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Working Paper 2010:15

Do voters vote in line with their policy preferences? The role of information

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Working paper 2010:15
December 2010

DO VOTERS VOTE IN LINE WITH THEIR POLICY PREFERENCES?
THE ROLE OF INFORMATION

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Do voters vote in line with their policy preferences? – The role of information*

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December 21, 2010

Abstract

This paper investigates how information affects voting behavior. Specifically, I test (i) if more informed voters are better at voting for their most preferred politicians and (ii) if this translates into a bias on the aggregate level. To do so, I use a set of Swedish individual survey data on the preferences for public spending of both politicians and voters, which provides an opportunity to investigate how information affects voters' ability to match their preferences with those of the politicians. The results support both hypotheses: more informed voters are more likely to vote for their most preferred politicians, and on the aggregate level, I find that the left-wing parties would have received 1 to 3 percentage points fewer votes if all voters had been fully informed.

Keywords: Voting behavior, Information, Vote aggregation

JEL classification: D70, D80, H71

*I am grateful for comments and suggestions made by Eva Mörk, Adrian Adermon, Matz Dahlberg, Mikael Elinder, Henrik Jordahl, Che-Yuan Liang, Heléne Lundqvist, Jeffrey Racine, James M. Snyder Jr and Ulrika Vikman as well as seminar participants at Uppsala university and participants at the 2009 Midwestern Political Science Association Conference, 2009 International Institute of Public Finance and 2009 IEB Summer School in Public Economics.

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1 Introduction

Ever since Downs (1957) put forth the hypothesis that voters are “rationally ignorant”, scholars have discussed what role information plays for the individual vote decision and, ultimately, for the aggregate election result. In this paper I argue that, even if more political knowledge does not change the voters’ preferences, the mere fact that some voters have more information than others may distort the election outcome. Using individual survey data on the preferences for public spending of both politicians and voters in Swedish municipalities, I study the extent to which more informed voters are more likely to vote for the politicians that have the most similar preferences as themselves. I then use the result to simulate the election outcome of a “fully informed” electorate. The results suggest that information is important both for the individual vote decision, and also on the aggregate level. I find that the left-wing coalition would have received 1 to 3 percentage points fewer votes if all voters had been fully informed.

Theoretically, however, it is not clear that a lot of political knowledge is needed for the voters to cast informed votes. Some scholars have argued that uninformed voters can use informational shortcuts to vote as if they are informed (see, for instance, Popkin, Gorman, Phillips, and Smith 1976, Conover and Feldman 1989, Lupia 1994 and McDermott 1997). Although voters may not know the candidates’, or parties’, specific policy positions, they may be able to identify their ideological leanings or party label. They can then use this knowledge to vote in the same manner as if they had complete information. If the voters use these shortcuts successfully, their lack of information will have no impact on the election outcome.

Even if voters do make errors when deciding for whom to vote, it is not clear that this introduces an aggregate bias. Following Condorcet’s jury theorem (Condorcet 1785), Shapiro and Page (1988), Wittman (1989) and Page and Shapiro (1992) argue that voter errors cancel out when votes are aggregated. The implicit assumption is that the errors are unsystematic. However, Caplan (2007) argues that voters make systematically biased mistakes that lead to an undesirable political outcome. Furthermore, even if the errors are unbiased, the jury theorem may not be valid if certain groups of voters have more information and therefore make fewer mistakes. As Delli Carpini and Keeter (1996) stated:

“political knowledge is not randomly distributed in the population. The very groups who are disadvantaged economically and socially are also less politically informed and, thus, disadvantaged in the struggle over the political allocation of scarce goods, services, and values” (p. 265).

To test whether the election outcome would have been different had all voters had the same information Bartels (1996), Delli Carpini and Keeter (1996), Althaus (1998, 2003) and Gilens (2001) simulate “fully informed” voting behavior.¹ The idea is that voters with similar demographic back-

¹See also Lau and Redlawsk (1997) for a discussion of how information help voters cast “correct” votes.

ground characteristics have similar political interests. Therefore, in a given demographic group, differences in voting behavior or preferences between informed and uninformed voters can be interpreted as an information effect.

This paper is closely related to this group of papers with one important difference. While earlier papers generally consider the information effect to occur either explicitly through policy preferences (i.e., information changes the preferences voters hold) or implicitly (the vote decision is based on preferences that are a function of information), I take policy preferences as exogenous. Instead, I investigate whether more informed voters are more likely to vote for the politicians whose policy preferences are closest to the voters'. To do so I use individual data on the preferences of both voters and politicians in Swedish municipalities. These data make it possible to directly investigate whether more informed voters vote for politicians who have preferences closer to their own.

To what extent is it informative to study the politicians' preferences? In the Downsian median voter model (Downs 1957), candidates are office-motivated and converge to the median voter's preferred position to win the election. This result holds even if they are policy-motivated; they are still forced to locate at the median.² If this is the case, politicians' preferences are irrelevant from the voters' perspective. The crucial assumption of this model is that it is possible for candidates to commit to policy before the election. As Alesina (1988) showed, if the candidates cannot commit, there is no other credible policy position than for the candidates to propose their most preferred position. This is the fundamental characteristic of the citizen candidate model (Osborne and Slivinski 1996 and Besley and Coate 1997) in which policy divergence is possible.

Recently, there has been some empirical evidence supporting the claim that politicians' preferences affect policy outcomes (see Levitt 1996, Lee, Moretti, and Butler 2004 and Chattopadhyay and Duflo 2004.) Especially relevant for this study, Petterson-Lidbom (2008), studying Swedish municipalities, finds that left-wing coalitions raise taxes and spending significantly compared with right-wing coalitions.

Given that politicians' preferences have an impact on policy outcomes, the natural question is to what extent the preferences of the voters correspond to those of the politicians. Ågren, Dahlberg, and Mörk (2007)³ find that politicians desire significantly more spending on local public services such as schools, child care and social care than voters. This result raises the issue of why voters elect politicians who have preferences that differ from their own. In this paper, I investigate whether the lack of information held by voters can be one explanation of why preferences differ between voters and politicians.

²Roemer (1997), among others, shows that policy divergence is possible if politicians are policy-motivated and uncertain of who will turn out to vote.

³They use the same data as I do in this study.

2 Theoretical framework

I will use a very simple model of partisan politics to structure the empirical analysis. There are two parties (coalitions), R and L , that are assumed to have exogenous preferences, i.e., they can be thought of as citizen candidates who cannot credibly commit to anything other than their own preferred policy. They have preferences over the size of the government budget with bliss points g_R^* and g_L^* , respectively. Voters derive utility from the winning party's budget policy, g_p . Following Lindbeck and Weibull (1987), I assume that voters also care about other party characteristics that are unrelated to budget policy. These characteristics are captured by the variable θ . Specifically, I assume the following utility function:

$$U_i(g_p, \theta_p) = -|g_i^* - g_p| + \theta_{ip}. \quad (1)$$

Due to a lack of information, voters do not directly observe the parties' policy positions; instead, voters observe these positions with some error. The more informed voters are, the smaller this error is. The probability that a voter will vote for party L is then

$$\Pr(i \text{ votes for } L) = \Pr(|g_i^* - g_R^*| - |g_i^* - g_L^*| > \theta_i + \nu_{ij}) \quad (2)$$

where $\theta_i \equiv \theta_{iR} - \theta_{iL}$ and ν_{ij} is the error the voter makes about the policy position of the two parties where j indicates how much information the voters has. A positive ν_{ij} means that the voter believes herself to be closer to party R compared with party L than is actually true while a negative ν_{ij} implies the opposite. I assume that $E(\nu_{ij}) = 0$ but that the variance of ν_{ij} decreases as the voter becomes more informed. As mentioned above, Caplan (2007) argues that voters makes systematic mistakes, which, in this case, would imply that ν_{ij} does not have zero expectation.⁴ I abstract from this in the model but allow for this possibility in the empirical section of the study. However, the estimates suggest that voters do not make systematic errors.

Let F_j be the cumulative distribution function of $\theta_i + \nu_{ij}$. The probability that the voter votes for L is then $F_j(|g_R^* - g_i^*| - |g_L^* - g_i^*|)$. Let $x_i \equiv |g_R^* - g_i^*| - |g_L^* - g_i^*|$. For any two information levels, I and I' where $I > I'$, $F_{I'}(x_i)$ is a mean-preserving spread of $F_I(x_i)$. It follows that:

$$\begin{aligned} \text{If } x_i < 0: & F_I(x_i) - F_{I'}(x_i) \leq 0, \\ \text{If } x_i = 0: & F_I(x_i) - F_{I'}(x_i) = 0, \\ \text{If } x_i > 0: & F_I(x_i) - F_{I'}(x_i) \geq 0. \end{aligned} \quad (3)$$

These equations indicate that as long as voter i is closer to party R than party L ($x_i < 0$), she is less likely to vote for party L the more informed she is. Conversely, if she is closer to party L than

⁴See also Romer (2003).

party R ($x_i > 0$), she is more likely to vote for party L if she has more information, which means that the probability that the voter votes for the party closest to her is larger for more informed voters. Figure 1 shows an example of this outcome where $F_I(x_i)$ has a steeper slope than $F_{I'}(x_i)$.

In this paper I will discuss the effect that information has on the probability that the voters vote according to their own preferences. In this model, I assume that information does not causally affect the voter's preferences, $U_i(g_p, \theta_p)$, but only how well s/he observe the parties' budget policies. This implies that a sufficient condition for the voter to vote according to her/his preference is that $\nu_{ij} = 0$. Because both θ and μ are unobserved, the identifying assumption in the empirical part of the paper is that θ is orthogonal to voters' information levels.

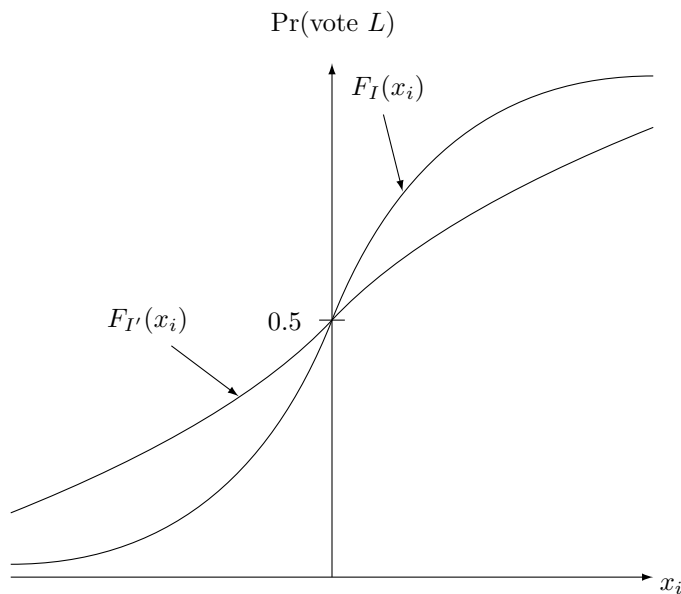


Figure 1: Probability of voting for party L

3 Institutional setting and data

To test the hypothesis presented above, I will use survey data on the preferences of both politicians and voters in Swedish municipalities. The Swedish municipalities are well suited to test the hypothesis because of their economic importance. During the period studied in this paper, Swedish municipalities contributed about 20% of total GDP and employed about 18% of the Swedish workforce. Their responsibilities ranged from providing schools, child care and social care to housing and infrastructure. Furthermore, the Swedish constitution states that the municipalities are autonomous.

The municipalities collect revenue from three primary sources: income taxation, grants from the central government, and various user fees. Central government grants, which account for about one fourth of the local budget, are determined exogenously at the national level and are not likely to be a determinant when voters decide for whom to vote.⁵ The most important factor in the local budget is the proportional income tax, which is also the most important tax on any level in Sweden. It represents approximately half of the local budget (nearly ten percent of national GDP) and is determined by the municipal council. The rest of the budget is made up of different user fees (around 17%) and loans.

I, therefore, argue that changing the municipal tax rate is the most straightforward way to change the size of the municipal budget. Thus, given its economic importance, voters are likely to assign substantial weight to the parties' positions on that issue.

3.1 The surveys

The surveys I will use cover two elections, the 1979 election and the 1991 election.⁶ The municipalities under study in 1979 were drawn using stratified sampling techniques. The municipalities were divided into 25 strata based on the demographic, economic and political characteristics of the municipalities.⁷ One municipality was drawn from each stratum; hence, the survey covers 25 municipalities. The voter survey was carried out with personal interviews. The vast majority of interviews was made between less than a month before and two weeks after the election. A total of 2100 individuals were selected, and 1608 of these individuals participated in the interviews. Thus, the response rate was around 77%.⁸ All politicians elected to the municipal councils in the 25 municipalities were selected to answer the survey, which was distributed via mail within six months after the election. 827 out of 1179 politicians answered the survey (response rate of 70%).

Twenty of the municipalities included in the 1979 survey were also included in the 1991 survey. Additionally, 8 new municipalities were added to the 1991 survey.⁹ This survey was conducted via

⁵Dahlberg and Johansson (2002) and Johansson (2003) find evidence suggesting that central government uses grants strategically, and Jordahl (2002) finds some support for the hypothesis that voters reward the central government with their vote if they get a large amount of grants. However, these votes are only for the central government, which redistributes the grants. There is less reason to believe voters hold the local government responsible because grant allocation is not decided at this level.

⁶The survey data are handled and distributed by the *Swedish National Data Service* (SND). Neither the SND nor the principal investigators bear responsibility for the analysis presented in this paper. The surveys are *SND 0100 - Local elections 1979*, *SND 0101 - Local politicians 1979-80*, *SND 0306 - Local citizen survey 1991* and *SND 0482 - Local politicians 1993*.

⁷The 1979 survey focused on the recent amalgamation of municipalities in Sweden. Because the three largest municipalities (Stockholm, Göteborg and Malmö) were hardly affected by this reform, they were excluded from the population.

⁸This number represents those respondents who answered the questions on the vote decision, tax rate opinion and all of the information variables. In five of the municipalities, 300 respondents were selected from each municipality. For the other 20 municipalities, 40 respondents were selected from each municipality.

⁹One of the additional municipalities was Göteborg, which was excluded from the population in the 1979 survey. One thousand individuals were selected from Göteborg. For ten other municipalities, 400 individuals were selected.

mail (sent out the day after the election) instead of personal interviews as was the case for the previous voter survey. This is the likely cause of the drop in response rate; 3187 out of a total of 7550 individuals (39%) answered the survey. The politicians was surveyed in 1993, two years after the election. This poses a problem, which will be discussed further below. 78% (1011/1292) replied to this survey.

Although Sweden officially has a multiparty system, it has been traditionally treated as a two-party system with one right-wing coalition (consisting of the Center Party (c), the Liberals (fp) and the Conservatives (m)) and one left-wing coalition (consisting of the Communists (vpk) and the Social Democrats (s)).¹⁰ To test the hypothesis presented above, I will only study the respondents who reported voting for one of the five parties listed above.¹¹

3.2 Who is informed?

The variable of interest is whether the voter is informed about the preferences of the politicians in each coalition. Although I am not able to directly observe this variable, I observe several proxy variables. To get a single measure of how much information each respondent has I use factor analysis to combine the information proxies into a single information index. The basic idea is that the higher the correlation between a given proxy variable and the other proxy variables, the more likely it is that the variable is also correlated with the information variable of interest; consequently, it is assigned a larger weight in the index.

I use five different variables as proxies of information. These are: (i) if the respondent knows the name of at least one member of the municipal council, (ii) if the respondent reads the part of the newspaper that deals with the local government,¹² (iii) if the respondent feels she has enough information about the upcoming election, (iv) if she is interested in politics and (v) if the respondent often talks about issues that concern the municipality. The actual questions asked, the variable coding and the result of the factor analysis can be seen in A.

The hypothesis advanced in the theoretical framework is that more informed voters are better at voting according to their preference. If certain groups of voters are more informed, the actual election result may be biased toward these groups because they would be better at selecting their most preferred politicians. Thus, it is important to investigate which groups have a high/low level

For the final 17 municipalities, 150 individuals were selected from each municipality.

¹⁰See, for instance, Alesina, Roubini, and Cohen (1997), Ågren, Dahlberg, and Mörk (2007) and Pettersson-Lidbom (2008). Nowadays the Green Party is generally considered a left-wing party and the Christian Democrats a right-wing party. However, at the time of the surveys, they either did not exist or considered themselves to be neither left-wing nor right-wing. Therefore, they are excluded from the analysis. However, the results do not change if these parties are included. The Communists have changed their name and is now called the Left Party.

¹¹In 1979, these five parties held 95% of the seats in the municipalities under study, whereas the corresponding number for 1991 was 89%.

¹²In the 1979 survey 30% of the respondents stated that the newspaper was the primary source of information about municipal issues and 65% stated it was one of the three most important sources of information. No similar question was asked in the 1991 survey.

of information. Table 1 shows the correlation between a number of different background variables and the information index. The information variable has been normalized so that 0 is the lowest and 1 is the highest score in the sample. Therefore, the coefficient represents the effect of going from the least informed to the most informed voter. As expected, the education variables are strongly positively related to information. Information also increases with the age of the respondent but at a decreasing rate. Women generally have a lower level of information, but the gender gap decreased substantially between the two surveys. Interestingly, conditional on the other covariates, income is not related to information. While the raw correlation (not shown here) between information and income is positive, the effect disappears when the education and working status variables are controlled for. Finally, individuals who work in the public sector, and specifically in the municipal sector, have more information. Overall, these results are similar to the findings in previous literature (see Delli Carpini and Keeter 1996). This suggests that the information index indeed measures the respondents' levels of political knowledge.

3.3 Tax rate demand

As mentioned earlier, I will investigate whether voters vote according to their own tax preferences. To identify each respondent's preference for government spending, I use the responses to the following statement, which was provided to both politicians and voters:

It is more urgent to lower municipal taxes than to increase municipal services.

The respondents could choose from four different responses. They could “agree” (coded as 1), “mostly agree” (2), “mostly disagree” (3) and “disagree” (4). From a theoretical standpoint, we want a single measure of the politicians' preferences within each coalition. Although each politician in the winning coalition may have a different tax preference, there can ultimately be only one policy outcome. Theoretically, it seems reasonable that the median politician within each coalition will decide the tax policy. Therefore, one way to estimate the coalition's tax preference would be to use the observed median tax preference. The problem is that there is no reason to believe that tax preferences are naturally divided into four categories. A more appealing option would be to say that individuals have latent tax preferences on a continuous interval. If this is the case, there is a problem of non-classical measurement error. However, we do have some additional information that can be used to reduce this problem that is illustrated in the following example. Consider the case of two different municipal councils, both of which have 11 right-wing politicians. In the first, there are 5 politicians who “agree” and 6 who “mostly agree”. In the second, there are also 6 who “mostly agree” but instead 5 who “mostly disagree”. If we were to take the observed median in each of these municipalities, it would be “mostly agree” (coded as 2) in both. However, in the first municipality, the politician with the lowest latent tax preference (in category 2) would be the median, while in the second municipality, the politician with the highest latent tax preference would be the median.

Table 1: Regression of background characteristics on the information variable

	(1) Both years	(2) 1979	(3) 1991
Age	0.00880*** (0.00146)	0.00849*** (0.00286)	0.00884*** (0.00161)
Age ²	-0.0000635*** (0.0000149)	-0.0000685** (0.0000281)	-0.0000551*** (0.0000171)
Female	-0.0528*** (0.00674)	-0.0908*** (0.0114)	-0.0281*** (0.00651)
Medium education level	0.0602*** (0.00937)	0.0622*** (0.0151)	0.0574*** (0.0117)
High education level	0.112*** (0.00858)	0.120*** (0.0132)	0.106*** (0.0123)
2nd income quartile	0.00842 (0.0112)	0.00489 (0.0166)	0.00377 (0.0151)
3rd income quartile	0.0111 (0.0122)	0.00282 (0.0159)	0.0151 (0.0145)
4th income quartile	0.0150 (0.0126)	0.0130 (0.0182)	0.0234 (0.0168)
Married	0.0275*** (0.00778)	0.0289** (0.0127)	0.0199* (0.00987)
Children under 16	0.00756 (0.0107)	0.0191 (0.0206)	0.00493 (0.0115)
Working home	-0.0344** (0.0166)	-0.0228 (0.0229)	-0.0292 (0.0222)
Student	0.0143 (0.0167)	0.0273 (0.0229)	0.0115 (0.0249)
Retired	-0.00304 (0.0138)	-0.0134 (0.0248)	-0.00717 (0.0168)
Not working	-0.0336** (0.0140)	-0.00634 (0.0237)	-0.0458** (0.0196)
Working in state sector	0.0217* (0.0109)	0.0164 (0.0190)	0.0214* (0.0114)
Working in municipal sector	0.0670*** (0.00900)	0.0733*** (0.0138)	0.0622*** (0.0112)
Working in county sector	0.0302*** (0.0106)	0.0109 (0.0214)	0.0353** (0.0138)
Civil servant	0.0330*** (0.00847)	0.0369* (0.0188)	0.0305*** (0.00957)
Employer	0.0385*** (0.0127)	0.0334** (0.0138)	0.0481** (0.0219)
Never worked	-0.0150 (0.0120)	0.00216 (0.0133)	0.00190 (0.0210)
Municipality \times time fixed effects	Yes	Yes	Yes
<i>N</i>	4361	1662	2699
adj. <i>R</i> ²	0.146	0.139	0.150

Standard errors, shown in parenthesis, have been adjusted allow for cluster effects within each municipality. *, ** and *** denote significance on the 10, 5 and 1 percent level respectively.

It therefore seems likely that the tax preference of the right-wing coalition would be higher in the second municipality than in the first.

If we are willing to make an assumption regarding how the tax preference is distributed within each response category, we can obtain an estimate of the tax preference that will lead to a smaller problem with measurement error in the estimations. Specifically, I will assume that tax preferences are uniformly distributed within each response category and that the distance between each response category is equal, that is, the data are cardinal. Given these assumptions, I can obtain a better estimate of the median tax preference in the following manner. Suppose the observed median is in the interval $[a, b]$, and there are N individuals with a tax preference in that interval. Suppose also that the median has the \tilde{N} th lowest tax preference in that category. The estimate of the latent median for coalition p in municipality j in time t , τ_{pjt}^* , is

$$\hat{\tau}_{pjt} = a + \frac{\tilde{N}}{N+1} = E(\tau_{pjt}^*), \quad (4)$$

which follows from the uniform distribution assumption.¹³ This assumption is clearly very strong because it is not possible to observe the latent tax preference of each respondent and, hence, we do not know its distribution. What we can do is empirically test whether this estimated median preference is something the voters care about. According to the theoretical framework, voters should care about the relative distance between the tax policies of the left and the right coalitions, x_{ijt} . The estimate of this is $\hat{x}_{ijt} = |\hat{\tau}_{Rjt} - \tau_{ijt}^{\text{obs}}| - |\hat{\tau}_{Ljt} - \tau_{ijt}^{\text{obs}}|$, where τ_{ijt}^{obs} is the observed tax preference of individual i ,¹⁴ that is, the absolute distance between the estimated median preference of the right-wing coalition and the voter's observed tax preference minus the absolute distance between the estimated median preference of the left-wing coalition and the voter's observed tax preference. It is expected that the higher this value is, the more likely the voter is to vote for the left-wing coalition.

We can now compare whether voters react more to this estimated relative distance than they do when we calculate the relative distance using the observed median, $x_{ijt}^{\text{obs}} = |\tau_{Rjt}^{\text{obs}} - \tau_{ijt}^{\text{obs}}| - |\tau_{Ljt}^{\text{obs}} - \tau_{ijt}^{\text{obs}}|$. This will be captured in the following equation:

$$\Pr(i \text{ vote } L) = \pi_0 + \pi_1 \hat{x}_{ijt} + \pi_2 x_{ijt}^{\text{obs}} + \eta_{ijt}. \quad (5)$$

If the above estimation of the relative distance is appropriate, it can be expected that $\pi_1 > 0$; that is, the further the voter is from the right-wing estimated median compared to the left-wing estimated median, the higher the probability that the voter votes for the left-wing coalition. However, if the

¹³In the example above, this means that the estimate of the latent median tax preference would be $1.5 + 1/(11+1) \approx 1.58$ in the first municipality and $1.5 + 11/(11+1) \approx 2.42$ in the second municipality.

¹⁴Because the uniform distribution is symmetrical, the observed tax preference is the best estimate of the latent tax preference on the individual level.

observed median is a better estimate of the latent median than we would expect $\pi_2 > 0$.

Table 2: Probit regression on the probability of voting for the left-wing coalition

	(1)	(2)	(3)
\hat{x}_{ijt}	0.122*** (0.00770)		0.197*** (0.0565)
x_{ijt}^{obs}		0.108*** (0.00789)	-0.0691 (0.0512)
Municipality \times time fixed effects	Yes	Yes	Yes
N	3658	3658	3658

The coefficients represent the marginal effects evaluated at the mean of all independent variables on the probability of voting for the left-wing coalition. Standard errors, adjusted to allow for cluster effects on the municipal level, are shown in parenthesis. *, ** and *** denote significance on the 10, 5 and 1 percent level respectively.

Table 2 shows the result when this equation has been estimated with probit regression. As can be seen, both measures of the relative distance are strongly significant when they are added separately. When the effects are estimated jointly, the standard errors become much larger because the measures are strongly correlated (the correlation coefficient is 0.981). Nevertheless, only the estimated relative distance, \hat{x}_{ijt} , is significant while the observed relative distance, x_{ijt}^{obs} , is not, which suggests that \hat{x}_{ijt} is a better measure of the relative distance between the voter and the two coalitions.

4 Empirical strategy and results

The hypothesis presented in Section 2 is that, given the distance in tax preference to the two coalitions, an informed voter will be better than an uninformed voter at voting for the closest coalition. If we define the coalition closest in tax preference to individual i , using the distance measure developed in the previous section, as party A_{ijt} ¹⁵ this hypothesis can be tested by estimating the following equation:

$$\Pr(i \text{ votes for } A_{ijt}) = \beta_0 + \beta_1 I_{ijt} + \beta_2 |\hat{x}_{ijt}| + \gamma_{jt} + \boldsymbol{\rho}' \mathbf{C}_{ijt} + \varepsilon_{ijt}, \quad (6)$$

where I_{ijt} is the information variable. The theoretical prediction is that $\beta_1 > 0$, i.e., the more informed the voter is, the more likely she is to vote for the coalition whose tax preference is closest to her own. As mentioned above, \hat{x}_{ijt} is the voter's distance from the right-wing parties minus the distance from the left-wing parties, meaning that $|\hat{x}_{ijt}|$ is the distance to the coalition farthest in

¹⁵That is, $A_{ijt} = R_{ijt}$ if $\hat{x}_{ijt} < 0$ and $A_{ijt} = L_{ijt}$ if $\hat{x}_{ijt} > 0$.

tax preference minus the distance to the coalition closest in tax preference. The expectation is that $\beta_2 > 0$, that is, the closer the voter is to one of the coalitions compared to the other, the more likely she is to vote for the closest coalition (with respect to tax preference). γ_{jt} allows the intercept to vary for each municipality and time period, which controls for the fact that the relative popularity of the coalitions may differ between municipalities. I will also include demographic control variables for age, age squared, sex and marital status in the vector \mathbf{C}_{ijt} .

As mentioned above, voters and politicians are not observed at the same time for the 1991 election, which poses a problem if something happened between the time the voters' preferences are observed (in 1991) and the time the politicians' preferences are observed (in 1993). Specifically, one concern is the possibility that the tax rate demand is a function of economic conditions in the municipalities. The time between 1991 and 1993 was one of the most economically turbulent periods in Sweden the last century, which means it is important to account for the economic situation. However, I cannot simply add economic indicators to the right hand side of (6) because the preferences of both the median politician and the voter are included in the dependent variable.

Instead, I can estimate the equation in two steps. Let \mathbf{Z}_{jt} be a vector of economic and demographic variables that affects preferences for spending in the municipality. First, I estimate the relationship between observed tax rate demand, τ_{ijt}^{obs} (on voters and politicians simultaneously), and the vector \mathbf{Z}_{jt} using OLS:

$$\tau_{ijt}^{obs} = \alpha + \lambda' \mathbf{Z}_{jt} + u_{ijt}. \quad (7)$$

This equation shows how the economic and demographic situation in the municipality affects preferences for the municipal tax rate. u_{ijt} is the part of the tax preference that can not be explained by the economic situation in the municipality, meaning that the residuals, \hat{u}_{ijt} , from the estimation of (7) represent the tax preference net of the economic condition in the municipality. I call this variable *estimated tax preference*. I use variables for unemployment, tax base, net migration, the proportion of immigrants and the proportion of young and elderly, as well as municipal taxes, debts and expenses to control for the economic situation in the municipalities.

4.1 Baseline results

Table 3 shows the result where (6) has been estimated using probit regression. As can be seen in column 1, information is strongly positively correlated with voting according to tax preference and significant on any conventional significance level. The coefficient shows the marginal effect evaluated at the mean of the information variable. Figure 2 shows the estimated effect over the entire distribution and the actual data aggregated into 20 (almost) equal-sized groups of the information variable. As the figure shows, the probability of voting according to tax preference is just over 50% for the least informed voters. That is, the least informed voters are equally likely to vote for the

Table 3: Probit regressions on probability of voting for coalition closest in tax preference

	Stated preferences				Estimated preferences				1979 only	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Information	0.197*** (0.0381)	0.184*** (0.0377)	0.202*** (0.0375)	0.179*** (0.0549)	0.201*** (0.0367)	0.205*** (0.0388)	0.194*** (0.0413)	0.189*** (0.0568)	0.160*** (0.0668)	0.198*** (0.0672)
Relative distance			0.145*** (0.0159)	0.146*** (0.0154)		0.161*** (0.0224)	0.161*** (0.0222)	0.162*** (0.0231)		0.129*** (0.0386)
Left preference (d)				-0.00864 (0.0665)				-0.0362 (0.0704)		
Left preference \times information				0.0453 (0.0886)				0.0277 (0.0859)		
Municipality \times time fixed effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes
Demographic variables	No	No	Yes	Yes	No	No	Yes	Yes	No	Yes
<i>N</i>	3364	3364	3350	3350	3364	3364	3350	3350	1308	1307

The coefficients represent the marginal effects evaluated at the mean of all independent variables on the probability of voting for the coalition closest in tax preference. Standard errors, shown in parenthesis, have been adjusted to allow for cluster effects within each municipality. *, **, and *** denote significance on the 10, 5 and 1 percent level respectively.

left- or right-wing coalition regardless of their tax preferences. For the most informed voters, the probability of voting according to tax preference is over 70%. A one-standard-deviation increase in information increases the probability of voting according to tax preference by approximately 4%.

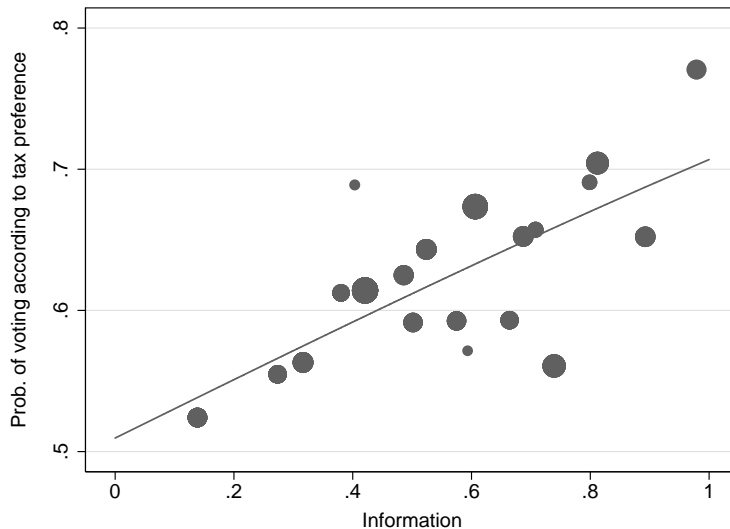


Figure 2: Probability of voting according to tax preference

Adding the relative distance does not affect the point estimate, and the coefficient (β_2 in equation (6)) is positive as expected. Furthermore, neither municipal \times time fixed effects nor the demographic control variables seem to affect the result in any significant way. In the fourth column, I have included a variable that indicates whether the voter shares her tax preference with the left-wing parties (that is, a variable taking on 0 if $\hat{x}_i < 0$ and 1 if $\hat{x}_i > 0$). If such a variable is positive, it would suggest that the voters, given their relative distance in tax preferences from the two coalitions, are biased towards the left-wing parties. More importantly, I also interact this variable with the information variable. If this interaction is different from zero, it would indicate that uninformed voters are biased in a different manner than informed voters. In this case, neither the main effect of the left preference variable nor the interaction effect is significantly different from zero. This result suggests that, regardless of information level, if a voter is of equal distance from the two coalitions, she is equally likely to vote for either of them. Therefore, Caplan’s (2007) concern that voters make systematic mistakes does not seem to be relevant in this case.¹⁶

Columns 5 through 8 show the result from the model run using estimated preferences to account for the difference in timing between the voters’ interviews (in 1991) and the politicians’ (in

¹⁶At least not in the sense that, given their tax preferences, the voters do not make systematic errors. It is, however, possible that the voters make biased errors when forming their tax preferences.

1993). The results are virtually unchanged by this. The information effect is still significant in all specifications with similar point estimates as before. However, this two-step procedure of estimating preferences may not completely solve the timing problem. During the years 1991 and 1992, the central government forbade the municipalities to raise taxes, which could potentially affect the respondents' preferences. Also, as mentioned before, the response rate of the 1991 survey was much lower than that of the survey conducted in 1979, which makes it less representative of the electorate. Therefore, in columns 9 and 10, I estimate the information effect using only the 1979 survey. The results are not affected in any significant way by this restriction.

Thus far, I have assumed a two-party system. However, because Sweden has a multi-party system this assumption could be an oversimplification. To test for this possibility, I regress the information variable on the probability of voting for the party (instead of coalition) closest in tax preference. The results are shown in Table 4. As can be seen, the information variable is strongly positively correlated with voting for the party closest in tax preference. Because I now compare the vote decision between five parties instead of two, I can no longer use the relative distance measure as a control. Instead, I use a dummy variable for each party that indicates whether that party is the closest in tax preference. Adding this control does not affect the result in any significant way. Furthermore, neither using estimated preferences nor only estimating for the 1979 election makes any difference for the estimated information effect. The fact that the size of the information effect is similar to the previous estimates suggests that the results are not sensitive to the two-party assumption. Because that simplification allows for the possibility of exploring how the relative distance measure interacts with the information effect (see next section), I will continue the analysis using the two-party system simplification.

4.2 Allowing for an interaction effect

The theoretical framework discussed in section 2 suggests that the information effect depends on the relative distance to the two coalitions, as shown in Figure 1. When the voter is at a nearly equal distance between the two coalitions, she is almost indifferent between the two tax policies. As the relative distance between the two coalitions increases, tax policy becomes relatively more important, and the information effect increases. To test whether there is such an interaction effect I estimate the following model:

$$\Pr(i \text{ votes for } A_{ijt}) = \alpha_0 + \alpha_1 I_{ijt} + \alpha_2 |x_{ijt}| + \alpha_3 (I_{ijt} \times |x_{ijt}|) + \mu_{jt} + \boldsymbol{\phi}' \mathbf{C}_{ijt} + \epsilon_{ijt}, \quad (8)$$

where I expect $\alpha_3 > 0$. The intuition for this expectation is that when the voter is at an almost equal distance between the two coalitions, the utility difference for the different tax policies is negligible to the voter, and other factors (θ in the theoretical model) matter more to the voter. In this case, the information effect is small. However, when the relative distance increases, the tax dimension

Table 4: Probit regressions on probability of voting for party closest in tax preference

	Stated preferences		Estimated preferences		1979 only	
	(1)	(2)	(3)	(4)	(5)	(6)
Information	0.186*** (0.0299)	0.200*** (0.0326)	0.189*** (0.0286)	0.190*** (0.0279)	0.210*** (0.0385)	0.203*** (0.0328)
Municipality \times time fixed effects	No	Yes	No	Yes	No	Yes
Demographic variables	No	Yes	No	Yes	No	Yes
Closest party indicators	No	Yes	No	Yes	No	Yes
<i>N</i>	3345	3331	3345	3331	1299	1298

The coefficients represent the marginal effects evaluated at the mean of all independent variables on the probability of voting for the party closest in tax preference. Standard errors, shown in parenthesis, have been adjusted to allow for cluster effects within each municipality. *, ** and *** denote significance on the 10, 5 and 1 percent level respectively.

becomes relatively more important, and we would expect the information effect to increase. When the relative distance is large, the information effect could potentially decrease because even less informed voters may be aware of the parties' positions when the differences between the parties are large. Such a nonlinear interaction effect is not captured in the specification in (8), but in section 4.2.1, I allow for a completely flexible functional form.

Table 5 shows the result from the probit estimations of (8). The first two columns show the result when the observed preferences are used. The interaction effect is significant at the 10% level with the expected positive sign. Because information is scaled between 0 and 1, the main effect of the distance variable measure the effect the relative distance has on the least informed voters. That variable is also significant at the 10% level, suggesting that the relative distance from the two coalitions matters even for the least informed voters. The main effect of information measures the information effect when the relative distance is zero, that is, when the voter is equally distant from the two coalitions. This variable is not significant, which confirms the finding in section 4.1 that differently informed voters are not differently biased toward the coalitions.

Figure 3 illustrates the effect for the estimates in column 1. As can be seen, when the relative distance is close to 0, the probability of voting according to one's tax preference is close to 0.5. As the relative distance increases, the probability of voting according to one's tax preference increases much faster for the voters with a high level of information. The maximum difference between the least and most informed voters is more than 30 percentage points. A one-standard-deviation increase in information increases the probability by approximately six percentage points at most.

When preferences are estimated using the two-step procedure, the information effect is substantially larger and significant at the 1% level. The main effect of the relative distance is now insignificant, suggesting that the least informed voters do not vote at all according to their tax preference. Figure 9 in appendix C shows the effect from the estimation in column 3. As mentioned above, the 1991 survey has some methodological problems. Therefore, in the last two columns, I estimated (8) only using the 1979 survey. Because the sample size decreases, the standard errors naturally increase. The estimated information effect is even slightly larger than when using estimated preferences, but because the standard errors are larger, the information effect is only significant at the 10% level.

4.2.1 Nonparametric estimation

In the model presented above, I assumed that the information effect is monotonically increasing in the relative distance, but there is reason to doubt that this is the case. For example, it is possible that when the relative distance between the coalitions is large, even the least informed voters increase their probability of voting for their preferred coalition with respect to tax preferences. This effect can be observed in Figure 1 where the difference between $F_I(x_i)$ and $F_{I'}(x_i)$ is decreasing at the extreme ends of the distribution of x_i . To allow for this effect, I will estimate a completely

Table 5: Probit regressions on probability of voting for coalition closest in tax preference

	Stated preferences		Estimated preferences		1979 only	
	(1)	(2)	(3)	(4)	(5)	(6)
Information	0.0500 (0.0950)	0.0586 (0.0931)	-0.0368 (0.108)	-0.0441 (0.109)	-0.0376 (0.204)	-0.0404 (0.206)
Relative distance	0.0668* (0.0344)	0.0694** (0.0347)	0.0353 (0.0536)	0.0377 (0.0533)	-0.00682 (0.104)	-0.00403 (0.104)
Relative distance \times information	0.136* (0.0714)	0.130* (0.0716)	0.218*** (0.0787)	0.215*** (0.0791)	0.242* (0.143)	0.238* (0.143)
Municipality \times time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Demographic variables	No	Yes	No	Yes	No	Yes
<i>N</i>	3364	3350	3364	3350	1308	1307

The coefficients represent the marginal effects evaluated at the mean of all independent variables on the probability of voting for the coalition closest in tax preference. Standard errors, shown in parenthesis, have been adjusted to allow for cluster effects within each municipality. *, ** and *** denote significance on the 10, 5 and 1 percent level respectively.

flexible model where no assumption is placed on the functional form.¹⁷ Specifically, I will use the local linear Kernel estimator. The drawback of this approach is that I cannot use many covariates as controls because they will cause the estimator to converge slowly towards the true value, the so called *curse of dimensionality*. The model I will estimate is simply

$$\Pr(i \text{ votes for } A_i) = f(I_{ijt}, |x_{ijt}|, D_{jt}) + v_{ijt} \quad (9)$$

where D_{jt} is a categorical variable indicating municipality and year. Using a smooth Kernel function (see Aitchison and Aitken 1976), I allow the municipal-specific effect to vary with the other covariates.

Figure 4 shows the result from the local linear estimation where the bandwidth has been selected using the Akaike information criterion cross-validation method.¹⁸ The difference of the local linear estimate from the parametric estimates is that the information effect increases quickly until the relative distance is moderate (around 1). After that, the effect remains relatively constant.¹⁹

4.3 Aggregate effect

Even though information may have a large effect on the individual’s vote decision, it is not clear that it matters at the aggregate level. If information is randomly distributed among voters, it will not matter for the electoral outcome that more informed voters are better at voting according to their tax preferences. If informed and uninformed voters have similar preferences, Condorcet’s jury theorem (Condorcet 1785) implies that errors will cancel out and that the “correct” decision will always be made when the number of voters are large. Page and Shapiro (1992) and Wittman (1989) also argue along this line. However, if informed and uninformed voters have very different preferences, the composition of politicians will be biased toward the informed voters because they are better at voting according to their tax preferences. In this case, information is strongly positively correlated with tax preferences such that more informed voters want higher taxes. This is illustrated in Figure 5, where information is plotted against tax preferences.²⁰ The relationship is statistically significant at any conventional significance level.

Because informed voters are better at voting according to their tax preferences and want higher taxes compared to uninformed voters, we might suspect that the election result would have been different if all of the voters were equally informed. Using the previous estimates, I calculate what

¹⁷The assumption is that the datagenerating process is smooth, i.e., no discontinuous jumps are allowed.

¹⁸See Hurvich, Simonoff, and Tsai (1998) and Li and Racine (2004) for details. Using the least-squares cross-validation technique to select bandwidth instead does not change the estimates in any significant way. The estimated effect differs for each municipality, so to present the effect in a single graph, I have taken the average effect weighted with the number of respondents in each municipality.

¹⁹Figure 10 in Appendix C shows the result when preferences are estimated with the two-stage procedure outlined above. As can be seen, the result is similar.

²⁰Preferences are aggregated over 20 (almost) equal-sized groups.

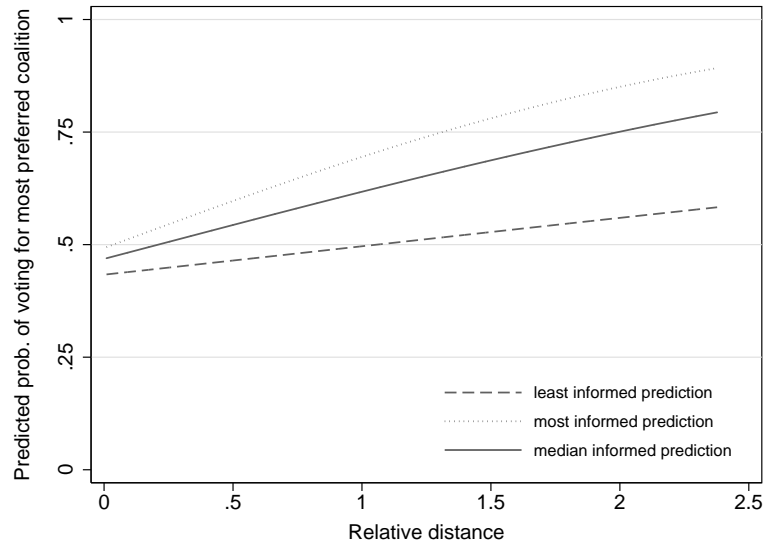


Figure 3: Predicted probability of voting according to tax preference, Probit, stated preferences

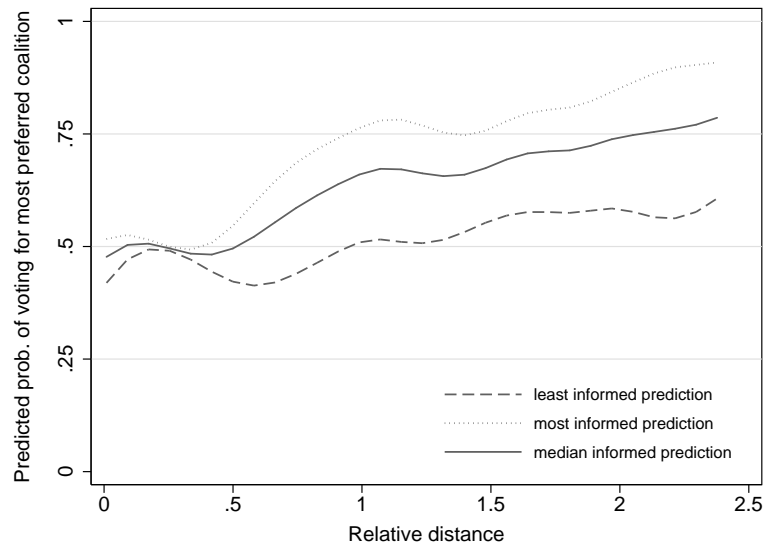


Figure 4: Predicted probability of voting according to tax preference, local linear regression using a bandwidth selected by AIC cross-validation, stated preferences

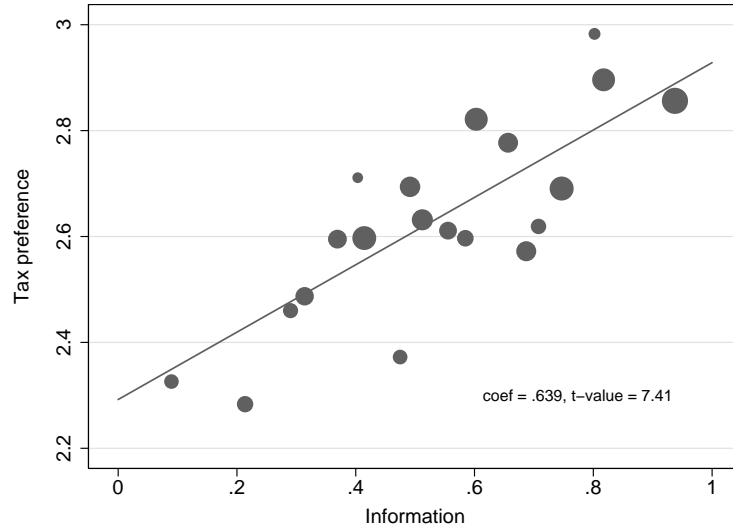


Figure 5: Scatterplot over tax preference and information

the election result would have been had all voters been “fully informed”, where fully informed is defined, following Delli Carpini and Keeter (1996), as the highest level of observed information. This calculation is done by aggregating the predicted probability for each individual of voting for the left-wing parties given (i) their actual level of information and (ii) the counterfactual that they would be fully informed.²¹ The difference between these two measures is the aggregated information effect.

The results in Table 6 are for eight different models: the six specifications in Table 5 as well as the two nonparametric estimations (Figures 4 and 10). As can be seen, the predicted left-wing vote share, using stated preferences and given the actual information level, is around 48%, which is close to the actual value of 48.5%. The estimated vote share for fully informed preferences is around 46% which gives an aggregate information effect of two percentage points. When preferences are estimated the aggregated effect is around 1 percentage point.

As previously mentioned, the 1979 voter survey had a response rate of 77%, while the 1991 voter survey only had a response rate of 39%. While these rates may not be problematic for the individual level estimations, the difference becomes a much bigger problem in the aggregate, where we need to assume that the non-respondents are identical to the respondents. Specifically, it is possible that less informed voters are less likely to respond, which could lead to an underestimation

²¹The predicted probability of voting for the left-wing coalition is simply the predicted probability of voting according to tax preference when the voter has a left-wing tax preference and 1 minus the predicted probability of voting according to tax preference when the voter has a right-wing tax preference.

Table 6: Predicted vote share for the left-wing coalition given different information levels

	Stated preferences			Estimated preferences				1979 only	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Predicted prob.	0.479	0.480	0.486	0.506	0.504	0.499	0.486	0.486	
All informed	0.460	0.461	0.463	0.496	0.496	0.486	0.456	0.457	
Difference	0.019	0.019	0.022	0.009	0.009	0.013	0.030	0.029	
Control variables	No	Yes	No	No	Yes	No	No	Yes	
Information effect	Interacted	Interacted	Flexible	Interacted	Interacted	Flexible	Interacted	Interacted	
Estimation method	Probit	Probit	LL	Probit	Probit	LL	Probit	Probit	
Municipal × time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
N	3364	3350	3364	3364	3350	3364	1308	1307	

of the aggregate information effect. The observed information level is indeed lower in the 1979 survey (mean of 0.516) than in the 1991 survey (mean of 0.557). While this may be caused by a general increase in knowledge between the two surveys, it may also be caused by selection in the 1991 survey.

The last two columns show the estimated information effect when only the 1979 survey is used. The aggregate information effect is indeed larger; the probability of voting for the left-wing coalition would decrease by around three percentage points if all of the voters were fully informed.

Even if the vote result would be different if all of the voters were informed, it is not clear that this shift would affect which party coalition takes power. If elections are generally lopsided, a couple of percentage points in either direction makes little difference. However, if elections tend to be close, the estimated effect could be important. In 9 out of the 53 elections (25 in 1979 and 28 in 1991) studied in this paper, of the five parties, the two left-wing parties received between 50 and 52 percent of the votes, which suggests that the information effect is indeed important.²²

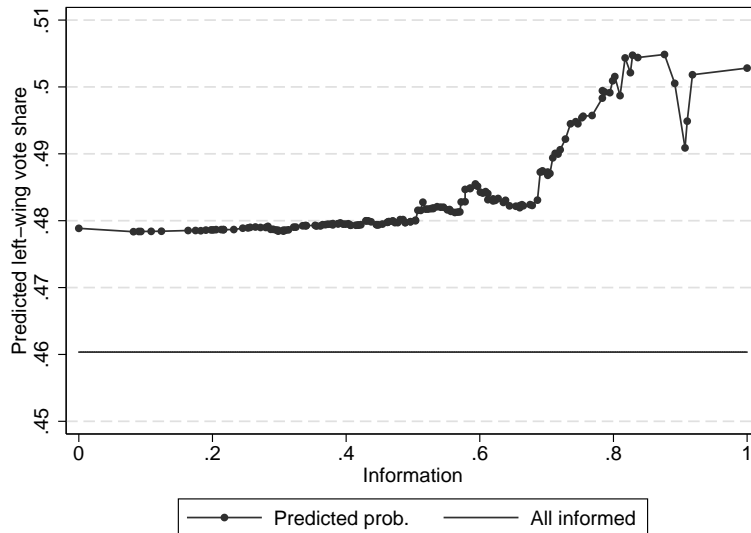


Figure 6: Effect of restricted turnout on the left-wing vote share

Given that voters with little information have trouble voting according to their tax preference, we may ask whether they would be better off not voting at all. Feddersen and Pesendorfer (1996) argue along this line. Given the previous estimates, I can test whether the election outcome would be less biased if the least informed voters had abstained from voting by restricting the aggregation to voters with information above a given threshold.

²²The corresponding number for all Swedish municipalities in these two elections is that in 40 out of 582 elections, the left-wing parties received between 50 and 52 percent of the votes for the five parties.

Figure 6 shows the result for the estimates from column 1 in Table 6. The y-axis shows the predicted left-wing vote share, and the x-axis presents the information threshold. The first point corresponds to the predicted left-wing vote share for all voters (0.479, as shown in Table 6), and moving further right on the x-axis shows the predicted aggregate left-wing vote share for voters with information of at least a given amount of information. The horizontal line indicates the predicted fully informed left-wing vote share (0.460). The figure shows that as turnout is restricted to more informed voters, the left-wing vote share increases and, as a result, the aggregate bias increases. Therefore, if reducing aggregate bias is desirable, restricting turnout to only informed voters would not be preferable. It is worth noting that I have only included individuals who actually voted. Therefore, I can not say what would happen with the aggregate bias if the least informed voters who abstained were to vote. However, the average turnout rate in the 53 elections under study was around 87%, which means that accounting for those who did not vote is of relatively little importance.

5 Summary

In this paper, I study whether voters have enough political information to vote for their preferred politicians. To do so, I use a data set that includes the observed preferences for government spending of both politicians and voters, which makes it possible to directly investigate the effect of information. Specifically, I am able to test whether voters with a high degree of information vote for politicians with preferences closer to their own compared to voters with a low degree of information.

The results suggest that the most informed voters are around 20 percentage points more likely to vote for the coalition closest in tax preference compared to the least informed voters. A standard deviation increase in information increases this probability by around 4 percentage points. I also showed that the effect depends on the relative distance in tax preference between the two coalitions; when a voter is at almost equal distance from the two coalitions, the effect of information is negligible. As the relative distance increases, the effect also increases.

A question that may be more interesting is whether the information heterogeneity in the electorate has an aggregate effect on the election outcome. Information can affect the aggregate result either by changing voters' preferences or, given voters' preferences, by increasing the probability that voters vote according to these preferences. Previous studies have either focused on the first mechanism (for instance, Althaus 1998) or the joint outcome (Bartels 1996) of these two effects. In this paper, I specifically focus on the second mechanism. Given the voters' preferences, I investigate whether the fact that more informed voters are better at voting for their most preferred politicians causes an aggregate distortion. If the information level is uncorrelated with policy preferences, it does not matter that some voters are informed and others are not. However, in this case, informa-

tion is strongly related to tax preferences, and highly informed voters desire high taxes. Using the parameter estimates from the individual-level regressions, I am able to simulate what the election result would have been if all of the voters had been fully informed. The results suggest that, in that case, the left-wing coalition would have received between 1 to 3 percentage points fewer votes. This means that the mere fact that information is not distributed homogeneously in the electorate causes a skewed election result, even if more information does not change the preferences of the voters. However, this result does not mean that it would be better if only the most informed citizens voted. Because their preferences are distinct from those of the population at large, restricting turnout would actually increase the aggregate bias.

In this paper, the policy positions of the politicians are exogenous. However, the fact that more informed voters are significantly “better” at voting has implications for the incentives facing politicians. For instance, because informed voters are more aware of the politicians’ actions, the politicians have a reason to target policy toward informed voters (see Besley and Burgess 2002 and Strömberg 2004). Furthermore, more informed voters are more likely to punish incumbents who misbehave (Ferraz and Finan 2008), which means that a well-informed electorate decreases the chances for corrupt behavior among politicians. Finally, given the estimates presented in this paper, it can be expected that politicians who run for office are selected to have preferences that are close to those of informed voters. This expectation is supported by the data. More informed voters want higher taxes, and, as Ågren, Dahlberg, and Mörk (2007) shows, politicians want higher taxes than the average citizen. One explanation could be that politicians with preferences for higher taxes are selected into politics because informed voters are more likely to reward them.

All of these results suggest that understanding how information affects voting behavior is key to understanding how the democratic system aggregates preferences. To establish a complete picture of how this relationship affects actual policy, the topic merits further study where decisions of both voters and politicians are studied jointly.

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A The information variable

The respondents were asked the following questions (the exact wording of the questions differed slightly between the two surveys):

1. Variable: Know politician name

Can You name any of the candidates for the various parties in this years council election in this municipality?

Coded: 0, If no name mentioned

Coded: 1, If at least one name mentioned.

2. Variable: Read local newspaper

How much of the topics in the newspaper that deals with local government questions, decisions by the council and local government boards in this municipality do You read?

Coded: 1, Nothing or almost nothing (also, don't read newspaper)

Coded: 2, Not very much

Coded: 3, Fairly much

Coded: 4, All or almost all

3. Variable: Subjectively informed

Now I would like to know how good You on the whole judge Your own knowledge about what is going on in local politics in this municipality.²³

Coded: 1, Bad knowledge

Coded: 2, Not very good knowledge

Coded: 3, Fairly good knowledge

Coded: 4, Good knowledge

4. Variable: Interested in politics

How interested are You in general in politics?

Coded: 1, Not at all interested

Coded: 2, Not very interested

Coded: 3, Fairly interested

Coded: 4, Very interested

5. Variable: Talk about municipality

How often does it happen that You talk to people in Your surrounding about local government questions that are specific for this municipality?

Coded: 1, Never

Coded: 2, Occasionally

Coded: 3, Often

²³For the 1991 survey the question was: Do You feel You know enough about the main opinions of the parties in the recent election? The responses was (1) No, completely unclear; (2) No, relatively unclear; (3) Yes, relatively clear; (4) Yes, completely clear.

Table 7 shows the result from the factor analysis and Figure 7 shows a frequency plot over the resulting information variable.

Table 7: Factor analysis result

	Factor loading	Uniqueness	Regression score
Know politician name	0.4127	0.8297	0.1623
Read local newspaper	0.5812	0.6622	0.2666
Interested in politics	0.6225	0.6124	0.3049
Subjectively informed	0.4100	0.8319	0.1594
Talk about municipality	0.6055	0.6334	0.2881

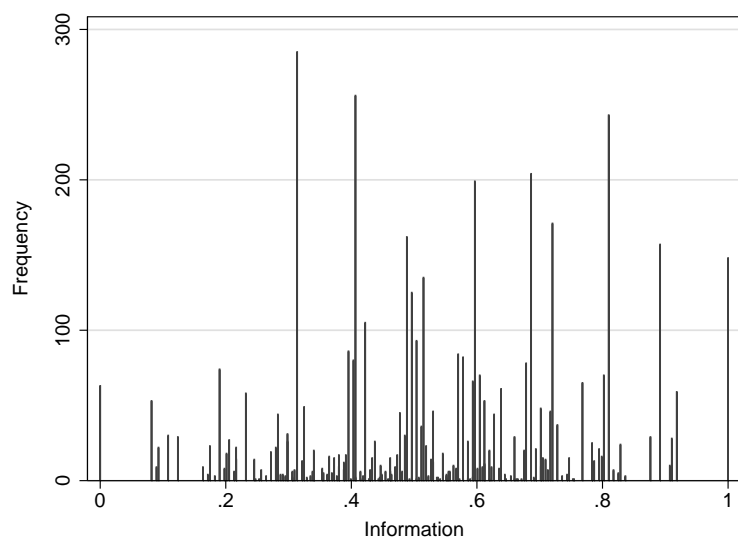


Figure 7: Frequency plot over the information variable

B Descriptive statistics

Table 8: Descriptive statistics, voters

	count	mean	sd	min	max
Information	3855	0.561	0.219	0	1
Know issue	3901	0.229	0.420	0	1
Know politician name	4068	0.671	0.470	0	1
Read local newspaper	4134	2.729	0.885	1	4
Interested in politics	4229	2.568	0.770	1	4
Subjectively informed	4171	0.418	0.493	0	1
Talk about municipality	4228	2.180	0.637	1	3
Stated tax preference	3658	2.668	1.077	1	4
Estimated tax preference	3658	-0.0220	1.075	-1.909	1.419
Voted according to stated pref.	3658	0.622	0.485	0	1
Voted according to estimated pref.	3658	0.627	0.484	0	1
Voted closest party (stated pref.)	3637	0.250	0.433	0	1
Voted closest party (estimated pref.)	3637	0.271	0.445	0	1
Voted for a left-wing party	4262	0.489	0.500	0	1
Relative distance (stated pref.)	3658	1.136	0.660	0.00952	2.377
Relative distance (estimated pref.)	3658	1.143	0.599	0.00952	2.377
Left preference (stated pref.)	3658	0.426	0.495	0	1
Left preference (estimated pref.)	3658	0.516	0.500	0	1
Closest to vpk (stated pref.)	3658	0.198	0.398	0	1
Closest to vpk (estimated pref.)	3658	0.192	0.394	0	1
Closest to s (stated pref.)	3658	0.119	0.324	0	1
Closest to s (estimated pref.)	3658	0.151	0.359	0	1
Closest to c (stated pref.)	3658	0.209	0.407	0	1
Closest to c (estimated pref.)	3658	0.167	0.373	0	1
Closest to fp (stated pref.)	3658	0.247	0.432	0	1
Closest to fp (estimated pref.)	3658	0.252	0.434	0	1
Closest to m (stated pref.)	3658	0.305	0.460	0	1
Closest to m (estimated pref.)	3658	0.276	0.447	0	1
Age	4240	46.23	16.79	18	80
Age ²	4240	2418.9	1620.1	324	6400
Female	4240	0.494	0.500	0	1
Married	4239	0.658	0.474	0	1

Table 9: Descriptive statistics, politicians

	count	mean	sd	min	max
Stated tax preference	1703	3	1.028	1	4
Estimated tax preference	1703	0.122	1.030	-2.195	1.386
Left-wing politician	2058	0.505	0.500	0	1
Age	2058	49.03	10.44	19	74
Female	2058	0.303	0.460	0	1

Table 10: Descriptive statistics, municipality data

	count	mean	sd	min	max
Expenses	81	11383.4	2225.7	7366	20269.1
Debts	81	5445.4	2383.8	17	13286.0
Log(population)	81	10.06	0.933	8.157	12.98
Net migration	81	0.00323	0.00801	-0.0146	0.0352
Proportion foreign citizens	81	0.0437	0.0296	0.00611	0.145
Prop. age 0-15	81	0.211	0.0217	0.166	0.302
Prop. age 16-64	81	0.619	0.0332	0.544	0.700
Prop. age 65-	81	0.169	0.0417	0.0447	0.262
Tax rate	81	16.32	1.069	13.75	18.20
Unemployment rate	81	4.536	3.098	0.600	12.09
Tax base	81	30743.7	4293.8	21391	43218.4

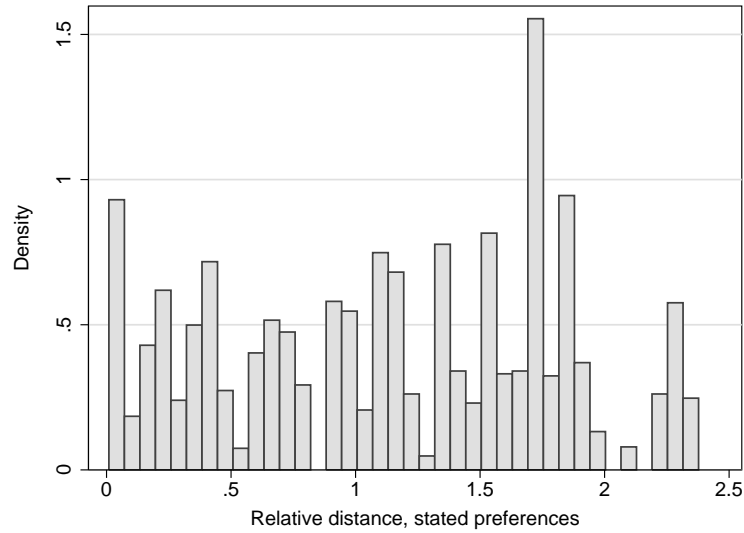


Figure 8: Histogram over the relative distance variable, \hat{x}_{ijt} , stated preferences

C Estimation results with estimated preferences

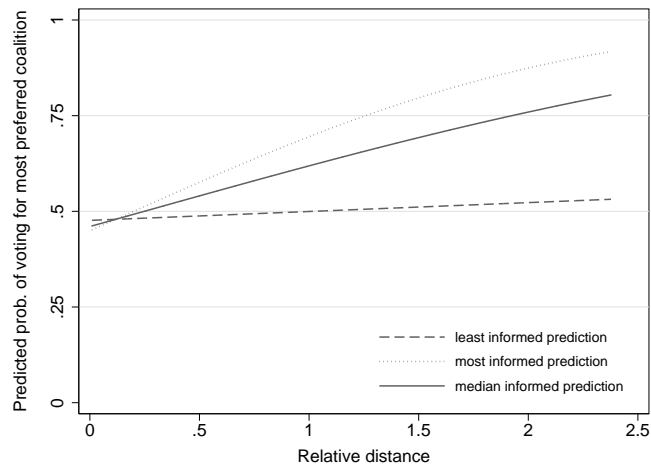


Figure 9: Predicted probability of voting according to preference, Probit, estimated preferences

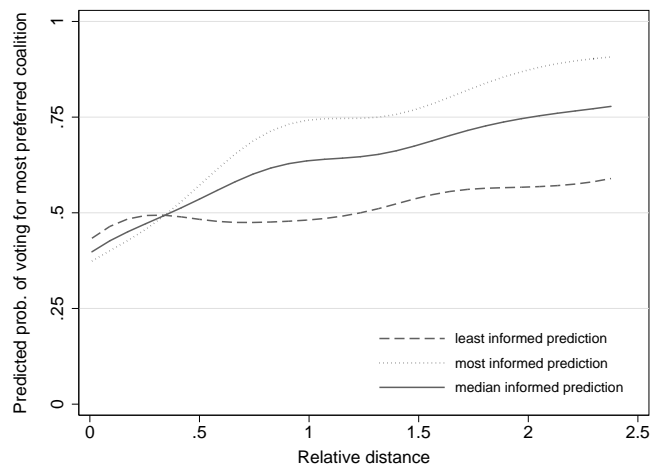


Figure 10: Predicted probability of voting according to preference, local linear regression using a bandwidth selected by AIC cross-validation, estimated preferences

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