Electoral Participation Based on Social Exchange: Theory and Evidence*

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Abstract

We build a model of voter turnout where a citizen's expressive benefit from voting increases in the quality of political information she possesses. Citizens acquire signals about the candidates at a cost, and then exchange the signals in randomly formed pairs. Social exchange pays off only in pairs where both partners possess signals, and the density of social interactions determines this payoff from social exchange. The density of social interactions, in turn, is determined by the characteristics of the neighborhood where citizens live, such as heterogeneity across social or economic dimensions. Thus, a higher density of social interactions has a double effect: first, more people get informed about the candidates' quality; second, the precision of the signals that people have increases. Both effects lead to a higher turnout. We test the model on the individual-level data from the British General Elections Survey of 2001, and find that the data strongly supports the theory. We also find no support for the standard pivotal-voter model, when we account for information acquisition.

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1 Introduction

Voting is the most common and important channel for citizens in a democracy to express their individual preferences about their leaders and the public policies. However, not all eligible citizens vote: average turnout in the elections to the Lower House of the Parliament in 1960-1995 varies from 51% in Poland to 95% in Australia (Franklin (1996): 218). Turnout also varies across groups of citizens: elder, richer, more educated citizens, trade-union members, and public employees vote more often (Wolfinger and Rosenstone (1980), Leighley and Nagler (1992)).

Economists' interest in voter participation is threefold. First, understanding turnout helps us to understand better the formation of economic policies and the outcomes of these policies. Mueller and Strattmann (2003) find that higher voter turnout increases government size and decreases income inequality. Fleck (1999) finds that regional turnout differences influence government spending allocation across regions.

Second, asymmetric participation across groups constitutes a political barrier to key policy reforms necessary to guarantee the health of developed economies in close future. The main example is Social Security reform. Politicians face strong electoral disincentives to carry out the reform because the age bias in turnout. Thus, understanding turnout is a prerequisite to implementing a politically viable reform.

Third, participation in elections is a collective action. Mainstream economics predicts that the free-rider problem plagues collective action. However, most democracies exhibit high turnout rates, and this indicates that the mainstream model is incomplete. Understanding turnout sheds light on other instances of collective action like lobbying, voluntary contributions to public goods, voluntary compliance schemes in trading and in environmental economics, etc.

However, despite having generated an extensive body of empirical research about turnout, we still lack a model that explains basic facts about voter participation (see Matsusaka (1995) for a set of stylized facts about turnout).

The problem was first posed by Downs (1957), and a first unified theory, the "pivotal voter" model, was presented by Riker and Ordeshook (1968). They modelled voting as a cost-benefit analysis, where benefits where the probability of casting the decisive vote in favor of one's preferred candidate plus the exogenous "taste" benefit. Thus, one votes if the benefit exceeds the cost:

$$pB + D > C, \tag{1}$$

where p is the probability of casting a decisive vote, B is the benefit from the

victory of the preferred candidate, D is the exogenous "taste" benefit, and C is the cost of voting.

Riker and Ordeshook also found that most variation in turnout was explained by the exogenous term D. All further attempts to alter the pivotal voter model that would explain turnout as a function of mainly p and B have not been much successful. The main problem is that in large elections, p vanishes very fast. This problem has been dubbed as "voter's paradox": it is unclear why one should vote if the probability that one's vote changes the outcome of the elections is nil. A good survey of this and related literature is Mueller (2003, ch. 14).

Recently, several authors concentrated their analysis on the insight that efforts by parties and other political groups (for example, trade unions) increase turnout. Uhlaner (1989), Morton (1991), and Shachar and Nalebuff (1999) have built models where the calculus of voting as in (1) is done at the group level, not at individual level. In that case, p does not vanish, and the group leaders have an incentive to mobilize group members. The problem of this approach is that it leaves the individual decision of participating in a "black box", thus essentially assuming away the main problem.

Harsanyi (1980) and Feddersen and Sandroni (2002) have relaxed the assumption of an egoist voter. In their models, a citizen supporting one side (side being a candidate or an issue at a referendum) adheres to the belief that she should "do her part" by showing up at the elections if the cost of voting is "reasonably low". This reasonable level is determined endogenously, by asking the question "What would be the level of voting costs below which those on my side of the issue should vote that would maximize the payoff of a representative member of my group?" Thus, citizens behave according to the rule that would be best for the whole group. Coate and Conlin (2002) test this model on the data from Texas liquor referenda and find considerable support for this theory.

Another route of research is to analyze more in depth what lies behind the exogenous D term. Fiorina (1976) proposed that the true meaning of D benefit is the utility from expressing one's opinion about the candidates or the issue at hand. The challenge now is to explain why this expressive benefit may vary across citizens.

This model attempts to resolve this challenge. We build our model around the non-restrictive hypothesis that one gets a higher benefit from expressing one's opinion about the candidates by voting when one is better informed about the quality of the candidates. Intuitively, if I have very precise information that the candidate A is much better than the candidate B (for example, I know that the latter has been caught when receiving bribes), then I feel very well from

going to the polls and giving support for candidate A, thus reducing B's chance of winning. On the other hand, if I have information that A is slightly better than B, but my information is very noisy, I would not get such a high benefit from expressing my opinion as in the first case, and I am likely to abstain[1].

This insight turns the fundamental question from "Why one votes?" to "Why and how one acquires information about the candidates?" Our model consists of three stages: social network formation, information acquisition and exchange, and voting. In the second stage, citizens get utility from exchanging their opinions about the elections in randomly formed matches. Social exchange, however, pays off only when both partners possess private information about the candidates. Getting this private information is costly. Thus, the pre-voting game exhibits strategic complementarity in action: a citizen is more likely to acquire information if other citizens also get informed. We resolve the multiplicity of equilibria using the global games approach first introduced by Carlsson and van Damme (1993) and analyzed in depth by Morris and Shin (2003).

The resulting unique equilibrium depends on the payoff from social exchange when both partners are informed. This payoff, in turn, depends on the density of social network which is formed in the first stage. The social and economic characteristics of the neighborhood (for example, ethnic/racial fragmentation, income inequality) drive the density of the network.

Thus, we find that in the neighborhoods with a more favorable characteristics (lower ethnic fragmentation, lower income inequality), citizens form a more dense social network. As a consequence, they have higher incentives to get informed about politics, since social exchange gives higher benefits. Citizens are better informed about the elections and participate more readily.

We then test the model using the data from British General Elections Study of 2001. We find that in local neighborhoods where citizens trust people more and have more belief in a fair treatment, people are better informed about politics. We also find that better information leads to higher participation. Finally, we test our model against the standard pivotal voter model and find no support for the latter.

Both ideas of social interactions and information acquisition in elections are not new, though our model is the first one linking these two pieces together. Knack (1992) and Posner (2000, ch. 8) have noted that voting may have a social norm aspect. In such case, social neighborhood characteristics would affect turnout. The problem of their approach is that the act of voting is hardly observable by others. Therefore, observing non-adherence to the norm is extremely

[1] Matsusaka (1995) first mentions this modelling approach. He also links this insight to the psychologists' concept of "cognitive dissonance".

difficult.

The role of information in voter participation has been studied extensively (see Larcinese (2002) for a survey). The main empirical finding of this literature is that information affects positively voter participation[2]. Most models, however, take the information profile of citizens as given. The two models with endogenous information acquisition are Matsusaka (1995) and Larcinese (2002). However, both models rely on pivotal-voter hypothesis. Given that the latter hypothesis is not supported by empirical evidence, explaining why one acquires political information remains a challenge. In our model, we resolve this problem by setting utility-bearing social exchange as the reason behind information acquisition.

The paper has the following structure. Part 2 presents the model. Part 3 discusses the empirical strategy and the data that we use. Part 4 provides basic summary statistics and simple correlations between the variables of interest. Part 5 presents the estimation results and discusses them in the light of the theoretical model. Part 6 concludes.

2 The Model

2.1 Setup

Consider a community populated with a unit-size continuum of atomistic citizens. Each citizen lives infinitely, and time is discrete: $t = 0, 1, 2, ..., T, T+1, ...$ Let us introduce a notion of distance between citizens in the community. This may be ethnic or racial distance, linguistic distance, or a distance based on income differences. Assume a perfectly symmetric setup: all citizens are located in equal distance from each other, and let's denote this distance as $d \in R_{++}$.

The timing of events is as follows: in period 0, citizens can establish a social network, and in periods $1, 2, ...T-1, T+1, ...$ they interact within the network. Period T is particular: in this period, the elections are held, and citizens decide whether to spend time to get informed about the elections, and whether to vote.

2.2 Social Network Formation

In period 0, citizens can form a social network within which they interact productively in period 0 and all future periods. Forming a network is a decentralized decision.

[2] Lassen (2003) presents evidence from a natural experiment that confirms the previously found link between information and turnout. The advantage of this paper is that it overcomes the usual endogeneity problem and thus makes clear the causality.

For citizen i, forming a link with every other citizen costs $c(d, s)$, where s denotes the density of the network, $s \in R_{++}$. This cost increases both with density and with distance:

$$\frac{\partial c}{\partial s} > 0, \quad \frac{\partial c}{\partial d} > 0,$$

and the marginal cost of a higher-density link increases with distance: $\frac{\partial c}{\partial s}$ is increasing in d. This means that it is more costly for a citizen to strengthen links with other citizens when they are located further away from her.

A citizen's utility from private leisure is linear in time. While the cost is paid once and for all, the benefits of the social network accrue every period. Given a network of density s, a citizen can spend her time endowment (in part or fully) for social exchange within the network, getting utility $v(s)$ per unit of time. A more dense network gives higher utility:

$$v'(s) > 0,$$

and social exchange gives more utility than private leisure, even when the network is least dense:

$$\lim_{s \to 0} v(s) \geq 1.$$

Thus, in period 0, a individual citizen's problem is:

$$\max_{s} \sum_{t=0}^{\infty} \delta^t v(s) + l_0, \tag{2}$$
$$\text{subject to } l_0 + c(s, d) = 1.$$

Here, l_0 denotes period 0 private leisure and $\delta < 1$ is the subjective discount factor.

The following proposition is true:

Proposition 1 *Equilibrium density of social network, s^*, decreases with distance d.*

Proof. *The first-order condition of problem (2) is*

$$\frac{1}{1-\delta} v'(s) = \frac{\partial c(s, d)}{\partial s} \tag{3}$$

Assuming an interior solution, (3) implicitly determines the equilibrium density s^*. Marginal benefit of a more dense network, given by the left-hand side, is independent of distance d, while the marginal cost (the right-hand side) increases in d, by assumption. Thus, the equilibrium density decreases with distance. ■

2.3 Information Acquisition

Consider now period T. We assume that T is sufficiently larger than 0, so that the effect of decisions in T on the network formation stage in period 0 is negligible.

At the beginning of period, the electoral campaign starts. There are two candidates running for office, A and B. The candidates intrinsically differ in quality: assume, without a loss of generality, that A is better than B. Denote as $q > 0$ the quality difference between the candidates.

Let's introduce the notion of salience of elections, $S \in R_{++}$. For example, in a federation with most power allocated to regions, regional elections are more salient than the federal ones.

Citizens can get informed about the candidates. To do so, they need to spend time $\tau \in (0, 1)$, and getting private information q_i, which is drawn from a normal distribution with mean equal to the true q and variance σ^2. Private information is independent across citizens and are drawn from the same distribution:

$$q_i \sim i.i.d.N(q, \sigma^2).$$

The benefit of getting informed for an informed citizen is twofold: first, she gets direct utility from getting informed, u_i. Second, she can exchange her private information with another citizen and get additional utility $\gamma(S)$ per unit of time spent in social exchange. Citizens enjoy more discussing the forthcoming elections when these elections are more salient:

$$\gamma'(S) > 0.$$

This social exchange occurs in randomly formed matches. For simplicity, we assume that once formed, the match cannot be dismantled until the next period. Citizens get additional utility only if both partners in a match are informed.

Direct utility (the individual taste signal) u_i is such that

$$u_i = \theta + \varepsilon_i.$$

The individual component ε_i is drawn from a c.d.f. $F(.)$. It has zero mean: $E(\varepsilon_i) = 0$, and its' distribution is symmetric: $F(0) = \frac{1}{2}$. Also, it is independent across citizens and is drawn from the same distribution. Prior to getting informed, citizens share a uniform uninformative prior about θ:

$$\theta \sim U(-\infty, \infty).$$

It is an improper distribution; however, we are interested only in conditional probabilities, so improperness does not constitute a problem.

Thus, the expected payoff for citizen i from getting informed is:

$$E\pi_i = l(1-\tau)v(d)(1+\gamma(S)) + (1-l)(1-\tau)v(d) + u_i,$$

where l denotes the share of informed citizens. With probability l, she gets matched to another informed citizen; she spends time $1-\tau$ in this match and gets utility $v(d)(1+\gamma(S))$ from social exchange (See Proposition 1: the exogenous distance d implicitly determines the benefit v, through the equilibrium density of social network, s^*). With probability $1-l$, she gets matched to an uninformed citizen; she spends time $1-\tau$ in this match and gets utility $v(d)$. Finally, with probability 1, she gets direct utility u_i.

Her payoff from not getting informed is just $v(d)$. Therefore, she gets informed if and only if

$$E\pi_i \geq v(d),$$

that is, only if her direct utility u_i exceeds a threshold level:

$$u_i \geq v(d)(\tau - l(1-\tau)\gamma(S)). \tag{4}$$

Note that there is a strategic complementarity between citizens. A citizen deciding to get informed increases marginally the share l and thus decreases the threshold for other citizens.

The following proposition and a corollary determine the unique equilibrium of the game.

Proposition 2 *The information acquisition game has a unique symmetric Nash equilibrium. The equilibrium strategy for every player i is*

$$\begin{cases} \textit{get informed if } u_i \geq v(d)(\tau - \frac{1}{2}(1-\tau)\gamma(S)) \\ \textit{do not get informed otherwise.} \end{cases} \tag{5}$$

Proof. *First we prove that (5) is an equilibrium strategy for every player i. Then we prove that this equilibrium is unique.*

CHARACTERIZATION. *We naturally restrict our attention to the class of strategies*

$$\begin{cases} \textit{get informed if } u_i \geq H \\ \textit{do not get informed otherwise,} \end{cases}$$

Let us call it a switching strategy around H, and let us call H a switching point. Let citizen i observe the individual taste signal u_i and let her think that all other citizens follow a switching strategy around H. The probability that citizen j gets a signal higher than H, given citizen i's signal, is:

$$\Pr\{u_j > H | u_i\} = \Pr\{\theta + \varepsilon_j > H | u_i\} =$$
$$= \Pr\{u_i + \varepsilon_j > H\} = \Pr\{\varepsilon_j > H - u_i\} = 1 - F(H - u_i)$$

By independence, this is also the citizen i's estimate of the share of informed citizens, l. Thus, from (4), she gets informed if

$$u_i \geq v(d)(\tau - [1 - F(H - u_i)](1 - \tau)\gamma(S)).$$

Let her signal be equal to H. Then, her rule becomes

$$u_i \geq v(d)(\tau - \frac{1}{2}(1 - \tau)\gamma(S)).$$

By symmetry, citizen i also follows the switching strategy around H. Thus,

$$H = v(d)(\tau - \frac{1}{2}(1 - \tau)\gamma(S)),$$

and all citizens follow the strategy (5).
UNIQUENESS. *Let $H' \neq H$ be an equilibrium switching point. Two possibilities exist: $H' > H$ and $H' < H$. Let $H' > H$. Then, any citizen i observing signal $u_i < H'$ does not get informed, and this holds for all signals $u_i \in (H, H')$. However, we have proven above that for any $u_i > H$, our citizen gets informed. Thus, H' cannot be larger than H. Analogously, one can prove that H' cannot be smaller than H. Therefore, H is a unique equilibrium switching point.* ■

The intuition behind this proposition is as follows. The benefit of spending time to get informed about the elections is higher the higher is the share of other informed citizens, since then the probability of getting in a good match is higher. If this benefit were perfectly symmetric across citizens, the game would have multiple equilibria.

However, given the asymmetric direct utility, the game exhibits a unique equilibrium. Only the citizens having a sufficiently high direct utility get informed. This occurs because their estimate the average signal is high enough, and thus, also their estimate of the share of informed citizens is high enough. The following corollary determines the equilibrium share of informed citizens.

Corollary 3 *The equilibrium share of citizens that get informed about the elections is*

$$l^* = 1 - F(v(d)\frac{2\tau - (1 - \tau)\gamma(S)}{2} - \theta). \tag{6}$$

Proof. *From Proposition 2, we know that the citizens getting individual taste signals higher than H get informed. Given the independence of signals, the share of such citizens is*

$$\begin{aligned} l^* &= \Pr\{u_i > H\} = \Pr\{\theta + \varepsilon_i > H\} = \Pr\{\varepsilon_i > H - \theta\} = \\ &= 1 - F(v(d)\frac{2\tau - (1 - \tau)\gamma(S)}{2} - \theta). \end{aligned}$$

■

Corollary 3 lends us several insights about the determinants of the share of informed citizens. First, more citizens get informed when the elections are salient:

$$\frac{\partial l^*}{\partial S} > 0. \tag{7}$$

This occurs even if the individual taste signals are completely independent of salience. A higher salience of elections indicates to a citizen i that, given that the expected benefit of getting informed is higher, some citizens get taste signals that are now above the threshold. Thus, the citizen i's estimate of the share of informed citizens if now higher, and she is more likely to get informed. Aggregating across all citizens, this means that the equilibrium share of informed citizens is now higher.

Second, less citizens get informed if the cost of getting informed is higher:

$$\frac{\partial l^*}{\partial \tau} < 0. \tag{8}$$

The mechanism is similar to the one described above. A higher cost increases the threshold; thus, a citizen i's estimate of the share of informed citizens is lower, and she is now less likely to get informed.

Finally, given that the elections are salient enough, more citizens get informed in communities with a lower distance between citizens:

$$\frac{\partial l^*}{\partial d} < 0, \text{ if } \gamma(S) > \frac{2\tau}{1-\tau}. \tag{9}$$

Intuitively, a lower distance between citizens induces a higher density of social network and a higher benefit of social interactions, thus increasing the expected benefit of getting informed (for any signal u_i).

2.4 Information Exchange

During social interactions in period T, each citizen belongs to one of three groups:

(a) uninformed citizens;

(b) informed citizens getting matched to uninformed ones;

(c) informed citizens getting matched to other informed citizens.

Let's assume that the prior distribution that a citizen i has about q is normal with zero mean and variance λ^2, $\lambda \to \infty$ (uninformative prior). This is also the posterior distribution about q for citizens of group (a), since they do not acquire new information, and thus do not update their prior.

For citizens in group (b), the posterior distribution about q is normal with mean q_i and variance σ^2. Finally, for citizens i and j in group (c), matched to each other, the posterior distribution about q is normal with mean $\frac{1}{2}(q_i + q_j)$ and variance $\frac{1}{2}\sigma^2$.

2.5 Voting

Since citizens are atomistic, the probability that any single vote is pivotal is negligible. Thus, the only reason why a citizen votes is that voting delivers her a benefit from expressing her opinion about candidates' relative quality. We assume that the benefit of voting net of the cost of voting, denoted with ξ, has the following properties:

(P1) The net benefit of voting, B_i, depends on the posterior expectation of the quality difference, $\widehat{q}_i$, the posterior variance, $\widehat{V}_i$, and the cost of voting, ξ:

$$B_i = B(\widehat{q}_i, \widehat{V}_i, \xi).$$

(P2) The net benefit of voting increases with expectation of the quality difference, decreases with variance, and decreases with the cost of voting:

$$\frac{\partial B}{\partial \widehat{q}_i} > 0, \quad \frac{\partial B}{\partial \widehat{V}_i} < 0, \quad \frac{\partial B}{\partial \xi} < 0.$$

Thus, higher is one's estimate of candidates' quality difference, better one feels from having expressed it at the elections. Also, lower is the precision of this estimate, less sure one is about the estimate, and thus gets a lower benefit from expressing her opinion.

(P3) The net benefit of voting is negative for a citizen whose expectation about candidates' quality difference is zero:

$$B(0, \widehat{V}_i, \xi) < 0.$$

For a citizen who sees no quality difference between the candidates, the cost of voting outweigh the expressive benefit.

Given this assumptions, the following proposition holds.

Proposition 4 *The equilibrium turnout increases with the salience of elections, and decreases with the costs of information and voting. Given that the elections are salient enough, the equilibrium turnout is higher in communities with lower distance between citizens.*

Proof. *Let's analyze the three groups of citizens separately. In group (a), no one votes, since all citizens have an uninformative private information and the net benefit of voting for then is negative. In group (b), given properties P2 and P3, a share of citizen votes. These are the citizens that have private information $q_i > \overline{q}$, where*

$$\overline{q} : B(\overline{q}, \sigma^2, \xi) = 0$$

Denote this share as $\overline{\omega}$. In group (c), citizens have the normal posterior distribution with half of the variance of group (b) citizens, but with the same expectation

(because citizens are atomistic and because of the law of large numbers). In this group, citizens that vote have private information $q_i > \underline{q}$, where

$$\underline{q} : B(\underline{q}, \frac{\sigma^2}{2}, \xi) = 0$$

Clearly, $\underline{q} < \overline{q}$. Denote the share of voters in group (c) as $\underline{\omega}$, with $\underline{\omega} > \overline{\omega}$. Size of group (b) is $l^*(1-l^*)$, while the size of group (c) is $(l^*)^2$. Thus, overall turnout Ω is

$$\Omega = l^*(1-l^*)\overline{\omega} + (l^*)^2\underline{\omega} = l^*(\overline{\omega} + l^*(\underline{\omega} - \overline{\omega})).$$

Turnout increases with the share of informed citizens:

$$\frac{\partial \Omega}{\partial l^*} > 0.$$

Thus, it has the properties analogous to those of the equilibrium share of informed citizens (7), (8), and (9). Finally, a higher cost of voting decreases the net benefit of voting for all citizens in both voting groups. Thus, a higher cost of voting decreases equilibrium turnout. ■

2.6 Discussion

In this section we discuss the main contributions of the model and their applications, as well as the robustness of our results to various assumptions.

The main contributions of the model are three. First and foremost, we build a model that sees electoral participation as a phenomenon based on (and driven by) social interactions. Our model links social neighborhood characteristics (such as heterogeneity across some economic or demographic dimension), information acquisition, and participation. Although such links have been noted empirically by political scientists, no consistent theoretical model has been built to analyze them. We hope to fill this gap. The main value added of the model thus lies in exposing a new way of looking at electoral participation.

Second, we move the attention of research from what happens at the polling station to what happens during the electoral campaign. We consider the information acquisition and exchange stage as the crucial one in understanding voter participation.

Finally, the strategic complementarity in action is not the feature unique to voter participation. Our approach of linking social neighborhood characteristics and individual action can be applied to other forms of political participation, such as strikes, protests, or ethnic conflicts.

Two applications of the model to electoral phenomena seem promising. First, the model can be adapted to analyze the long-standing question of why proportional representation system fosters higher turnout (Jackman (1987)). A possible way to address this problem is to ask why citizens might find it easier to decide among the candidates in the proportional representation system. One guess is that such electoral system induces the entry of more than two parties, which then target their programs to narrow policies (e.g., Greens, regional parties). This makes screening the quality of parties easier, thus reducing the decision cost for citizens.

Second, we can address the normative question of Condorcet whether elections aggregate information efficiently. Feddersen and Pesendorfer (1997) have answered this question positively. However, in their model, information is exogenously provided to a fraction of citizens. In our model, instead, information is driven by the social context. This may alter the conclusions, and analyzing this issue seems an inviting application.

The model relies on several simplifying assumptions. Information acquisition is a binary decision. We can relax this assumption, and instead assume that citizens choose the amount of private information. This can be done at the cost of increasing complexity. In this more general model, at information acquisition stage citizens engage in a multiple-action game with strategic complementarities, instead of a binary-action game. Frankel et al. (2003) analyze such games, getting results analogous to those of Morris and Shin (2003). Thus, the main predictions of the model survive.

Next, we model social exchange as a global-interactions game with random matching. We relax the assumption of random matching in favor of some kind of assortative matching, still retaining the main intuition. We can also allow citizens interact in groups of more than two partners. In both cases, since strategic complementarity in action remains present, the key results of our model continue to hold.

Finally, we do not allow citizens to quit unproductive matches until the end of the period. Instead, we can build a more complex model with the break–up and formation of new pairs, and the key results pass through, as long as break-up has a cost.

We acknowledge that our modelling of network formation is simplistic. The key point is that perfect symmetry assumption is very strong. The distance between citizens, be that ethnic/racial fragmentation or income heterogeneity, is usually asymmetric. Often, citizens belong to one of the two major groups, and thus two-type modelling of network formation may be more relevant.

3 Empirical Strategy and Data

In the empirical part of the paper, our goal is to analyze the link between the neighborhood characteristics and individual choice of information acquisition and voting. Furthermore, we aim to estimate the impact of more dense social interactions in the neighborhood on turnout.

For a basic specification, we assume that the "latent variable" measuring the net benefit from voting of a citizen i living in neighborhood j of region k can be modeled as

$$B_{ijk} = b_0' X_{ijk} + b_1 Info_{ijk} + b_2' I_k + e_{ijk}, \tag{10}$$

where X_{ijk} is the vector of individual characteristics, $Info_{ijk}$ is political information that the citizen possesses, I_k is a dummy variable for region, and e_{ijk} is the error term distributed normally with mean 0 and variance σ_{jk}. We do not observe the latent variable B_{ijk}, but only the individual choice of voting, which takes value 1 if B_{ijk} is positive and 0 otherwise:

$$\begin{aligned} P_{ijk} &= 1 \text{ if } B_{ijk} > 0 \\ P_{ijk} &= 0 \text{ if } B_{ijk} \leq 0 \end{aligned} \tag{11}$$

Note, however, that information acquisition in our model is endogenous. Empirically, we can specify the information acquisition as follows. We assume that the direct utility from information acquisition for a citizen i living in neighborhood j of region k can be modeled as

$$u_{ijk} = a_0' X_{ijk} + a_1' N_{jk} + a_2' I_k + \epsilon_{ijk}, \tag{12}$$

where X_{ijk} is the vector of individual characteristics, N_{jk} is the vector of neighborhood characteristics, I_k is a dummy variable for region, and ϵ_{ijk} is the error term distributed normally with mean 0 and variance $\widetilde{\sigma}_{jk}$. Again, we do not observe the latent variable u_{ijk}, but some measure of the amount of political information that a citizen possesses. This measure is correlated with the latent variable:

$$\frac{\partial Info_{ijk}}{\partial u_{ijk}} > 0. \tag{13}$$

We estimate the Probit model (10)-(11) and the OLS model (12)-(13) using individual level data, taking the wards as neighborhood dimension. We are mainly interested in the parameters a_1' and b_1.

Estimating the two models as a system would result in inconsistent estimates, due to the endogeneity of information acquisition. Thus, we need to use instrumental variables, with model (12)-(13) as the first-stage regression and

replacing the $Info_{ijk}$ variable in the probit model with the residuals of the first stage.

The source of data that we use is the British General Elections Study 2001. This survey interviews 2330 individuals during several weeks after the General Elections in the UK of June 7, 2001 (though we estimate our model on about 1500 observations due to missing observations on income). A positive feature of this survey is that it contains, beyond the usual demographic and income characteristics of individuals, data on a few social and political dimensions. In particular, on social dimension, the survey questionnaire includes questions about one's trust in people and one's opinion whether people treat each other fairly. On political dimension, the questionnaire includes questions about one's knowledge of politics, one's party membership, and, of course, one's participation in the elections. Importantly, the responses about participation are verified using election registers, so the data about turnout is reliable.

Another key feature of the survey is that it allows us to aggregate individual observations at the small neighborhood level. The UK is divided in small administrative units called "wards". For example, England consists of approximately 8500 wards. Moreover, the dataset contains important constituency-level political variables, such as the marginality of a constituency at the previous general elections. The dataset covers 128 constituencies and 248 wards in England, Scotland, and Wales.

All variables are described in Appendix A. Here we explain how some individual categorical variables and aggregate variables are constructed.

At the individual level, two variables are slightly different with respect to most similar surveys. EDU is a binary variable that takes value 1 if a respondent answered "yes" to the question "Do you have any educational or work-related qualifications [beyond the compulsory level]?" and value 0 of she answered "no". INCOMES is a categorical variable containing 12 categories. It takes value 1 if a respondent's household annual income is below 5000 pounds, value 1 if it lies between 5000 and 10000, etc., and value 12 if it is beyond 60000 pounds.

The fundamental variable QSCORE is the score of the respondent on the political knowledge quiz consisting of 6 questions about the elections. Crucially, it is an objective measure of one's knowledge of elections, and thus is better than the usual questions about one's declared knowledge or interest in politics.

Graph 1 presents the frequency of observations at the ward level. The dataset contains on average 9 individual observations per ward, although we have a few wards with a single individual and a few ones with more than 25 individuals.

We have constructed four variables at the ward level. MTRUSTW is the average trust in the ward. Respondents mark, on a 0-10 scale, their answers

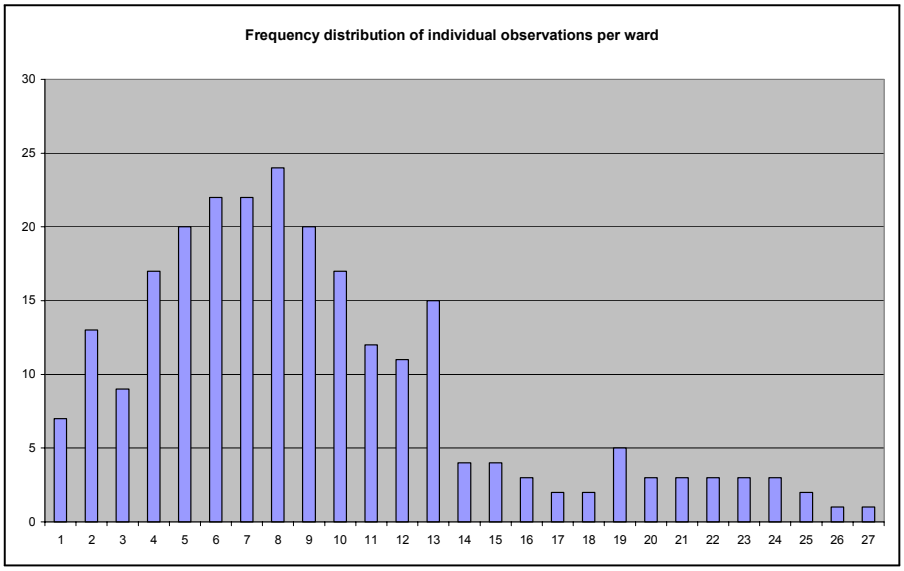

Figure 1: Individual observations per ward

to the question "Generally speaking, would you say that most people can be trusted, or that you can't be too careful dealing with people?" We then calculate the average score of the respondents belonging to the same ward. Analogously, MFAIRW is the average ward-level score of answers to the question "Do you think that most people you come into contact with would try to take advantage of you if they got the chance or would they try to be fair?" MEDUW is the ward-level average of EDU. Finally, MHMOWNW is the ward-level average of homeownership binary variable.

At the constituency level, the unique variable that we use is MARGINAL. It measures the level of marginality of the constituency at the 1997 general elections and takes value 1 if the constituency seat was won with a margin less than 5%, value 2 if the margin was 5-10%, etc., and value 5 if the margin was larger than 20%.

4 Descriptive Results

We start by presenting summary statistics for key variables and a few correlations between individual voting, individual information about politics, and neighborhood social characteristics. Summary statistics for all variables are presented in Appendix B.

	Mean	St.dev.
elpart	0,689	0,463
qscore	4,472	1,258
mtrustW	4,554	1,175
mfairW	5,875	1,036
marginal	3,994	1,327

Figure 2: Descriptive Statistics

	elpart	qscore	mtrustW
elpart			
qscore	0,2281***		
mtrustW	0,0666***	0,1514***	
mfairW	0,0808***	0,1510***	0,5600***

Figure 3: Simple Correlations

Figure 2 describes the sample characteristics of the key variables. About 69% of respondents participated in the elections. This number is somewhat higher than the official national turnout figure of 60%. Thus, the representativeness of the sample is fairly good, though not exceptional. The respondents are relatively well-informed about the elections: the average score is 4.5 out of 6. At the neighborhood level, average trust is 4.6 on 0-10 scale, while average belief in fair treatment by others is 5.9 on 0-10 scale. Finally, at the constituency level, the average level of marginality is low: on average, a seat in the lower chamber of the UK parliament was won in this elections with a margin of 15-20%. This is a confirmation of the landslide victory of the Labour Party in 2001.

Figure 3 shows simple correlation coefficients between individual participation, individual information acquisition, and the neighborhood-level variables. The correlation between individual participation and information acquisition is relatively high, 0.23, while the direct correlation between participation and neighborhood social characteristics is much lower (though always statistically significant): ELPART is correlated 0.07 with MTRUSTW and 0.08 with MFAIRW. On the other hand, individual information acquisition correlates more with ward-level variables: QSCORE correlates 0.15 both with MTRUSTW and MFAIRW. This is a sign that most of the effect of neighborhood social characteristics on turnout goes through information acquisition, in line with our model. Not surprisingly, two ward-level variables are strongly correlated (0.56).

qscore	Coef	t	Significance
dleis1	-0,206	-1,90	*
dleis2	(dropped)		
dleis3	0,060	0,70	
dleis4	-0,066	-0,77	
mtrustW	0,074	2,37	**
mfairW	0,079	2,36	**
rlg	-0,691	-0,66	
ms	-0,141	-2,25	**
marginal	0,004	0,17	
age	0,047	4,61	***
age2*100	-0,041	-4,26	***
gender	0,459	7,65	***
edu	0,198	2,88	***
incomes	0,043	3,64	***
homeown	0,220	3,18	***
union1	0,163	2,24	**
union2	0,158	2,41	**
partmem	0,303	2,33	**
unempl	-0,143	-0,96	
constant	2,191	2,64	***
Region controls	YES		
Ethnicity controls	YES		
Religion controls	YES		
Employment sector controls	YES		
Method		OLS	
Number of obs		1680	
R2		0,2553	
Adj-R2		0,2291	

Figure 4: First-stage estimates

5 Econometric Evidence

5.1 Basic Regressions

Figures 4 and 5 show the results of the estimation of our empirical model (10)-(13). Figure 4 presents the estimates of the first stage, with information score as dependent variable, while Figure 5 presents the estimates of marginal probit coefficients of the second stage, with electoral participation as dependent variable.

Both individual-level and neighborhood-level variables have a significant impact on information acquisition. Age has a positive and significant coefficient, while the coefficient on age squared is negative and significant. Elder people

know more about politics, with an inverted-U pattern with respect to age. Elder people clearly have more experience, since they have lived through more electoral campaigns than younger citizens. Gender has a positive and significant coefficient, meaning that men are more informed about politics than women. This may be due to some exogenous cultural reason (for example, men have traditionally been more involved in politics than women), or because women have less time available for social interactions, and thus, benefit less from investing into information acquisition. Notably, marital status has a significant negative coefficient, meaning that married people know less about politics. This supports our social exchange theory, since married people, having a permanent partner for social exchange and having several additional social exchange topics (such as children and housekeeping matters), care less of learning about the elections.

Education, income, and homeownership all have a positive significant coefficient. Richer and more educated people possess more political information, since they have access to better (more expensive) sources and bear a lower information processing cost. Homeowners are likely to have a more stable and a more dense social network than people renting a flat, and thus face higher incentives to invest into political information acquisition.

Not surprisingly, trade union and political party membership both have positive and significant coefficients. This is clearly because both types of organizations are strongly involved into electoral politics and put effort into informing their members about the elections.

Finally, our main variables, neighborhood social characteristics, have positive and significant coefficients. Both in neighborhoods where people trust more and where people believe more in fair treatment by others, citizens possess more political information. Our theory suggests that in such neighborhoods social interactions are more dense (thus giving more benefit from social exchange), and therefore citizens face higher incentives to acquire political information.

Let's now look at the estimates of the participation equation (Figure 5). Age and age squared both have significant coefficients, positive and negative, respectively. Thus, the age pattern is similar to that of information acquisition. Intuitively, elder (and thus more experienced) citizens can base their inference about candidate quality on their past experience, and thus have a lower variance of their private information.

We expect all other individual demographic variables have no direct effect on participation, but only through information. This intuition is generally confirmed with a single exception. Surprisingly, homeownership has a positive and significant coefficient. That is, homeownership has a double effect on turnout:

elpart	Marg. Coeff.	z	Significance
qscore_res	0,8367	7,23	***
marginal	0,0151	1,43	
age	0,0175	3,74	***
age2*100	-0,0103	-2,31	**
gender*	-0,0312	-1,12	
ms*	0,0404	1,38	
edu*	0,0032	0,10	
incomes	0,0005	0,09	
homeown*	0,1466	4,53	***
union1*	0,0829	2,52	**
union2*	-0,0056	-0,18	
partmem*	0,1389	2,07	**
unempl*	-0,0833	-1,14	
canv*	0,0291	0,98	
phoned*	0,0918	2,04	**
Region controls	YES		
Ethnicity controls	YES		
Religion controls	YES		
Employment sector controls	YES		
Method		Probit	
Number of obs		1538	
LR chi2(48)		283,82	
Pseudo-R2		0,1498	
Obs. P		0,693	
Pred. P		0,72	

Figure 5: Second-stage estimates

first, through higher incentives to learn about the elections, and second, by higher direct incentives to participate. The most natural candidate is the social-norm mechanism of voting. Community considers voting (although it is observed only imperfectly) a social norm, and thus the citizens which have stronger social links (and the homeowners are more likely to belong to this group than the people renting their flats) follow the norm more. This suggests a second channel (which we leave unmodelled), based on social norms, through which social neighborhood affects voter participation.

Current trade union membership and political party membership both have a positive and significant coefficient. Thus, current union members and party members are more likely to participate in the elections, even after accounting for information. This is probably because both unions and parties organize "get out the vote" campaigns among their members, and such campaigns affect participation decision. Importantly, past union membership affects information acquisition but not voting. This finding supports our model. Political information and the skills to process such information are acquired during trade union membership and are retained even after one leaves the union. That is why we observe a positive effect of past union membership on information score. However, once a citizen has left the union, she is not involved in the "get out the vote" campaigns of the union. Thus, past union membership should not affect directly the participation decision.

Party effort affects participation to some degree. Canvassing has no significant effect on voting. However, PHONED has a positive and significant coefficient. That is, receiving a phone call from a party during the campaign, asking how the citizen might vote, increases the likelihood that the citizen votes. Our model does not explain this fact.

Finally, the coefficient on residuals from the first stage is positive and significant. This means that possessing more political information induces a citizen to participate more in the elections.

5.2 Testing the Model against the Pivotal-Voter Model

Our dataset allows us to test our model against the pivotal-voter model. This latter model has been the mainstream explanation of the rational choice approach to turnout problem. Its main empirical prediction is that one is more likely to vote if the probability of one's casting the decisive vote is higher. In particular, when less people vote in the district, such probability increases.

To perform the test, we include two more neighborhood-level variables in the second stage. These variables are MEDUW and MHMOWNW. Since both education and homeownership increase one's likelihood to vote (the first through

information channel, the second through both information and voting channels), the wards with higher MEDUW and MHMOWNW should exhibit a higher turnout. Thus, the pivotal voter model would predict that in such wards, one's likelihood to cast a decisive vote is lower and thus, citizens from these wards should be less inclined to vote. On the other hand, our model suggests that no correlation exists between these variables and one's likelihood to vote. At best, given the social norm channel, we predict a positive coefficient on MHMOWN.

Figure 6 presents the results of this altered estimation. We find that the coefficients on both MEDUW and MHMOWNW are not significant. What is even more important, neither of them is negative. Thus, we conclude that our data supports the social exchange model and provides no support for the pivotal voter model.

6 Conclusion

This paper presents a model of voter participation based on social exchange. We develop the model around the intuition that political information that citizens possess is the key factor determining participation, and that citizens acquire such information to exchange it with other citizens, to benefit from social exchange. This benefit depends on the density of the social network within which the exchange takes place. Thus, the variables that affect this density influence information acquisition and, eventually, voter participation.

One such variable is the distance between citizens. Higher distance induces a less dense network, since the marginal cost of higher density increases with distance, while the marginal benefit is independent from distance.

We test the hypotheses of our model using the data from British General Elections Study of 2001. We find that higher average trust and higher average belief in fair treatment in the neighborhood induce citizens to acquire more political information, controlling for individual characteristics. We also find that more information leads citizens to vote more readily, and that most individual variables affect only information acquisition, but not voting. Finally, we find that the data provides no support for the standard pivotal-voter model.

Our model thus sheds light on a key point. Despite voting is unobservable, voter participation, through information acquisition and exchange, is fundamentally a social phenomenon. Therefore, to understand the policy implications of turnout, we should strive to understand the determinants of social behavior at the electoral campaign stage.

Overall, we hope that the change of the point of view on participation that this paper proposes is a useful step towards understanding turnout. We believe

elpart	Marg. Coeff.	z	Significance
qscore_res	0,8431	7,27	***
marginal	0,0163	1,54	
meduW	0,0475	0,65	
mhmownW	0,0888	1,16	
age	0,0175	3,65	***
age2*100	-0,0102	-2,27	**
gender*	-0,0310	-1,11	
ms*	0,0385	1,31	
edu*	-0,0032	-0,21	
incomes	-0,0007	-0,13	
homeown*	0,1333	3,95	***
union1*	0,0859	2,60	***
union2*	-0,0023	-0,08	
partmem*	0,1398	2,09	**
unempl*	-0,0853	-1,17	
canv*	0,0264	0,89	
phoned*	0,0898	1,99	**
Region controls	YES		
Ethnicity controls	YES		
Religion controls	YES		
Employment sector controls	YES		
Method		Probit	
Number of obs		1538	
LR chi2(48)		283,82	
Pseudo-R2		0,1498	
Obs. P		0,693	
Pred. P		0,72	

Figure 6: Social-exchange model vs. pivotal-voter model

that paying attention to social behavior is as important for the understanding of political phenomena as introducing economic behavior into the analysis. If electoral participation is an indicator of the health of a democracy, then it is also an indicator of the health of the society.

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Appendix A. Variable Definition

The following is the list of variables that we use in empirical part of the paper. All data come from British General Elections Study, Cross-Section Survey, downloaded from the UK Data Archives at the University of Essex, http://www.data-archive.ac.uk/. In all cases when we constructed variables, survey values "no answer" or "don't know" were coded as missing values.

age: age of the respondent.

gender: dummy equal to 1 if the respondent is male and 0 if the respondent is female.

ms: dummy equal to 1 if the respondent is married and 0 otherwise.

edu: dummy equal to 1 if the respondent has educational or work-related qualifications beyond the compulsory level and 0 otherwise.

incomes: categorical variable taking value 1 if the respondent's annual household income is below 5000 pounds, 2 if it is between 5000 and 10000, etc., 12 if it is above 60000.

homeown: dummy equal to 1 if the respondent's household owns the house in which she is living and 0 otherwise.

union1: dummy equal to 1 if the respondent currently is a member of a trade union and 0 otherwise.

union2: dummy equal to 1 if the respondent used to be a member of a trade union and 0 otherwise.

rlg: dummy equal to 1 if the respondent goes to a religious service regularly and 0 otherwise.

dleis1: dummy equal to 1 if the respondent reported having no time left over weekly after she has carried out her work and family responsibilities and 0 otherwise.

dleis2: dummy equal to 1 if the respondent reported a great deal of time left over weekly after she has carried out her work and family responsibilities and 0 otherwise.

dleis3: dummy equal to 1 if the respondent reported having a fair amount of time left over weekly after she has carried out her work and family responsibilities and 0 otherwise.

dleis4: dummy equal to 1 if the respondent reported having some time left over weekly after she has carried out her work and family responsibilities and 0 otherwise.

partmem: dummy equal to 1 if the respondent is a member of a political party and 0 otherwise.

unempl: dummy equal to 1 if the respondent is currently unemployed and 0 otherwise.

elpart: dummy equal to 1 if the respondent has participated in the general elections of June 7, 2001, and 0 otherwise.

qscore: the respondent's score on the political knowledge quiz consisting of the following true/false questions:

(1) Polling stations close at 10:00 p.m. on election day (true);

(2) It is official Conservative Party policy that Britain should never join the single European currency (false);

(3) The Liberal Democrats favour a system of proportional representation for Westminster elections (true);

(4) The minimum voting age is 16 (false);

(5) Unemployment has fallen since Labour was elected in 1997 (true);

(6) Only taxpayers are allowed to vote in a general election (false).

canv: dummy equal to 1 if the respondent has been contacted by a canvasser during the electoral campaign, and 0 otherwise.

phoned: dummy equal to 1 if a anyone from a political party has phoned to the respondent asking how she might vote and 0 otherwise.

The construction of the following variables has been explained in Section 3 of the paper.

mtrustW: ward average of trust in people on 0-10 scale.

mfairW: ward average of belief in fair treatment by people on 0-10 scale.

meduW: ward average of **edu**.

mhmownW: ward average of **homeown**.

marginal: the level of marginality of the constituency in the general elections of 1997.

Variable	Obs	Mean	Std. Dev.	Min	Max
age	2316	50,8290	17,7917	18	95
gender	2330	0,4425	0,4968	0	1
ms	2326	0,5782	0,4939	0	1
edu	2322	0,6430	0,4792	0	1
incomes	1751	4,6688	3,2094	1	12
homeown	2326	0,7124	0,4527	0	1
union1	2324	0,2177	0,4128	0	1
union2	2324	0,3120	0,4634	0	1
rlg	2316	0,5924	0,4915	0	1
dleis1	2320	0,1254	0,3313	0	1
dleis2	2320	0,1746	0,3797	0	1
dleis3	2320	0,2543	0,4356	0	1
dleis4	2320	0,4457	0,4971	0	1
partmem	2326	0,0456	0,2086	0	1
unempl	2326	0,0322	0,1767	0	1
elpart	2151	0,6894	0,4628	0	1
qscore	2324	4,4720	1,2578	0	6
canv	2325	0,2237	0,4168	0	1
phoned	2326	0,0894	0,2854	0	1
mtrustW	248	4,5537	1,1748	0	10
mfairW	248	5,8750	1,0335	0	8
mhmownW	248	0,7122	0,2075	0	1
meduW	248	0,6432	0,2032	0	1
marginal	128	3,9939	1,3266	1	5

Figure 7: Appendix B. Summary Statistics