary school	27,2%
Not graduate	0,8%

Source: Audipress, 2008

relationship between education and patterns of reading. Finally, Section 5 provides some discussion tentative conclusions.

2 The set up

Imagine a situation where there exist a set of a potentially relevant issues, described by an interval $L \subset \mathbb{R}$, and an individual.

The individual must choose between two actions, a and b, for each issue in L. For each issue, there are two possible states of the world, A and B respectively: if the state is A (B) on some issue, the most appropriate choice as regards that issue is a (b). At time 0, Nature picks up one issue, $i \in L$ which we define as the "hot" issue, and selects a state (A or B) for each issue in L. When the individual makes his choice, he knows what the hot issue is, but he does not know the state of the world for any issue; π is the prior probability that the state of the world is A. The issues are not all equivalent from the point of view of the individual: the utility from choosing the appropriate action depends on how different ("far") the concerned issue is from the "hot" one. Formally:

- $\omega^A(i,j) \equiv \omega^A - |i-j|$ is the *ex-post* utility of the individual when he picks up the appropriate action about the j issue and the state of the world is A. Analogously, $\omega^B(i,j) \equiv \omega^B - |i-j|$, when the state of the world is B.

- l^A (l^B) is the *ex-post* utility of the individual when he picks up the least appropriate action when the state of the world is A (B).

As regards the provision of information, we assume that there exist two sources. At time 1, each source observes a signal σ_j for each $j \in L$. If the state of the world is A (B), the signal σ_j is A $(B)$with probability q. q might be interpreted as the reliability of a report or the accuracy of the information. Each source then publishes a report truthfully revealing the signal that it has observed.[4] Since the individual does not know the states of the world, then he may choose on the basis of his prior π or he may resort to the additional information contained in the reports. Reading is a costly activity. Reading costs have, in principle, two components: one is the price of the report, the other is the opportunity cost of time. In this paper we assume that the first component is absent.

[4] Since we are concerned with the demand side of the market, we do not enter in any details about technology, costs and revenues of the sources.

Define $s_1, s_2, ..., s_n \subseteq L$ as the collection of disjoint closed intervals which the individual reads about. Further, define $S \equiv \overset{N}{\underset{i=1}{\cup}} s_i$. Reading one report concerning a issue i requires a time $\frac{1}{h}$, where h measures the individual capability of processing information in a given time interval. The larger h, the shorter the time required to read. If instead the individual reads two reports about a given issue, this requires a time $\frac{k(h)}{h} = \theta(h)$, where $k(h)$ is a continuous decreasing function of h, bounded below at 1 (it is impossible to read two reports in a time smaller than the time required to read one). An implication of the previous assumption is that $\theta(h) - \frac{1}{h}$ decreases with respect to h. Then, given an interval S on L, $\frac{S}{h}$ is the time required to read one report for each issue in S, while $\theta(h) S$ is required to read two reports. We assume that h is related to the education level of the individual, and with some degree of approximation shall refer to h as the individual stock of human capital. Then, given h and the hot issue i, the individual chooses $S(i)$. In this model it will turn out that the choice of S is independent of i, but this is not the necessarily the case in general.

At time 2, the individual reads the reports he has selected and makes his choices about all the issues in L.

3 Reader's behavior

Here, we investigate the conditions under which an individual is willing to read one, two or no reports on a given issue. We assume that the reader's *ex-ante* best is a, given the prior π, for any j and i. Formally:

$$\begin{gathered} V(a; i, j) = \pi\omega^A(i, j) + (1-\pi) l^B > \\ \pi l^A + (1-\pi)\omega^B(i, j) = V(b; i, j) \end{gathered} \tag{1}$$

The above expression (1) rewrites as:

$$V(a; i, j) = V(a) - \pi |i - j| \tag{2}$$

where $V(a) \equiv \pi\omega^A + (1-\pi) l^B$. The expected utility for an individual who reads a single report is:

$$V_1(i, j) = V_1 - q |i - j| \tag{3}$$

where

$$V_1 = q\left[\pi\omega^A + (1-\pi)\omega^B\right] + (1-q)\left[(1-\pi) l^B + \pi l^A\right] \tag{4}$$

The expected utility for an individual who reads two reports is instead:

$$V_2(i,j) = V_2 - \alpha |i-j| \tag{5}$$

where

$$V_2 = \pi q [2-q] \omega^A + (1-\pi) q^2 \omega^B + \pi (1-q)^2 l^A + (1-\pi) \left(1-q^2\right) l^B \tag{6}$$

Notice that for any admissible value of q, $V_2 \geq V_1$.

We assume that

$$V_2 - V(a) > 0 \text{ and } V_1 - V(a) > 0 \tag{7}$$

Let us define,

$$\alpha = q [2\pi (1-q) + q] \tag{8}$$

We shall focus on the subset of cases which emerge when

$$\pi < q < \alpha \tag{9}$$

This restriction implies that the marginal value from expanding the range of issues covered by the reader is always decreasing, both when the individual reads just one report and when he reads two reports on the marginal issue. Focusing on this case means avoiding the systematic occurrence of corner solutions, namely, cases where, as h falls below some threshold value, the individual reads nothing about all issues, while for h larger than the threshold he reads at least one report about all issues in $[0, L]$.

Let us now turn to the decision problem for an individual who knows what the hot issue i is and must decide which issues to read about and whether to read one or two reports. The individual consumes an outside good, c, and owns a time endowment T whose market price is unit.

We explore first a pattern where the individual reads

- two reports on each issue contained in an interval Σ centered at i,
- one report on two intervals, namely $\left[i + \frac{\Sigma}{2}, i + \frac{S}{2}\right]$ and $\left[i - \frac{S}{2}, i - \frac{\Sigma}{2}\right]$
- no reports on the issues contained in the intervals $\left[0, i - \frac{S}{2}\right]$ and $\left[i + \frac{S}{2}, L\right]$

The intuition is that the individual devotes less reading time to issues which are less related to ("farthest" from) the hot one and concentrates his reading effort on the hot issue and the closest ones. The expected utility function to be maximized by choosing S and Σ is:

$$\begin{gathered} U(\Sigma, S, c) = c + \int_{i-\frac{\Sigma}{2}}^{i+\frac{\Sigma}{2}} V_2 - \alpha\left|i-j\right| dj + \int_{i+\frac{\Sigma}{2}}^{i+\frac{S}{2}} V_1 - q\left|i-j\right| dj + \\ + \int_{i-\frac{S}{2}}^{i-\frac{\Sigma}{2}} V_1 - \left|i-j\right| q dj + \int_{0}^{i-\frac{S}{2}} V(a) - \pi\left|i-j\right| dj + \\ + \int_{i+\frac{S}{2}}^{L} V(a) - \pi\left|i-j\right| dj \end{gathered} \tag{10}$$

If we define, $\Delta = S - \Sigma$, expression (10) rewrites as:

$$\begin{gathered} U(\Sigma, \Delta, c) = c + V_2\Sigma - \alpha\frac{\Sigma^2}{4} + V_1\Delta - q\left(\frac{\Delta^2+2\Sigma\Delta}{4}\right) + \\ + V(a)(L-\Sigma-\Delta) + \pi\left(\frac{\Delta^2+2\Sigma\Delta+\Sigma^2}{4} + i^2 + \frac{L^2}{2} - iL\right) \end{gathered} \tag{11}$$

The individual faces the following budget constraint:

$$c \leq \left(T - \frac{\Delta}{h} - \theta(h)\Sigma\right), \; L \geq \Sigma + \Delta, \; \Sigma, \Delta \geq 0. \tag{12}$$

The first-order conditions are:

$$\frac{\partial U(\Sigma, \Delta, c)}{\partial \Sigma} = V_2 - V(a) + (\pi - \alpha)\frac{\Sigma}{2} + (\pi - q)\frac{\Delta}{2} - \theta(h) - \mu_1 + \mu_2 = 0 \tag{13}$$

$$\frac{\partial U(\Sigma, \Delta, c)}{\partial \Delta} = V_1 - V(a) + (\pi - q)\frac{\Sigma + \Delta}{2} - \frac{1}{h} - \mu_1 + \mu_3 = 0 \tag{14}$$

Where $\mu_1, \mu_2, \mu_3 \geq 0$ are respectively the Lagrange multipliers associated with $L \geq \Sigma + \Delta$, Σ, $\Delta \geq 0$.

Let us first consider the corner solution: $L > \Delta > 0$, $\Sigma = 0$.The solution is characterized by the following conditions:

$$\Delta = \frac{2\left(V_1 - V(a) - \frac{1}{h}\right)}{q - \pi} > 0 \tag{15}$$

$$V_2 - V_1 < \theta(h) - \frac{1}{h} \tag{16}$$

If we define:

$$\widetilde{h}_2 \text{ such that } V_2 - V_1 = \theta(\widetilde{h}_2) - \frac{1}{\widetilde{h}_2}$$

then condition (16) is true for $h < \widetilde{h}_2$ and false for $h \geq \widetilde{h}_2$. If we instead define:

$$h_1^0 \text{ such that : } \quad V_1 - V(a) = \frac{1}{h_1^0}$$

obviously (15) is nonnegative for $h \geq h_1^0$. Then if we define the $\Delta - region$ as the set of h values such that $\Delta > 0$ and $\Sigma = 0$, such region is given by the interval $\left(h_1^0, \widetilde{h}_2\right)$.

Let us turn to the other corner solution, namely, $L > \Sigma > 0, \ \Delta = 0$. The solution is characterized by the following conditions:

$$\Sigma = \frac{2\left(V_2 - V(a) - \theta\left(h\right)\right)}{\alpha - \pi} > 0 \tag{17}$$

$$V_1 - V(a) - \frac{1}{h} + (\pi - q)\frac{\Sigma}{2} < 0 \tag{18}$$

by substituting Σ, condition (18) rewrites as:

$$V_2 - V(a) - \left[V_1 - V(a)\right]\frac{\pi - \alpha}{\pi - q} > \theta\left(h\right) - \frac{1}{h}\frac{\pi - \alpha}{\pi - q} \tag{19}$$

Let us define:

$$\underline{h}_1 \quad \text{such that : } \quad V_2 - V(a) - \left[V_1 - V(a)\right]\frac{\pi - \alpha}{\pi - q} = \theta\left(\underline{h}_1\right) - \frac{1}{\underline{h}_1}\frac{\pi - \alpha}{\pi - q}$$

In principle, condition (19) may hold for $h > \underline{h}_1$ or for $h < \underline{h}_1$,depending on whether the right-hand side of (19) is decreasing or increasing with respect to h. More precisely, condition (19) holds for $h > \underline{h}_1$ if:

$$k'\left(h\right) < \frac{1}{h}\left(k\left(h\right) - \frac{\pi - \alpha}{\pi - q}\right)$$

Moreover with we define:

$$h_2^0 \text{ such that : } V_2 - V(a) = \theta\left(h_2^0\right)$$

then 17 holds if $h > h_2^0$. If the $\Sigma - region$ is defined as the set of h values where $\Sigma > 0$ and $\Delta = 0$,such a region is defined as the interval:

$$\left(\max\left(h_2^0, \underline{h}_1\right), \infty\right)$$

if the right-hand side of (19) is decreasing. If instead the right-hand side of (19) is increasing, the $\Sigma - region$ coincides with the interval:

$$\left(h_2^0, \underline{h}_1\right)$$

The remaining corner solution, $\Delta = \Sigma = 0$, is a candidate solution if $h \in (0, \min\left[h_1^0, h_2^0\right])$ .We shall call this interval the $0 - region$.

Finally, let us consider the unconstrained solutions, ($L > \Delta + \Sigma$, $\Delta, \Sigma > 0$):

$$\Delta = \frac{2}{\alpha - q}\left[\theta(h) + V(a) - V_2 + \frac{\pi - \alpha}{\pi - q}\left(V_1 - V(a) - \frac{1}{h}\right)\right] > 0 \quad (20)$$

$$\Sigma = 2\left[\frac{(V_2 - V(a) - \theta(h))}{\alpha - q} + \left(V(a) - V_1 + \frac{1}{h}\right)\right] > 0 \quad (21)$$

It is immediate to see that (20) may be true for $h < \underline{h}_1$or for $h > \underline{h}_1$. If we define $\underline{h}_2$ as:

$$\underline{h}_2 \text{ such that } V_2 - V(a) - (\alpha - q)(V_1 - V(a)) = \theta(\underline{h}_2) - (\alpha - q)\frac{1}{\underline{h}_2}$$

then we can conclude that 21 holds if $h > \underline{h}_2$ (notice that $\theta(h) - (\alpha - q)\frac{1}{h}$ is decreasing).

Defining the $\Sigma, \Delta - region$ as the set of h values such that $\Sigma, \Delta > 0$ is a solution, this region coincides with the interval

$$(\max(\underline{h}_2, \underline{h}_1), \infty)$$

if the right-hand side of (19) is increasing . If instead the right-hand side of (19) is decreasing $\Sigma, \Delta - region$ coincides with the interval:

$$(\underline{h}_2, \underline{h}_1)$$

4 Education and patterns of reading

In the present section we study how the reading behavior changes according to h. For instance, it is commonplace, that for sufficiently low levels of education, individuals do not read at all as in the $0 - region$. What happens outside the $0 - region$ depends on the position of the remaining regions. In turn it depends on how the critical values $h_1^0, \widetilde{h}_2, h_2^0, \underline{h}_1$and $\underline{h}_2$ are ordered: any ordering of these five elements corresponds to a pattern of reading behavior. For instance, $\widetilde{h}_2 < h_1^0$ means that the $\Delta - region$, as defined above, does not exist: in this case the individuals who choose to read, read two reports on at least some topics. Since the following propositions set very narrow limits to the set of admissible orderings, they also limit the set of admissible patterns of reading behavior. Lemma 1 deals with the case where (19) holds for $h > \underline{h}_1$, while Lemma 2 analyzes the opposite case.

Lemma 1 *Under assumption (9) and if condition (19) holds for* $h > \underline{h}_1$*, the following implications obtain:*

a) $h_2^0 > \underline{h}_2 \Longrightarrow h_2^0 < h_1^0$*;* $h_2^0 < \underline{h}_2 \Longrightarrow h_2^0 > h_1^0$
b) $h_1^0 > \underline{h}_2 \Longrightarrow h_1^0 > h_2^0$*;* $h_1^0 < \underline{h}_2 \Longrightarrow h_1^0 < h_2^0$
c) $\underline{h}_2 > \widetilde{h}_2 \Longrightarrow \underline{h}_2 < h_1^0; \underline{h}_2 < \widetilde{h}_2 \Longrightarrow \underline{h}_2 > h_1^0$
d)$\underline{h}_2 > \underline{h}_1 \Longrightarrow \underline{h}_2 < h_1^0; \underline{h}_2 < \underline{h}_1 \Longrightarrow \underline{h}_2 > h_1^0$
e) $h_2^0 > \underline{h}_1 \Longrightarrow h_2^0 < h_1^0$*;* $h_2^0 < \underline{h}_1 \Longrightarrow h_2^0 > h_1^0$
f) $\widetilde{h}_2 > \underline{h}_1 \Longrightarrow \widetilde{h}_2 < h_1^0; \widetilde{h}_2 < \underline{h}_1 \Longrightarrow \widetilde{h}_2 > h_1^0$
g) $\widetilde{h}_2 > h_2^0 \Longrightarrow \widetilde{h}_2 > h_1^0; \widetilde{h}_2 < h_2^0 \Longrightarrow \widetilde{h}_2 < h_1^0$
h)$h_1^0 > h_2^0 \Longrightarrow h_1^0 > \widetilde{h}_2; h_1^0 < h_2^0 \Longrightarrow h_1^0 < \widetilde{h}_2$
i)$h_1^0 > \widetilde{h}_2 \Longrightarrow h_1^0 > h_2^0$*;* $h_1^0 < \widetilde{h}_2 \Longrightarrow h_1^0 < h_2^0$

Proof. See Appendix A. ■

Lemma 2 *Under assumption (9) and if condition (19) holds for* $h < \underline{h}_1$*, the implications a),b),c) and g),h),i) of the previous proposition still hold. The implications d),e),f) are replaced by the following ones, respectively:*

d')$\underline{h}_2 > \underline{h}_1 \Longrightarrow \underline{h}_2 > h_1^0; \underline{h}_2 < \underline{h}_1 \Longrightarrow \underline{h}_2 < h_1^0$
e') $h_2^0 > \underline{h}_1 \Longrightarrow h_2^0 > h_1^0$*;* $h_2^0 < \underline{h}_1 \Longrightarrow h_2^0 < h_1^0$
f') $\widetilde{h}_2 > \underline{h}_1 \Longrightarrow \widetilde{h}_2 > h_1^0; \widetilde{h}_2 < \underline{h}_1 \Longrightarrow \widetilde{h}_2 < h_1^0$

Proof. In the proofs of statements e),f),g) of the previous proposition, the sign of the inequality in the first step of each proof is reverted. The result follows easily. ■

We can single out now the patterns of reading behavior which are the consistent with the above Lemmas. The following Proposition deals separately with the case where (19) holds for $h > \underline{h}_1$ and with the opposite case.

Proposition 3

- *In the case (19) holds for* $h > \underline{h}_1$*, the two following ordering are consistent with Lemma 1:*

  $\alpha)h_1^0 < h_2^0 < \underline{h}_2 < \widetilde{h}_2 < \underline{h}_1$

  $\beta)\underline{h}_1 < \widetilde{h}_2 < \underline{h}_2 < h_2^0 < h_1^0$

- *In the case (19) holds for* $h < \underline{h}_1$ *the following four cases are consistent with Lemmas 1 and 2:*

  $\gamma)\widetilde{h}_2 < \underline{h}_2 < h_2^0 < h_1^0 < \underline{h}_1$

  $\delta)\widetilde{h}_2 < \underline{h}_2 < h_2^0 < \underline{h}_1 < h_1^0$

  $\varepsilon)\underline{h}_1 < h_1^0 < h_2^0 < \underline{h}_2 < \widetilde{h}_2$

  $\eta)h_1^0 < \underline{h}_1 < h_2^0 < \underline{h}_2 < \widetilde{h}_2$

Proof. Inspection of the set of possible orderings and elimination of not- admissible cases yield the result. ■

According to pattern α), the $0 - region$ lies between 0 and h_1^0; if $h_1^0 < h < \underline{h}_2$, the reader reads one report on all topics of interest. Somewhere in the interval $\left[\underline{h}_2, \widetilde{h}_2\right]$, the reader switches from reading one report on all topics to reading two reports on some topics and one on other topics. This certainly happens when $\underline{h}_1 > h > \widetilde{h}_2$. As $\underline{h}_1 < h$, the $\Sigma - region$ begins and the reader reads two reports on any topic of interest.

According to pattern β), the $0 - region$ lies between 0 and h_2^0; at h_2^0, the $\Sigma - region$ begins. The $\Delta - region$ and the $\Sigma, \Delta - region$ do not exist in this case. As h increases the reader shifts from reading nothing to reading two reports on any issue.

The next four cases just correspond to two patterns of behavior.In

cases γ) and δ) the $\Delta - region$ does not exist. The $0 - region$ lies between 0 and h_2^0.For $h \in (h_2^0, \underline{h}_1)$, readers read two reports on all the topics of interest. For larger values of h readers read two reports on some topics and one on other ones.

In case ε) and θ) individuals read nothing at $h < h_1^0$,read one report for $h \in (h_1^0, \underline{h}_2)$, while for all $h > \underline{h}_2$, read two reports on some topics and one on the other ones. The $\Sigma - region$ does not exist.

5 Discussion of results

This paper proposes a framework for the analysis of the demand-side in the market for news. We modeled explicitly the value of information as a outcome of a rational choice. In particular, we have stressed the relationship between the level of education and the individual's reading behavior. By reading behavior we mean both the time devoted to reading and the number of sources to which the individual resorts. In our framework, education affects the choices concerning reading through its effect on the cost of reading, which essentially consists in the opportunity cost of time. Education makes the individual more efficient in processing information and therefore allows him to save on the opportunity cost. Then we obtain the standard prediction of a positive relationship between education and reading. However, our analysis puts into the fore the choice of reading one versus more reports, and this choice depends in a non-trivial way on the shape of the relationship between education and the reading cost. This is how different patterns of reading emerge from our model. Of course, the reading behavior described by our model can be an equilibrium, only under some suitable assumption about the sources' behavior, which were exogenously imposed in the present model.

In the paper we assumed that there exist two sources covering all the potential issues. In a more complete model, however, the existence of one or more sources should be an equilibrium outcome. Here we introduce a simple exercise to suggest how this model could be used to analyze the impact of demand structure on the equilibrium behavior of sources. Suppose now that the two sources face a very simple decision problem: they must choose whether or not to enter the market, by paying an entry fee F. Sources are financed by advertising, at a unit per-reader fee. After entry, each source covers the whole issue space, without any further cost. Suppose, as a starting point, that the pattern of reading is the α pattern (see the previous paragraph), with the (unit) population distributed across education levels as follows.

- ρ_0 in the 0-region
- ρ_Δ in the $\Delta-$region
- $\rho_{\Sigma\Delta}$ in the Σ, Δ region
- ρ_Σ in the Σ region

(where $\rho_0 + \rho_\Delta + \rho_{\Sigma,\Delta} + \rho_\Sigma = 1$). The individuals who are willing to read just one report are split between the two sources. Suppose that one of the sources is already in the market (the incumbent source) and consider the decision problem for the entrant. The entry condition is as follows:

$$\frac{1}{2}\rho_\Delta + \left(\rho_{\Sigma,\Delta} + \rho_\Sigma\right) = \left(1 - \rho_0 - \frac{1}{2}\rho_\Delta\right) \geq F \tag{22}$$

It is immediate to see that the existence of two sources in the market in equilibrium depends on the total size of reading population $(1 - \rho_0)$ and on it composition: a high share of single-report readers reduces the size of double-report readers. Suppose now that condition (22) does not hold and the incumbent remains the only operating source. In this case, readers in the Σ, Δ and Σ regions are constrained to read one report only, which to them is better than reading none. Then the existence condition for the incumbent is

$$(1 - \rho_0) \geq F \tag{23}$$

Here, the only relevant magnitude is the size of the reading population. Even if condition (23) holds true, the situation would be suboptimal. Although some individuals are willing to read more than one report, there exists just one source. From the point of view of pluralism, this is clearly an unsatisfactory outcome .

A more striking outcome emerges when the pattern of reading is of the β type. In this case, the entry condition becomes

$$\rho_{\Sigma} \geq F \tag{24}$$

What happens if the condition (24) is not satisfied? Since the second source does not enter the market, one might expect the double readers to limit themselves to a single report. However this is not the case under the β pattern: readers prefer reading two reports rather than one, but if they must choose between reading one report and not reading at all, they prefer the second alternative. Then even one source cannot profitably operate in this market. The intuition is that a polarized population, where few are willing to read more than one source while a large share of the population does not read, may end up with a very poor supply of news. in this simplified framework, the market for news collapses to 0 so that pluralism is not even at issue.

The two simple examples above justify the emphasis that we put on demand related issues in the study of media markets *vìs a vìs* supply related influences, such as capture, journalist incentives, entry costs and other variables extensively studied in the existing literature. More specifically, our approach stresses the role of the distribution of the population across education levels; furthermore the relationship between education and reading behavior also matters, as shown by the comparison between the α and β patterns.

In the paper as whole and in the above examples we have ruled out all the out-of-pocket cost for the reader. The introduction of a newspaper price would affect the reading pattern and would allows for price-based adjustment. This might be an interesting extension of the present model. As a final remark, the model rests upon a tentative representation of reading costs, whose details would require an extensive empirical investigation.

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6 Appendix A

Proof of Lemma 1.

We begin by proving, for each statement, the first of the two implications; the second one then easily follows.

a) $h_2^0 > \underline{h}_2 \Longrightarrow V_2 - V(a) - (\alpha - q)(V_1 - V(a)) > \theta(\ h_2^0) - (\alpha - q)\frac{1}{h_2^0} = V_2 - V(a) - (\alpha - q)\frac{1}{h_2^0}$

$\Longrightarrow V_1 - V(a) < \frac{1}{h_2^0} \Longrightarrow h_2^0 < h_1^0.$

b) $h_1^0 > \underline{h}_2 \Longrightarrow V_2 - V(a) - (\alpha - q)(V_1 - V(a)) > \theta(h_1^0) - (\alpha - q)\frac{1}{h_1^0}$; since $V_1 - V(a) = \frac{1}{h_1^0}$,

we have $V_2 - V(a) > \ \theta(h_1^0) \Longrightarrow h_1^0 > h_2^0$

c) $\underline{h}_2 > \widetilde{h}_2 \Longrightarrow V_2 - V_1 > \theta(\underline{h}_2) - \frac{1}{\underline{h}_2} = V_2 - V(a) - (\alpha - q)\left(V_1 - V(a) - \frac{1}{\underline{h}_2}\right)$

$\Longrightarrow 0 > V_1 - V(a) - (\alpha - q)\left(V_1 - V(a) - \frac{1}{\underline{h}_2}\right) - \frac{1}{\underline{h}_2} =$

$= \left(V_1 - V(a) - \frac{1}{\underline{h}_2}\right)(1 - (\alpha - q)) \Longrightarrow \underline{h}_2 < h_1^0$

d) $\underline{h}_2 > \underline{h}_1 \Longrightarrow V_2 - V(a) - \theta(\underline{h}_2) > \frac{\pi-\alpha}{\pi-q}\left[V_1 - V(a) - \ \frac{1}{\underline{h}_2}\right]$

$\Longrightarrow V_2 - V(a) - (V_2 - V(a)) + (\alpha - q)(V_1 - V(a)) - (\alpha - q)\frac{1}{\underline{h}_2} > \frac{\pi-\alpha}{\pi-q}\left[V_1 - V(a) - \ \frac{1}{\underline{h}_2}\right] \Longrightarrow 0 > \left(\frac{\pi-\alpha}{\pi-q} - \alpha + q\right)\left[V_1 - V(a) - \ \frac{1}{\underline{h}_2}\right]$

$\Longrightarrow V_1 - V(a) - \ \frac{1}{\underline{h}_2} < 0 \Longrightarrow \underline{h}_2 < h_1^0$

e) $h_2^0 > \underline{h}_1 \Longrightarrow V_2 - V(a) - \theta(h_2^0) > \frac{\pi-\alpha}{\pi-q}\left[(V_1 - V(a)) - \frac{1}{h_2^0}\right]$

$\Longrightarrow (V_1 - V(a)) - \frac{1}{h_2^0} < 0 \Longrightarrow h_2^0 < h_1^0$

f) $\widetilde{h}_2 > \underline{h}_1 \Longrightarrow V_2 - V(a) - \theta(\widetilde{h}_2) > \frac{\pi-\alpha}{\pi-q}\left[V_1 - V(a) - \ \frac{1}{\widetilde{h}_2}\right]$

$\Longrightarrow V_2 - V(a) + \ V_1 - V_2 - \frac{1}{\widetilde{h}_2} \geq \frac{\pi-\alpha}{\pi-q}\left[V_1 - V(a) - \ \frac{1}{\widetilde{h}_2}\right]$

$\Longrightarrow 0 > \left[V_1 - V(a) - \ \frac{1}{\widetilde{h}_2}\right]\left(\frac{\pi-\alpha}{\pi-q} - 1\right) \Longrightarrow \widetilde{h}_2 < h_1^0$

g) $\widetilde{h}_2 > h_2^0$ implies that $V_2 - V(a) > \theta(\widetilde{h}_2) = \ V_2 - V_1 + \frac{1}{\widetilde{h}_2}$

$\Longrightarrow \ V_1 - V(a) = \frac{1}{h_1^0} > \frac{1}{\widetilde{h}_2} \Longrightarrow \ \widetilde{h}_2 > h_1^0.$

h) $h_1^0 > h_2^0 \Longrightarrow V_2 - V(a) > \theta(h_1^0)$

$\Longrightarrow V_2 - V_1 > \theta(h_1^0) - V_1 + V(a) = \theta(h_1^0) - \frac{1}{h_1^0} \Longrightarrow h_1^0 > \widetilde{h}_2$

i) $h_1^0 > \widetilde{h}_2 \Longrightarrow V_2 - V_1 > \theta(h_1^0) - \frac{1}{h_1^0} = \theta(h_1^0) - (V_1 - V(a))$

$\Longrightarrow V_2 - V(a) > \theta(h_1^0) \Longrightarrow h_1^0 > h_2^0$