

# The Instrumental Voter Goes to the News-Agent: Demand for Information, Election Closeness, and the Media

Valentino Larcinese\*

Department of Government and STICERD  
London School of Economics and Political Science<sup>†</sup>

First draft: November 2001 - This version: March 21, 2003

## Abstract

This paper studies the impact of instrumental voting on information demand and mass media behaviour during electoral campaigns. If voters act instrumentally then information demand should increase with the closeness of an election. Mass media are modeled as profit-maximizing firms that take into account information demand, the value of customers to advertisers and the marginal cost of customers. Information supply should be larger in electoral constituencies where the contest is expected to be closer, there is a higher population density, and customers are on average more profitable for advertisers. The impact of electorate size is theoretically undetermined. These conclusions are then tested with comfortable results on data from the 1997 general election in Britain.

## 1 Introduction and related literature

The literature explaining voting and elections using the tools of rational choice theory is vast. This approach to electoral behaviour assumes instrumental voting: citizens care about public policies and voting is the instrument to reach them, or at least to increase the probability of obtaining the preferred option.

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\*I am grateful to Tim Besley, Evelina Larcinese, Ian Preston, Imran Rasul, David Stromberg, and participants in the meeting of the Public Choice Society in S. Diego, the workshop on mass media economics at STICERD, the EEA and ESEM meetings in Venice, and seminars at LSE and SOAS. I wish to express my gratitude to CODE-Universitat Autònoma de Barcelona, for their hospitality during the completion of this work, and to the European Commission for financial support (Marie Curie Fellowship). The usual disclaimer applies.

<sup>†</sup>Address for correspondence: London School of Economics, Department of Government, Houghton Street, London, WC2A 2AE, United Kingdom, Tel. +44 (0) 20 7955 6692. Fax. +44 (0) 20 7831 1707. E-mail: V.Larcinese@lse.ac.uk.

This theory poses some problems, including the fact that the probability to be pivotal in large elections is normally so low that it could be considered negligible in optimization processes. This criticism can be overcome if we are ready to compromise on what we intend by a rational act. In a weak sense, agents behave rationally according to their perception of the reality, that could be different from the “objective” state of facts. In the case of voting, the probability to be pivotal in a large election is clearly very low, but it is not zero. The subjective perception of the probability of casting a decisive vote does not necessarily coincide with the infinitesimal numbers that appropriate but cumbersome calculations would deliver (see for example Uhlaner and Grofman 1986). Moreover, voting can be seen as a “low cost-low benefit” activity (Aldrich 1993): it is therefore possible that even small changes in this probability might have an effect on incentives to participate in an election.

If we accept this argument then turnout should be larger in closer elections, when the probability to cast the decisive vote is higher. Unfortunately empirical analysis does not deliver any firm conclusion. Foster (1984), after reviewing a number of studies on the closeness-turnout linkage in the US, concludes that “the perceived probability of a tied election at the state level is not a powerful or reliable factor in explaining across-state voter participation rates in presidential elections”. Grofman, Collet and Griffin (1998) study on US Senate and House of Representatives elections find evidence of higher turnout among registered voters in closer contests. Other recent studies based either on aggregate data (Kunce 2001) or on survey data (Matsusaka and Palda 1999) show instead a poor relationship between closeness and turnout. Using poll data, Kunce (2001) also shows how “the extent to which pre-election perceptions matter depends directly on how one measures the likelihood of a close contest”. It seems fair to say that evidence is, at best, mixed.

In this paper we will consider another implication of instrumental voting: when elections are closer then information on candidates and platforms should be more valuable as the probability for a vote to matter is higher. Although Downs (1957) himself hints at both the “paradox of voting” (low incentives to vote) and “rational ignorance” (low incentives to gather political information) as closely related consequences of instrumental voting, the second of the two paradoxes has received less attention, in particular for what concerns the predictive implications of comparative static analysis.

Thus, information acquisition should be related to the probability for a voter to be pivotal. If the suppliers of political information (mass media) are aware of this, then we should expect also their behaviour to be influenced by marginality. In this sense, mass media behaviour under different circumstances will give us the possibility to provide a different kind of test of theories of instrumental voting and of the role of marginality as an incentive for participation. This clearly allows us to exploit information not used so far for this purpose.

The second purpose of this paper has to do with the potential impact of political information and mass media on public policy. Recent theoretical and empirical research points clearly in this direction. Besley and Burgess (2002) provide evidence on Indian states responsiveness to calamities and find that this

is associated with the circulation of newspapers. Besley and Prat (2002) show how mass media pluralism can increase information availability and politicians' accountability. In general, as information plays a key role in agency relations, it is reasonable to expect information availability to be important for accountability (and therefore for public policy) when decision-making power is delegated to governments (see also Lohmann 1998). The distribution of political information may have an impact on redistributive policy as office-seeking politicians will target their platforms at voters that are more likely to be aware of them (Larcinese 2002a). Stromberg (2002) shows how candidates' platforms can be driven by mass media targeting of specific groups. Stromberg (2001) also shows how the diffusion of radio had a significant impact on the distribution of New Deal spending.

Indeed, most people seem to believe that mass media have a relevant impact on citizens' electoral choices. Politicians appear to struggle for media attention and tend to complain when they do not receive enough space on newspapers or television. Some politicians blame the media for bad electoral performances. In some countries access to television and electoral advertising during electoral campaigns are publicly regulated and even publicly funded. All this must be based on the presumption that media are effective in influencing voters' behaviour.

Studies in this sense have not delivered any conclusive evidence, both because of an objective lack of data and because of the difficulty to identify the media effects in reality. In particular, media effects could potentially be of several different types. At the very minimum, the media can be seen as informing the citizens about the different available options on the political market. Some theories, however, give to mass media more power than this and see them as capable of persuading the people by shaping their policy preferences. Research in this direction started in the period between the two World Wars, under a general presumption that mass communication was an extraordinarily powerful device (see Lippman 1922). However, the first systematic study conducted on survey data by a group of researchers at Columbia University seemed rather to show the opposite (Lazarsfeld, Berelson and Gaudet 1944). The influence of the Columbia school (also through a subsequent work by Berelson, Lazarsfeld and McPhee 1954) was such that since then the dominant view has been that campaigning and the media have only "minimal effects" on voters. Until quite recently, most studies continued to find little evidence of persuasion by mass media (Finkel 1993).

A radical shift in communication studies has been induced by a new cognitive theory that goes under the name of "uses and gratifications" (see Blumler and McQuail 1968). Rather than asking what are the effects of the media on people's opinions, this theory starts by asking why the people use the media in the first place. Only understanding individual motivations will make possible to recognize the possible effects. It is immediate that this theory should be of particular interest to rational choice theorists as it basically starts from individual preferences. The shift in the focus of attention produced new empirical evidence that seemed in contrast with the minimal effects found by the Columbia school.

Iyengar and Kinder (1987) examine evidence from electoral campaigns and television news and conclude that their effects have not much to do with persuasion but rather with “commanding the public’s attention (agenda-setting) and defining criteria underlying the public’s judgement (priming)”<sup>1</sup>. Bartels (1993) shows how apparent “minimal effects” can be, at least partially, a consequence of measurement errors. Zaller (1992 and 1995) puts forward one further argument against the “minimal effects” evidence by arguing that tangible effects are only due to the “reception gap”, the difference between the amount of information received about different candidates. According to Zaller, most studies were conducted on presidential elections, where the campaign is normally quite intense on both sides, with plenty of information on both candidates: this generates a minimal reception gap and therefore minimal effects, which is not the same as saying that the campaigns had no effect. In local elections, where the reception gap between incumbents and challengers is normally much larger, the impact of the media appears instead sizeable.

What is missing so far is a formal analysis of the political information market, with a demand for information that comes from individual preferences and a supply of information provided, among others, by media firms. This type of analysis would clearly be more limited in scope, not pretending to identify the broad range of possible media effects. However, by restricting our attention on few observable variables, we can be more precise on media’s behaviour during electoral campaigns and on voters’ motivation. This can clearly have consequences for our presumptions on the possible effects of mass media on voters.

Among previous studies in this direction, Matsusaka (1995) provides a Bayesian decision-theoretical model of political information demand. Larcinese (2002b) models information acquisition as an individual production function, considering the role of ideological beliefs, and provides evidence on the linkage between information and turnout during the 1997 general election in Britain. Specific characteristics of the media industry (like economies of scale and concentration) can also be expected to matter for the way people are informed about politics. Works in this direction are Spence and Owen (1977) and Noam (1987).

The theoretical model presented in this paper builds on Stromberg’s (2002) model of mass media competition. Stromberg argues that “the increasing-return-to-scale technology and advertising financing of media firms induce them to provide more news to large groups, such as tax payers and dispersed consumer interests, and groups that are valuable to advertisers”. Eventually, this information bias will be taken into account by politicians when proposing electoral platforms and will therefore translate into a policy bias.

We will explicitly model information acquisition and how it relates with the election closeness as well as with observable individual characteristics. Our units of analysis (called “groups” in Stromberg’s model) are represented by electoral constituencies: in this way we will be able to implement a test of our predictions, as well as of some of Stromberg’s results.

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<sup>1</sup>Bartels (1988), Zaller (1989), Popkin (1991), and Franklin (1991) find similar results. The theory of agenda-setting was first proposed by McCombs and Shaw (1972).

One of such results concerns the effect of group size on news supply. Larger groups should receive more media attention as they provide more readership and therefore more revenue. The same can be said of groups that are more valuable to advertisers (for example wealthier groups). However, in the context of our model a countervailing effect can be identified: in larger groups we should expect a more severe collective action problem. Thus, in larger constituencies the probability to cast a decisive vote is smaller and such will be the demand for information. This “collective action effect” can potentially offset the “group size effect”; only empirical investigation can shed further light and allow us to accept or reject any theoretical result in this sense.

Information supply also depends on the newspapers’ production function. Fixed costs are normally very high but we argue that delivery costs could also play an important role in information supply: more densely populated areas will receive more news coverage (other things equal) simply because the cost of the marginal reader is lower in such areas.

The paper can be summarized as follows. In the next section we will present the theoretical model of information demand and supply. Political information can be demanded for a number of reasons, including instrumental voting. Thus, it will be higher in marginal constituencies. This higher demand will induce a larger supply by profit-maximizing media firms. Media’s revenue per reader is represented by the price paid for the newspaper plus the amount paid by advertisers per reader. This amount is not the same for all customers and can be expected to be higher for customers that are more valuable to advertisers. The cost of producing newspapers is fixed but there is a variable delivery cost. Thus, in equilibrium, information supply is higher in marginal constituencies as well as in constituencies with richer and more concentrated electorate. About the size of the electorate we identify two effects working in opposite directions, the “group size effect” and the “collective action effect”. In section 3 these predictions are tested using data from the 1997 general election in the United Kingdom. The test consists of two parts. The first uses aggregate data and focuses on mass media behaviour. We will use data collected from a major national newspaper during the electoral campaign, as well as electoral data and the 1991 Census. The second part will focus instead on individual behaviour and use survey data from the 1997 British General Election Study. The results suggest a high degree of compatibility between our theory and the data. Section 4 concludes.

## 2 The model

We start by considering a polity divided into two electoral constituencies  $\mu$  and  $o$ . Each constituency elects a member of parliament (MP). There are two competing parties  $L$  and  $R$  each presenting one candidate in all constituencies. MPs are elected in a first past the post system. With obvious notation we will indicate the candidates in each constituency with  $L_\mu, R_\mu, L_o, R_o$ .

Suppose the two candidates in each constituency are chosen independently by parties through a process that is unknown to citizens. This process can be represented for both parties by respective distribution functions  $F_R(a)$  and  $F_L(a)$  (with densities  $f_L(a)$  and  $f_R(a)$ ) over the support  $\mathcal{A} \subseteq \mathfrak{R}_+$  of candidates' types.

For simplicity we will assume that the policy space is the same as the candidates' space and, abusing notation, that utility from policy  $a$  is  $a$ . Policies are formed at the central level by the parliament of the two MPs and affect both constituencies. If  $a_\mu$  is the candidate elected in constituency  $\mu$  and  $a_o$  is elected in constituency  $o$ , then the central policy will be  $a^* = \frac{1}{2}a_\mu + \frac{1}{2}a_o$ .

The net benefit to citizen in constituency  $\mu$  from electing the preferred of the two candidates  $a_{\mu L}$  and  $a_{\mu R}$  is given by

$$\begin{aligned} B(a_{\mu L}, a_{\mu R} | a_o) &= |(\frac{1}{2}a_o + \frac{1}{2}a_{\mu L}) - (\frac{1}{2}a_o + \frac{1}{2}a_{\mu R})| \\ &= \frac{1}{2}|a_{\mu L} - a_{\mu R}|. \end{aligned} \tag{1}$$

Analogously

$$B(a_{oL}, a_{oR} | a_\mu) = \frac{1}{2}|a_{oL} - a_{oR}|. \tag{2}$$

We also assume that  $\mu$  is marginal and this is common knowledge; i.e., if we indicate with  $P_i$  ( $i = \mu, o$ ) the (common) prior probability that a vote will result decisive, each agent believes that  $P_\mu > P_o$ . We can think of these probabilities as coming from different prior beliefs about the candidates in the two constituencies. For example in constituency  $\mu$  the distribution functions  $F_R(a)$  and  $F_L(a)$  are "more similar" than in  $o$ . However, also the population size in each constituency will clearly play a role as a larger electorate, with given priors, will reduce the probability of each single vote to be pivotal. This "collective action effect" can be expected to play a role and will be considered in the empirical investigation. A trivial way to consider this effect is to write  $P_i = P_i(N_i)$  where  $N_i$  is the size (in terms of electorate) of constituency  $i$ .

## 2.1 Information demand

To avoid cumbersome notation we will focus on a generic constituency. Citizens utility from voting when types are known is then  $W(a_L, a_R) = PB(a_L, a_R)$ . However, the expected utility from an informed voting choice before candidates are selected is given by

$$W^* = P \int \int B(a_L, a_R) dF_L(a) dF_R(a) \tag{3}$$

For simplicity, and without loss of generality, here we will assume that there is no cost of voting.

We assume voters are ex ante uninformed about candidates. We will indicate the expected utility from uninformed voting as  $\widetilde{W}$ . We can then define the ex

post utility of an informed versus an uninformed vote as

$$\Delta(a_L, a_R) = W(a_L, a_R) - \widetilde{W} \quad (4)$$

Before gathering information, however, the candidate types are unknown. Thus, the ex ante utility of gathering information is

$$\Delta = \int \int [W(a_L, a_R) - \widetilde{W}] dF_L(a) dF_R(a). \quad (5)$$

**Lemma 1**  $\Delta = W^* - \widetilde{W} \geq 0$ .

*Proof.*

Let us consider a generic constituency and introduce the following notation:

$$\begin{aligned} \mathcal{A}_L^2 &= \left\{ a_L, a_R \text{ s.t. } P \int \int (a_L - a_R) dF_L(a) dF_R(a) > 0 \right\} \\ \mathcal{A}_R^2 &= \left\{ a_L, a_R \text{ s.t. } P \int \int (a_L - a_R) dF_L(a) dF_R(a) < 0 \right\} \end{aligned}$$

Suppose now that  $F_L(a)$  and  $F_R(a)$  are s.t. candidate  $L$  is preferred, i.e.

$$\int \int (a_L - a_R) dF_L(a) dF_R(a) > 0$$

An uninformed voter in this case votes for candidate  $L$ . Her ex ante utility is

$$\begin{aligned} \widetilde{W} &= \frac{1}{2} P_i \int \int_{\mathcal{A}_L^2} (a_L - a_R) dF_L(a) dF_R(a) - \\ &\quad \frac{1}{2} P_i \int \int_{\mathcal{A}_R^2} (a_R - a_L) dF_L(a) dF_R(a) \end{aligned}$$

The ex ante (i.e. before knowing the realization of candidates) utility of an informed vote is instead

$$\begin{aligned} W^* &= \frac{1}{2} P_i \int \int_{\mathcal{A}_L^2} (a_L - a_R) dF_L(a) dF_R(a) + \\ &\quad P_i \int \int_{\mathcal{A}_R^2} (a_R - a_L) dF_L(a) dF_R(a). \end{aligned}$$

The second term in the right-hand side is positive by definition, therefore  $W^* - \widetilde{W} \geq 0$ . ■

Political information can be demanded for a number of different purposes. Instrumental voting is just one possibility. A sense of civic duty for example might play a role as this can be seen as part of being a “good citizen”. Political information can also be demanded to understand or forecast public

policies and this in turn can be useful for better private decision-making (see Larcinese 2002a). Finally, information can be enjoyed as a consumption good and therefore be directly included in the utility function. We represent all this “exogenous” utility from information with  $\Lambda$  and say that total utility from information is

$$\Phi = \Lambda + \lambda\Delta \quad (6)$$

Instrumental voting therefore implies that  $\lambda > 0$ . Otherwise we should expect  $\lambda = 0$ , i.e. no demand for political information arising from voting decision-making. Thanks to the following result, we will be able to test  $\lambda > 0$  versus an alternative of  $\lambda = 0$ .

**Proposition 1** *If  $\lambda > 0$  then  $\Phi$  is higher in constituency  $\mu$ .*

*Proof.* Straightforward from the (1), as  $\Delta = \Delta(P)$  with  $\frac{\partial\Delta(P)}{\partial P} > 0$  and  $P$  is inversely related to expected margins of victory.

## 2.2 Information supply and mass media

We consider two newspapers  $\Gamma$  and  $\Theta$ . They supply political news about both constituencies. We assume they have a fixed space  $\bar{s}$  to devote to these news and indicate with  $s_\mu^\Gamma \in [0, \bar{s}]$  the space devoted by newspaper  $\Gamma$  to news about  $\mu$ ; analogously we can define  $s_\mu^\Gamma, s_\mu^\Theta, s_o^\Theta$ . Each citizen buys one newspaper. The probability for a citizen that buys newspaper  $j$  to get informed about constituency  $i$  is  $q(s_i^j)$ , with  $q' \geq 0$  and  $q'' \leq 0$ . We will assume each citizen only cares about her own constituency, thus simply ignoring news about the other constituency.

We then have  $s_\mu^j + s_o^j = \bar{s}$  ( $j = \Gamma, \Theta$ ) and define a newspaper news profile as  $\{s_\mu^j, s_o^j\}$ . A citizen living in constituency  $\mu$  gets from newspaper  $\Gamma$  a utility from news equal to

$$\Psi(s_\mu^\Gamma) = q(s_\mu^\Gamma)\Phi_\mu. \quad (7)$$

Newspapers also report about other things apart from politics. Culture, sport, and other events are also covered as well as enjoyed by readers. Each paper has its own mix over these different forms of entertainment and also its own way of dealing with them. Also, the way politics in itself can be reported is not unique. The depth and the focus of news, as well as possible partizanship, all matter for the reader. We will therefore indicate the expected utility from newspaper  $\Gamma$  ( $\Theta$ ) to citizen  $k$  in constituency  $\mu$  with  $\Psi(s_\mu^\Gamma) + \gamma_k$  ( $\Psi(s_\mu^\Theta) + \theta_k$ ), where  $\gamma_k$  ( $\theta_k$ ) is a fixed characteristic of newspaper  $\Gamma$  ( $\Theta$ ) that makes it different from  $\Theta$  ( $\Gamma$ ). Analogously for the other constituency. We are then assuming that editorial choices, entertainment content, partizanship etc. are fixed characteristics of each newspaper: this is not an unrealistic assumption in the short run and certainly within the space of an electoral campaign.

Then we say that citizen  $k$  in constituency  $\mu$  buys newspaper  $\Gamma$  if

$$\Psi(s_\mu^\Gamma) + \gamma_k \geq \Psi(s_\mu^\Theta) + \theta_k \quad (8)$$

and buys newspaper  $\Theta$  otherwise. Let us indicate with  $\widehat{\Psi}_\mu$  the difference  $\Psi(s_\mu^\Gamma) - \Psi(s_\mu^\Theta)$  and with  $\eta_k$  the difference  $\theta_k - \gamma_k$ .

Newspapers are uncertain about individual preferences, in particular preferences about the entertainment component. We assume  $\eta_k$  is distributed according to a distribution function  $H_i$  ( $i = \mu, o$ ), which is common knowledge. The corresponding density function is  $h_i$ . Thus, the probability that citizen  $k$  in constituency  $\mu$  buys newspaper  $\Gamma$  is given by  $\Pr[\eta_k \leq \widehat{\Psi}_\mu] = H_i(\widehat{\Psi}_\mu)$ .

We then introduce the following assumption, that will ensure that the pay-off functions of the newspapers are concave<sup>2</sup>.

**Assumption 1**  $\frac{|h'_i(\widehat{\Psi}_i)|}{h_i(\widehat{\Psi}_i)} \leq \frac{|q''_i(s_i^j)|}{\Phi_{[i q'_i(s_i^j)]^2}}$ ,  $i = \mu, o$ ;  $j = \Gamma, \Theta$ .

Newspapers maximize expected profits. Each reader provides the newspaper with a revenue  $\rho$  which is the sum of the price directly paid by readers to buy the paper and the amount paid by advertisers per reader. Therefore total profits in the industry are given by  $\Pi = n\rho - 2\overline{C}$ , where  $n$  is the total number of citizens in the polity and  $\overline{C}$  the fixed cost to produce each newspaper. For the moment, we only consider fixed costs and assume marginal costs are zero. In reality there are variable costs due to printing and delivery but the “cost of the first copy” is normally the biggest by far. We will consider variable costs later.

Since we are interested in the share of the market that newspapers have in each constituency we will rewrite the expected profit equation for newspaper  $\Gamma$  as

$$E(\Pi^\Gamma) = \rho[E(n_\mu^\Gamma) + E(n_o^\Gamma)] - \overline{C} \quad (9)$$

where  $n_i^j$  is the number of readers newspaper  $j$  has in constituency  $i$ . For newspaper  $\Theta$  we have  $\Pi^\Theta = \Pi - \Pi^\Gamma$ . Since costs are sunk, newspapers are only interested in maximizing revenue: in our model this implies that newspapers will maximize the expected number of readers. Indicating with  $N_i$  the total number of voters in constituency  $i$ , we will have

$$E(n^\Gamma) = N_\mu H_\mu(\widehat{\Psi}_\mu) + N_o H_o(\widehat{\Psi}_o) \quad (10)$$

$$E(n^\Theta) = N_\mu [1 - H_\mu(\widehat{\Psi}_\mu)] + N_o [1 - H_o(\widehat{\Psi}_o)] \quad (11)$$

A strategy for newspaper  $j$  is given by  $s^j = [s_\mu^j, s_o^j]$ . We will indicate the set of feasible strategies for newspaper  $j$  with  $\Sigma_j = \{s_\mu^j, s_o^j \mid s_\mu^j + s_o^j = \overline{s}\}$ .

This is a zero-sum game. Therefore a Nash equilibrium of the maximizing readership game is given by a strategy profile  $\{s_\Gamma^*, s_\Theta^*\}$  s.t.  $s_\Gamma^* \in \Sigma_\Gamma, s_\Theta^* \in \Sigma_\Theta$  and

$$E(n^\Gamma | s_\Gamma^*, s_\Theta) \geq E(n^\Gamma | s_\Gamma^*, s_\Theta^*) \geq E(n^\Gamma | s_\Gamma, s_\Theta^*) \quad (12)$$

**Proposition 2** *Suppose that Assumption 1 is satisfied,  $\lambda > 0$ , and  $N_\mu = N_o$ .*

*Then an equilibrium strategy profile  $\{s_\Gamma^*, s_\Theta^*\}$  must satisfy  $s_\mu^\Gamma = s_\mu^\Theta > s_o^\Gamma = s_o^\Theta$ .*

<sup>2</sup>This is an adaptation of condition C1 in Lindbeck and Weibull (1987). Interpretations of this condition in the context of probabilistic voting are also discussed in their paper.

*Proof.* The best response function for newspaper  $j$  is defined implicitly by the first order conditions

$$\begin{aligned} N_\mu h_\mu(\widehat{\Psi}_\mu) \Phi_\mu q'(s_\mu^j) &= \varphi \\ N_o h_o(\widehat{\Psi}_o) \Phi_o q'(s_o^j) &= \varphi \\ j &= \Gamma, \Theta \end{aligned}$$

where  $\varphi$  is the Lagrange multiplier associated with the problem. This implies

$$\begin{aligned} q'(s_\mu^\Gamma) &= q'(s_\mu^\Theta) \\ q'(s_o^\Gamma) &= q'(s_o^\Theta) \end{aligned}$$

and therefore

$$\begin{aligned} s_\mu^\Gamma &= s_\mu^\Theta \\ s_o^\Gamma &= s_o^\Theta \end{aligned}$$

Now remember that

$$\begin{aligned} \Phi_\mu &= \Lambda + \lambda \Delta(P_\mu) \\ \Phi_o &= \Lambda + \lambda \Delta(P_o) \\ \frac{\partial \Delta(P_i)}{\partial P_i} &\geq 0, \quad i = \mu, o. \end{aligned}$$

Being  $\Phi_\mu > \Phi_o$  from the first order conditions we get that  $s_\mu^j > s_o^j$ ,  $j = \Gamma, \Theta$ . To satisfy the second order conditions we need the Hessian matrix

$$\begin{bmatrix} N_\mu h'_\mu(\widehat{\Psi}_\mu) [\Phi_\mu q'(s_\mu^j)]^2 + & & 0 \\ + N_\mu h_\mu(\widehat{\Psi}_\mu) \Phi_\mu q''(s_\mu^j) & & \\ 0 & & N_o h'_o(\widehat{\Psi}_o) [\Phi_o q'(s_o^j)]^2 + \\ & & + N_o h_o(\widehat{\Psi}_o) \Phi_o q''(s_o^j) \end{bmatrix}$$

to be negative semi-definite. A sufficient condition is, in this case, that each element on the main diagonal is non-positive. Assumption 1, therefore, guarantees that the second order conditions are satisfied. ■

So far we only focused on the implications of marginality on information demand and supply. There are a number of other factors that can have an influence on information demand and supply and therefore should be used as control variables when trying to assess the effects of election closeness. On the media revenue side it is quite realistic to assume that not everyone has the same value for advertisers and that newspapers are capable of discriminating among different readers. The extent of this discrimination depends on the knowledge newspapers and advertisers have of market conditions and people's characteristics. Thus, we should expect this type of discrimination to become more and more relevant as new technologies improve the amount and quality of information on customers. Stromberg (2002) relates the value to advertisers to an

interest in specific aspects of public policy: for example, being interested in a particular public service rather than others reveals something about people's income, and readers' income is important for advertisers. At the same time in practice we do not observe any price discrimination across different readers. This means that discrimination will mainly occur through information supply.

Another consideration concerns costs. So far we assumed that the marginal cost of producing and delivering papers was zero. Although, as we said, marginal costs have only a minor part in the production of newspapers, for our purposes delivery costs could be important. We are considering possible spatial discrimination by newspapers and in this sense delivery costs could show substantial variation. In particular, in areas which are densely populated, marginal delivery costs are quite low while they could be sizeable if our newspapers wanted to reach readers in remote parts of the country.

By modifying our assumptions and introducing differentiated constituencies we will therefore obtain a rationale for control variables that will make our test more reliable. At the same time in this way we will also be able to implement a direct test of some of the main Stromberg's results.

Heterogeneity here enters at the constituency level. In other terms newspapers are not able to discriminate readers according to any other individual characteristics apart from the constituency they come from, and we now assume constituencies are statistically different. This is actually the strategy that will be used to implement the empirical analysis.

**Assumption 2**  $\rho_\mu \neq \rho_o$ .

Advertisers will induce from the constituency a number of other characteristics of interest and therefore will be willing to pay differently for marginal readers coming from different constituencies.

Assumption 3 introduces delivery costs.

**Assumption 3** *The newspaper cost function is  $TC = \bar{C} + N_\mu H_\mu(\hat{\Psi}_\mu)v_\mu + N_o H_o(\hat{\Psi}_o)v_o$ , where  $v_\mu$  and  $v_o$  are the cost of marginal readers.*

For empirical purposes we will mainly identify  $v_\mu$  and  $v_o$  with delivery costs. Now we can define the net marginal revenue per-reader as

$$\tilde{\rho}_i = \rho_i - v_i, \quad i = \mu, o \quad (13)$$

The profit equation for newspaper  $j$  can be re-written as

$$E(\Pi^j) = \tilde{\rho}_\mu E(n_\mu^j) + \tilde{\rho}_o E(n_o^j) - \bar{C}, \quad j = \Gamma, \Theta \quad (14)$$

To ensure that every citizen buys one newspaper and newspapers have an interest in reaching all citizens we assume the following:

**Assumption 4**  $\tilde{\rho}_i > 0 \quad \forall i$ .

Now the problem will not simply be to maximize expected readership, as each reader must be weighted by her “net value”. The next proposition provides the Nash equilibrium condition in this case.

**Proposition 3** *Suppose Assumptions 1-4 are satisfied and  $\lambda > 0$ . Then an equilibrium strategy profile  $\{s_\Gamma^*, s_\Theta^*\}$  must satisfy  $s_\mu^\Gamma = s_\mu^\Theta, s_o^\Gamma = s_o^\Theta$  and  $\frac{q'(s_\mu^*)}{q'(s_o^*)} = \frac{N_o \tilde{\rho}_o \Phi_o}{N_\mu \tilde{\rho}_\mu \Phi_\mu}$ .*

*Proof.* The profit equation for newspaper  $j$  can be expressed as

$$E(\Pi^j) = \tilde{\rho}_\mu N_\mu H_\mu(\widehat{\Psi}_\mu) + \tilde{\rho}_o N_o H_o(\widehat{\Psi}_o) - \bar{C}, \quad j = \Gamma, \Theta.$$

The result follows immediately from the first order conditions

$$\begin{aligned} \tilde{\rho}_\mu N_\mu h_\mu(\widehat{\Psi}_\mu) \Phi_\mu q'(s_\mu^j) &= \varphi \\ \tilde{\rho}_o N_o h_o(\widehat{\Psi}_o) \Phi_o q'(s_o^j) &= \varphi \\ j &= \Gamma, \Theta. \end{aligned}$$

where  $\varphi$  is the Lagrange multiplier associated with the maximization problem.

Proceeding as in the proof of Proposition 2, it is straightforward to show that Assumption 1 is sufficient for the second order conditions to be satisfied. ■

Proposition 3 tells us that now newspapers can discriminate across constituencies also on the basis of further information they may have. Other things equal, information supply will be higher in the constituency with larger  $\tilde{\rho}_i(\cdot) = \rho_i(\cdot) - v_i(\cdot)$ . On the revenue side we can relate the readers’ value for advertisers to factors as income, age, education etc. The net value of readers for newspapers will then take into account their location and be higher where readers are on average more valuable and lower where delivery costs are higher; we will use population density to capture this last element.

Finally, also the total size of constituencies,  $N_\mu$  and  $N_o$ , (in terms of absolute population, or absolute electorate) should play a role. However, as we noticed at the start of this section, we can have both a “groups size effect” (like in Stromberg) as well as a “collective action effect” and we will approach empirical investigation with no prior about the sign of this variable.

We can therefore summarize our findings in the following testable proposition:

**Theoretical Results** *Other things equal, information supply is higher in constituencies with a closer electoral race, more densely populated, and where citizens are on average more valuable to advertisers. The effect of the size of electorate is uncertain.*

### 3 Evidence

We will proceed now to verify the compatibility of our theoretical results with data. Empirical investigation will concern the 1997 general election in the United Kingdom. For the purpose of this analysis we will use data from England, Scotland and Wales. The political situation in Northern Ireland is substantially different from the rest of the country as the main divide is between Catholic and Protestants rather than on the traditional left-right dimension.

In the U.K. members of parliament (MPs) are elected one in each constituency in a first past the post system. The election is won by the party which obtains the larger number of MPs as support of the parliament is necessary to become prime minister. Party leaders are intended to be candidate prime minister, but they still need to win in their own constituency to become MP. There are two major parties, Conservative and Labour, although other parties manage to win in some constituencies. In particular the Liberal-democratic party is well established nationally as a “third party”. In the 1997 the Labour party obtained a neat victory after 18 years of Conservative ruling.

#### 3.1 The Data

Evidence provided is of two types. First, we will focus on information supply, using the electoral constituency as unit of observation. There were 641 such constituencies in England, Scotland, and Wales in 1997.

Three main sources of data will be used. First of all we need data about information supply by newspapers. For this purpose we will use a major national newspaper, “The Guardian”. We will define information supply for each constituency as the number of articles that mention such constituency or one of its candidates during the last 30 days of the electoral campaign. This variable is indicated as *News*.

We will then use information about electoral results<sup>3</sup>. In particular, we will use this information to measure the marginality of a constituency. A first possibility is to focus on percentage differences and therefore use the following formula:

$$\frac{W - R}{W + R} \tag{15}$$

where  $W$  is the percentage of votes for the winning candidate and  $R$  the percentage for the runner up. The larger such indicator the lower the degree of marginality of the constituency. However, to capture the idea of marginality as the probability of casting a decisive vote, the absolute difference in votes between candidates might be a more appropriate indicator. We will consider both possibilities.

One problem with such indicators is that they measure election closeness *ex post*. A rational expectations assumption would work in favour of using such measures: in general, when using aggregate data, there is no reason to expect

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<sup>3</sup>Boothroyd (2002).

a systematic bias in expectations within a constituency. Nevertheless, voters' swings are not always well predicted by opinion polls, and this could generate non-random biases in voters' expectations<sup>4</sup>.

One alternative possibility is to use past election results. Unfortunately this would also be quite problematic in our case. The main obstacle is that in between 1992 (year of the previous general election) and 1997 most constituency borders were changed, making therefore hard any comparison, even where the denominations were left unchanged. Moreover, in 1997 there were expectations of a large swing from the ruling party (Conservatives) to opposition parties (mainly the Labour): thus, previous election closeness could not represent a good measure of expected election closeness as this would crucially depend on who held the constituency.

For these reasons, to capture expected closeness we will use the BBC "100 contested constituencies". Those are constituencies on which the BBC decided to focus its attention on the night of the results: they were the expected closest 100 Conservative-held constituencies (and therefore the decisive ones). This should capture information from polls and the general feeling about election closeness of BBC journalists.

We will also use information about the total number of electors in each constituency and the turnout percentage. With the first variable we try to test if the "group size effect" can actually prevail on the "collective action effect". The percentage of turnout indicates the extent of political participation (at least in the form of voting) and therefore can be broadly intended as a measure of interest in politics by the citizens of a given area.

Information about other possibly relevant characteristics of the constituency will be derived from the 1991 Census<sup>5</sup>. We include the population density, one of the key variables in our theoretical analysis, entering into the newspapers' cost function. Then we consider variables that can possibly give a representation of the social and economic conditions of the districts. Information on income is not available but proxies have been used, namely the unemployment rate and the percentage of citizenship with high qualifications (degree and higher). Age can have an influence on propensity to consume and consumption patterns (thus affecting how valuable a reader is to advertisers) and therefore has been included. Also, the percentage of inactive population (mainly retired, but also including students and permanently sick) is used. There are reasons (as well as anecdotic evidence<sup>6</sup>) to think that inactive population, in particular old or sick individuals, should be less valuable to advertisers, as they tend to consume less than average, or are less responsive to advertising.

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<sup>4</sup>See Cox (1988) or Kuncze (2001) for some problematic aspects of *ex post* indicators.

<sup>5</sup>The data we used were recorded at the level of districts, local administration entities with no direct link with electoral constituencies. Most constituencies are contained within the borders of a single district and these posed no problems. Others (around 25% of them) span over parts of different districts and in such cases data referred to districts have been weighted in order to get approximated constituency data. The weighting factors have been reconstructed by using the detailed description of constituencies (and their relations with districts and wards) contained in Rallings and Thrasher (1995).

<sup>6</sup>See Stromberg (2002).

One possible concern might derive from the fact that The Guardian, like most national newspapers in the U.K., is based in London. This could bias the news in favour of London constituencies both because of a lower cost of news collection and, more generally, because of a larger sensitivity to a nearer environment. This could be particularly relevant for our results about population density, given that this variable is clearly higher in London than elsewhere. For this reason we include a Greater London control dummy, equal to 1 for the Greater London constituencies.

Finally we also include a “big-shot” control. As some candidates have naturally a prominent position and bigger visibility during the electoral campaign, it seems necessary to be able to single out this effect from what we want to test. Therefore we introduce a dummy variable equal to 1 for constituencies where “big-shots” are candidates. By big-shot we intend all the candidates who have been ministers in the current and any past government, the members of the current “shadow-cabinet”, and the current leader of the Liberal Democratic Party.

We also provide evidence on citizens’ use of newspapers across different constituencies. This helps us isolating the hypothesis that differentiated supply is actually a consequence of differentiated demand from the competing possibility that all citizens are interested in marginal constituencies. For this purpose we will use the 1997 British General Election Study, a post-election survey consisting of individual observations about people that were interviewed a short time after the election. Our sample will consist of 2807 observations. Among other questions, respondents were asked whether and how frequently they used to read newspapers during the electoral campaign, and which paper. In the U.K. the distinction between high quality and low quality (tabloid) papers is quite straightforward and commonly accepted. We can therefore separate regular users of quality papers during the electoral campaign ( $QP$ ) from the rest of the population and try to assess the impact of marginality on the demand for political information. We also have information on the usage of local papers and this can be exploited to make our conclusions more robust. Data include a number of demographic and economic characteristics of the interviewed individuals, as well as a measure of ideological motivation.

All variables are described in more detail in the Appendix and summary statistics are reported in table 1.

## 3.2 Empirical Specification

Using the dataset described above we intend to test the theoretical results reported at the end of section 2. Preliminary data analysis seems to suggest that a very limited number of constituencies get a disproportionate attention from media (see Tab. 2). For example almost 90% of constituencies have  $News \leq 5$  while only 3 constituencies have  $News > 100$ . This suggests that the relationship we want to estimate could be highly non-linear.

A linear regression would indeed deliver quite poor results. We will instead present estimates for the following equation:

$$\ln(\text{News}_i) = \alpha_0 + \alpha_1 D_i + \alpha_2' X_i + \alpha_3' Z_i + u_i, \quad i = 1, \dots, 641 \quad (16)$$

where:

$D$  is a measure of the distance between candidates (winner and runner up) or a dummy for expected contested constituencies (*bbc100*),  $X$  is a three-dimensional vector of population density, size of the electorate, and turnout (therefore  $\alpha_2' = [\alpha_{21}, \alpha_{22}, \alpha_{23}]$ ), and  $Z$  represents a set of control variables from the 1991 Census, plus the “big-shot” dummy ( $\alpha_3' = [\alpha_{31}, \alpha_{32}, \dots, \alpha_{3k}]$ ). As usual  $u_i$  represents independent disturbance terms that have zero mean and are uncorrelated with the exogenous variables of the model. Estimation will be by OLS.

Almost all the parameters have an expected sign in terms of our model. However, our main parameter of interest is  $\alpha_1$ . In general, we want to assess if  $\alpha_1$  is significantly different from zero. As discussed previously, we will consider several possible measures of constituencies’ marginality, and we expect a negative sign for measures of the distance between candidates and a positive sign for *bbc100*.

The other variables serve as controls with respect to this aim; at the same time they are of interest for their own sake as we can use their estimates to assess the reliability of our model of the information market.

It is important to distinguish alternative competing possibilities from our hypothesis that larger news supply is a consequence of higher demand. We will accomplish this task by estimating newspaper readership at the individual level. The equation to be estimated in this case is given by

$$QP_i = \beta_0 + \beta_1 D_i + \beta_2' W_i + u_i, \quad i = 1, \dots, 2807 \quad (17)$$

where  $QP$  is a binary variable equal to 1 for a quality paper or a local paper reader, and  $W$  is a vector of individual control variables including, among other covariates, income, education, sex and age.

### 3.3 Results

OLS estimates of equation (16) are reported in Table 3. We start by considering the role of election closeness. In column 1 and 2 we use *ex post* indicators of election closeness (based on percentage distance in column 1 and absolute distance in column 2). In both cases *ex post* distance has the expected sign and is significant at 5% level in column 1 and very close to it in column 2. When we use expected closeness (as captured by the dummy *bbc100* in column 3) the significance level increases substantially, reaching a nil p-value for the hypothesis of  $\alpha_1$  being zero. As discussed previously, the 1997 general election witnessed a large generalized shift of votes away from the Conservative party. This was to some extent expected and therefore the most interesting constituencies were the previously Conservative-held ones. In a sense, the final outcome was mainly

decided in such constituencies and this should have increased the demand for information<sup>7</sup>. Thus, it is not surprising that when we focus on contested Conservative constituencies results get sharper. Actually, some constituencies may have been *ex post* very close just because the swing of votes has probably been larger than expected, making the Labour candidates winning (marginally) also in constituencies that never were marginal or Labour-held before. Therefore, *ex post* marginality could be an imperfect measure of expected salience.

In column 4 we also get rid of another *ex post* indicator, turnout, but results remain substantially unchanged. Thus, from this analysis we can safely conclude that expected marginality matters for information supply.

Other variables also show a high compatibility of our model with facts. Population density has the expected sign and is always significant at the 5% level, except in column 3, where it is significant at the 7.5% level.

The signs of other control variables also show good support for some of the Stromberg-type conclusions. In particular, and differently from Stromberg, we saw that the effect of group's magnitude is not necessarily uncontroversial. However, empirical evidence seems to suggest that the effect of the group size should overcome the potential collective action problem that size generates. In particular, in column 2 we use the absolute distance between candidates and therefore we isolate the potential "group size effect". However, there are no noticeable differences between this and the other cases. Although the magnitude and significance of the electorate size are larger in column 2, these remain always positive and comfortably significant at the 5% or 1% level.

The same is not true for Turnout, that also should serve as a signal to newspapers about the degree of attention to political matters. The sign is always negative, although t-ratios are never satisfactory.

Good support also comes from the unemployment rate, that we use as a proxy for the level of well-being in a given constituency. On the other hand there is little evidence in favour of the relevance of other factors that the literature seems to have identified as determining information supply. Anecdotic evidence is reported of television programmes that have been suspended because watched mainly by the elderly, who were judged not valuable by advertisers. We find that constituencies with larger inactive population (mainly represented by retired) receive more attention from newspapers. It is clear that inactive people might have more time to devote to information gathering and when we come to election times retired people might also have all the incentives to put a disproportionate attention to political platforms.

Finally, average age and the percentage of people with high degrees do not seem to have significant effects, while there is some evidence of a "Greater London effect". A pure control variable is *big-shot*. Both the magnitude and the significance of *big-shot* are relevant but this does not come as a surprise nor is the consequence of any theoretical advance made in this paper.

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<sup>7</sup>In terms of our model, in general elections citizens care mainly about final policies: thus, marginality in one constituency is more relevant when it matters for the whole outcome of the election.

In table 4 we turn to micro-level analysis and report probit estimates of equation (17). Most parameters show the expected sign, with education and income being overall the best explanatory variables. Sex, church attendance and length of residence in the area also show sizeable and significant effects. Our main variable of interests, however, are the measures of electorate size and marginality. While for the significance of most other variables several explanations are possible, the size of electorate and marginality have a strong relationship with voters' instrumental behaviour. Both come with the expected sign, quite independently of the marginality index used and the significance levels are rather reassuring. We can see this as further evidence that mass media behaviour during that electoral campaign was actually driven, at least partially, by instrumental demand for information rather than a broad and non-instrumental interest in the election.

## 4 Summary and conclusion

The purpose of this paper has been to study the implications of instrumental voting behaviour for the political information market. This allows us to test the instrumental voting hypothesis by using data that have not been exploited so far for this purpose, namely data on information acquisition and mass media behaviour during electoral campaigns.

One central implication of instrumental voting is the positive linkage between election closeness and political participation. Both theoretical and empirical literature have mainly identified participation with electoral turnout. We focus instead on information acquisition and make more precise the idea that it should be higher when elections are expected to be closer. On the other side of the information market, profit maximizing mass media should therefore discriminate between different electoral constituencies according to their expected marginality. We do not observe newspapers' price discrimination in reality. However our research shows, both theoretically and empirically, that the media can have a different way to discriminate, namely targeting their attention (in terms of reported news) to marginal constituencies.

Moreover, research in communication studies and recent formal models, in particular Stromberg (2002), have pointed out that the media can be expected to target customers who are more valuable to advertisers, i.e. wealthier, better educated, younger. Our model gives an explicit empirical content to those predictions and, by using the electoral constituencies in the 1997 British election as units of observation, we can perform a formal empirical test of these conclusions. Evidence on Stromberg's results is overall satisfactory: although not all our estimates are compatible with such results, we can safely conclude that there is enough evidence of newspapers targeting their news according to the electorate characteristics. We also provide empirical support for the idea that larger groups should receive more attention from the media, although we have shown that this conclusion does not necessarily follow from the theory.

Information supply can also be linked with the newspapers' cost function.

We do not enter into the details of fixed costs, that represent a large part of the cost of producing a newspaper. However, we find that delivery costs could be relevant for the purpose of our analysis: in particular, information supply should be higher in more densely populated areas. This proposition too finds confirmation in our empirical investigation.

Our main purpose, however, was to show that information acquisition and news supply is, at least partially, driven by instrumental voting. We show that mass media, other things equal, tend to target marginal constituencies during electoral campaigns. This could be due to a genuine higher information demand arising in marginal constituencies as well as to a number of other reasons, like a general interest of the public in marginal constituencies, or the effort of party leaders to target marginal constituencies. To discriminate between these hypotheses we also provide evidence on voters' usage of newspapers and find that quality and local papers tend to be more demanded in marginal constituencies. Thus, our analysis seems to suggest a comfortable compatibility between instrumental voting behaviour and observed facts in the information market.

If we think that the media introduce a bias in the way people are informed about politics, something that has been left aside in the present work, and if this bias is in turn exploited by politicians, then we can speak of a "media-driven-bias" in public policy-making. In the context of our model this bias is combined with an "attention-bias" that should substantially drive politicians to target marginal constituencies.

This analysis does not pretend to be conclusive and there are several margins for improvements and questions that further research should try to address.

On the theoretical side, the model of media competition is still quite simple. New insights could come from explicitly considering the advertising market and the possibility for newspapers to select the combination of political information, advertising and other news in the paper. Also, considering the possibility of entry and, more in general, different industry structures, could deliver interesting results as well as normative implications for regulating the media market<sup>8</sup>. Further research could help us understanding redistributive implications. In particular, and depending on the rules that regulate the relationship between central governments and local administration, we should expect marginal constituencies to benefit disproportionately of targetable benefits. This possibility deserves closer scrutiny in future research.

On the empirical side, improvements on our current knowledge are also possible. For what concerns our estimates, the relationship between news and closeness (as well as news and other variables) is clearly non-linear. We have chosen a log-linear specification and shown that it fits our data quite well. It would clearly be useful however to resort to non-parametric estimation. Above all there is the need for further data collection about both individuals and the media. More data about different newspapers (or other media), different elections and, possibly, different countries, could help us understand what is the

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<sup>8</sup>An analysis of this type with respect to politicians' accountability can be found in Besley and Prat (2002).

robustness and the generality of our results and maybe to isolate the relevant institutional characteristics that induce differentiated behaviour.

## 5 Appendix: description of variables and tables

### 5.0.1 Constituency level

- *News*. It is the number of articles appeared on the newspaper “The Guardian” during the last 30 days before the poll date and containing either a reference to the electoral constituency or the name of one of its candidates.
- *Dist\_P* = percentage distance between the winning candidate and the runner-up in the 1997 election, given by the formula  $(W-R)/(W+R)$ , where  $W$  = percentage of votes for the winning candidate,  $R$  = percentage of votes for the runner up.
- *Dist\_N* = absolute distance between the winning candidate and the runner-up in the 1997 election, divided by 1000.
- *BBC100* = dummy variable equal to 1 if the constituency has been included by the BBC among the “100 contested constituencies”.
- *Density* = population density expressed as the number of residents per hectare divided by 1000.
- *Electorate* = total electorate in the constituency divided by 1000.
- *Big shot* = dummy variable equal to 1 if one of the candidates in the constituency has been classified as a ”big-shot”. This means when one of the candidates is either a current or former minister, or a current member of the “shadow cabinet”, or the leader of the Liberal-Democratic Party.
- *Unemployment%* = unemployment rate, expressed as total unemployed over active population, multiplied by 100.
- *Inactive%*= percentage of inactive population. This is the total of retired, students, permanently sick and other inactive over total residents multiplied by 100.
- *Age* = average age.
- *HighD* = percentage of residents with high qualifications, defined as the number of residents with degree or higher title over the total residents, multiplied by 100;
- *GLondon* = dummy variable equal to 1 for the greater London constituencies.

### 5.0.2 Individual level

- *QP* = dummy variable equal to 1 if the respondent is a regular reader of The Times, The Guardian, The Independent, The Financial Times, The Daily Telegraph, or any local newspaper.
- *Education* : respondent's education level. Categorical variable from 1 to 7.
- *Income*: total household income from all sources before tax. Categorical variable from 1 to 16.
- *Age* : respondent's age (>18).
- *Sex*: 1=male
- *Married*: 1=yes (=1 also if "living as married")
- *Asian*: =1 if Indian, Pakistani, Bangladeshi, Chinese, Other Asian.
- *Black*: =1 if Black African, Black Caribbean, Other Black
- *Churchgoer*: "Apart from such special occasions as weddings, funerals and baptisms and so on, how often do you attend services or meeting connected with your religion?". Categorical variable from 1 (never or practically never) to 8 (once a week or more).
- *Length of Residence* : Answer to the question: "How long have you lived in this neighbourhood?".
- *Ideology*: derived from individual placement on a left (0) to right (10) scale. Ideology=0 if left-right=5, Ideology=1 if left-right=4 or 6 etc.
- *Registered*: 1=yes.
- *Voted92*: =1 if voted in 1992 general election (self reported).
- *Economic Activity*. Categorical variable:
  1. "in paid work for at least 10 hours in week" or "waiting to take up paid work already accepted"; 1498 obs.;
  2. "in full time education (not paid for by the employer, including on vacation)". 9 obs.;
  3. "on government training/employment programme". 64 obs.;
  4. "unemployed". 127 obs.;
  5. "permanently sick or disabled". 131 obs.;
  6. "wholly retired from work". 642 obs.;
  7. "looking after the home". 324 obs.;
  8. "other". 18 obs.

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**Table 1: Summary statistics**

	Obs	Mean	Std. Dev.	Min	Max
News	641	3.8658	18.4735	0 (app. to 0.01)	388
Log(News)	641	-1.3847	2.8319	-4.6052	5.961
Dist_P	641	0.2972	0.2006	0.0012	0.8219
Dist_N	641	10859	6906	53	33759
BBC100	641	0.156	0.3631	0	1
Density	641	1.6524	1.9092	0.0088	11.6298
Electorate/1000	641	66.5437	8.0574	22.983	101.68
Turnout%	641	71.3165	5.6359	51.4	82.2
BS	641	0.078	0.2684	0	1
Age	641	37.8866	1.881	32.8793	46.533
Inactive%	641	51.32	3.2413	38.858	61.0908
Unemployment%	641	9.45	3.8	2.868	22.4896
HighD%	641	7.0963	3.743	1.4891	25.084
GLondon	641	0.1154	0.3198	0	1
QP	2807	0.1778	0.3824	0	1
Education	2807	3.6021	2.1637	1	7
Income	2807	7.0495	4.587	1	16
Age	2807	48.3035	17.517	18	94
Sex	2807	0.4653	0.4989	0	1
Married	2807	0.5885	0.4922	0	1
Asian	2807	0.0185	0.1349	0	1
Black	2807	0.0089	0.094	0	1
Churchgoer	2807	1.9882	2.6079	0	7
Length of Residence	2807	19.5248	17.9378	0	94
Ideology	2807	1.9291	1.7758	0	6
Registered	2807	0.9865	0.1156	0	1
Voted92	2807	0.7973	0.4021	0	1

**Table 2: The variable "News"**

News	Frequency	Percent	Cumulate
0	265	41.34	41,34
1	165	25.74	67.08
2	74	11.54	78.63
3	28	4.37	83
4	18	2.81	85.80
5	24	3.74	89.55
6-10	25	3.9	93.45
11-20	19	2.96	96.41
21-30	10	1.56	97.97
31-40	3	047	98.44
41-50	3	047	98.91
51-100	4	0.62	99.53
>100	3	0.47	100

**Table 3: Information Supply (OLS)**

Dependent Variable = Log(News)

	1	2	3	4
Dist_P	-1.4808 (-1.960)			
Dist_Nx1000		-0.0366 (-1.924)		
BBC100			1.1889 (4.306)	1.0415 (3.84)
Density	0.2448 (2.076)	0.2521 (2.153)	0.2081 (1.783)	0.2535 (2.227)
Electorate/1000	0.0321 (2.311)	0.3891 (2.884)	0.0334 (2.463)	0.336 (2.46)
Turnout	-0.04 (-1.406)	-0.0305 (-1.138)	-0.0472 (-1.801)	
Big shot	3.4017 (8.815)	3.3891 (8.726)	3.4925 (8.955)	3.4918 (8.899)
Age	-0.1074 (-1.268)	-0.1071 (-1.264)	-0.0701 (-0.83)	-0.07 (-0.836)
Inactive	0.1449 (2.022)	0.1423 (1.989)	0.1257 (1.753)	0.1209 (1.704)
Unemployment	-0.1789 (-2.544)	-0.179 (-2.555)	-0.1985 (-2.847)	-0.1625 (-2.414)
HighD	0.0327 (0.857)	0.0284 (0.742)	0.039 (1.036)	0.0322 (0.862)
GLondon	0.7046 (1.589)	0.7094 (1.605)	0.8574 (1.971)	0.8016 (1.855)
Constant	-2.8828 (-0.764)	-3.919 (-1.082)	-3.3395 (-0.948)	-6.8138 (-2.368)
Obs	641	641	641	641
R-squared	0.1662	0.166	0.1818	0.1779

Note: robust standard errors. T-statistics in parenthesis

**Table 4: Information Demand  
(Probit marginal effects)**

Dependent Variable = QP

	1	2	3
Education	0.0368 (10.20)	0.0368 (10.03)	0.0367 (9.99)
Income	0.0178 (9.12)	0.0184 (9.30)	0.0185 (9.31)
Age	0.0041 (1.67)	0.0045 (1.80)	0.0045 (1.80)
Age2	0.0002 (0.07)	-0.00002 (0.01)	-0.00004 (0.02)
Sex	0.0584 (4.14)	0.0605 (4.23)	0.0604 (4.22)
Married	-0.0037 (0.24)	-0.0045 (0.29)	-0.0045 (0.30)
Asian	0.0669 (1.12)	0.0545 (0.93)	0.0538 (0.92)
Black	0.1124 (1.36)	0.0734 (0.95)	0.0717 (0.93)
Churchgoer	0.0107 (4.36)	0.0114 (4.60)	0.0115 (4.62)
Length of Residence	-0.0009 (2.20)	-0.0011 (2.46)	-0.0011 (2.47)
Registered	-0.0969 (1.45)	-0.3821 (1.50)	-0.3955 (1.55)
Voted92	-0.0104 (0.58)	-0.0112 (0.61)	-0.0111 (0.60)
Ideology	0.0199 (5.41)	0.0196 (5.28)	0.0196 (5.28)
GLondon	0.0404 (1.64)	0.0450 (1.78)	0.0437 (1.74)
Electorate/1000	-0.0029 (3.98)	-0.0021 (2.92)	-0.002 (2.85)
Dist_P	-0.1785 (4.87)		
BBC100		0.0474 (2.24)	0.0453 (2.14)
Big shot			-0.0225 (0.85)
Economic Activity	yes	yes	yes
Obs.	2807	2807	2807
Log-Likelihood	-1053.1073	-1061.8214	-1061.4073
Pseudo-R2	0.1983	0.1917	0.192

Note: robust standard errors. T-statistics in parenthesis