Shades of Brown and Green: Party Effects in Proportional Election Systems *

Olle Folke†
IIES

November 12, 2009

Abstract

Small parties play an important role in proportional election systems. For example, the emergence and electoral success of environmental and anti-immigration parties have constituted one of the central changes in the political landscape in Europe over the last three decades. But we do not know if this has actually had any implications for policy, since no methods exist for credibly estimating the effect of legislative representation in proportional election systems. Because party representation is not randomly assigned, both observable and unobservable factors influence policy outcomes as well as party representation. Using a part of the legislative seat allocation that is as good as random, I estimate the causal effect of party representation on immigration policy, environmental policy and tax policy in Swedish municipalities. The results show that party representation has a large effect on the first two policies, but not on the tax policy.

1. Introduction

A distinct feature of proportional election systems is the emergence and existence of small parties (Duverger, 1954). Still, we do not know much about whether, and to what extent, individual parties, small or large, shape policy. There are simply no suitable methods for estimating the effect of legislative representation of political parties in proportional election systems.[1] In this paper, I try to fill this methodological gap and estimate how party representation affects immigration policy, environmental policy and tax policy.

To estimate the causal effect of legislative representation, I use observations that are sufficiently close to seat allocation thresholds, for part of the seat allocation to be considered as good as

*The author gratefully acknowledges helpful comments from David Strömberg, Torsten Persson, Jim Snyder, Per Pettersson-Lidbom, Ethan Kaplan, Donald Green, Matz Dahlberg, Orit Kedar, Emilia Simeonova, Albert Solé-Ollé, Jens Hainmueller, Peter Nilsson, Hans Grönqvist, Heléne Lundqvist, Erika Färnstrand Damsgaard, Erik Meyersson, Jon Fiva, Karin Edmark, Björn Tyrefors Hinnerich, and seminar participants at IIES, MIT, Harvard, CIFAR, Trondheim NTNU, SULCIS, IEB Summer School, the 24th annual EEA congress, SLU and IFAU. The views expressed in the paper are mine, as is the responsibility for any mistakes.

†IIES, Stockholm University, S-106 91 Stockholm, Sweden; folke@iies.su.se

[1] Around half of the democracies in the world, including most European countries, have political systems with proportional representation, or elements of it.

random. The identifying assumption is that observations close to either side of a seat threshold are equal in all respects, except party representation. If this holds, any observed differences in policy outcomes between observations on opposite sides of a seat threshold can be attributed to the differences in party representation. The identifying assumption is thus similar in spirit to that in regression discontinuity design (RDD).[2] Although the methodology is intuitively simple, there are several complex methodical challenges associated with the inherent characteristics of proportional election systems. This implies that I have to make several deviations, and developments, from the typical RDD. Several of these methodological developments can be applied to other issues and questions.

In addition to methodological advances, I also present a set of substantive results. Applying the method to data from Swedish municipalities, I show that changes in legislative representation have large and significant effects on immigration and environmental policy. However, I do not find any evidence of legislative representation affecting the municipal tax rate. The results also show that OLS estimates of party representation effects give misleading results.

Focusing on immigration and environmental policy is natural since the two policy areas seem to have been central for the emergence of new small parties in Western Europe since the beginning of the 1980's. Examples of electorally successful anti-immigration parties include Front National in France, Freiheitliche Partei Österreichs in Austria, Partij voor de Vrijheid in the Netherlands, Dansk Folkeparti in Denmark and Vlaams Blok in Belgium. Green parties have been sufficiently successful to gain parliamentary representation in several countries such as Germany, France, Italy, Sweden and Belgium.

Proportionality of the election system has been central for the electoral success of green parties.[3] To illustrate this, consider the United States and Germany, which both have strong environmental movements. In Germany, where the representatives to the national parliament are elected proportionally, the Greens (die Grünen) have been represented in the national parliament after every election since 1983, commonly winning between 6 and 9 percent of the seats. Between 1998 and 2005 it was also part of the governing coalition. In the US, the Green Party has never been represented in Congress, and only on a few occasions has it been represented in state legislatures. However, the US environmental movement is still directly involved in policy formation through, for example, lobbying and public campaigns.[4] Thus, it is not clear whether the parliamentary representation of

[2] See Imbens & Lemieux (2008) for an overview of the RD methodology.

[3] Studies specifically focusing on the emergence and success of environmental parties include Kitschfelt (1989), Rohrschneider (1993) and Burchell (2002).

[4] For example, the Sierra Club in the US has 1.3 million members.

German greens gives them a larger influence on public policy than US greens. This paper will help me address the question of whether political representation actually gives environmental movements better possibilities of influencing policy.

Proportionality of the electoral system has also been central for the emergence and electoral success of anti-immigration parties.[5] Even though it is unclear if, and how, representation of anti-immigration parties has affected policy, their electoral success is often met by strong public, and political, reactions. An example of this is that the success of the German NPD, a party very far to the right, with slogans like "Stop the Invasion by Poles", lead other parties to call for a ban of NPD. For example, the Bavarian interior minister, Joachim Herrmann, stated that: "If we leave the NPD to do what it wants until the federal republic is at risk, then we have missed the right point for a ban". Given that we do not know how, or even if, representation of anti-immigration parties affects policy, it is unclear if the representation of parties like NPD politicians should be a concern. This is another question this paper helps to address.

Apart from immigration and environmental policy, I also examine how legislative representation affects tax policy. The tax rate is a general-interest policy that, unlike immigration and environmental policy, is basically defined on the left-right policy spectrum, which commonly defines how governing coalitions are formed. This makes for an interesting comparison with the other two policies and also allows me to relate the results to Petterson-Lidbom (2009) who, using an RDD, estimates the effect of legislative seat majorities on economic outcomes in Swedish municipalities.

There are few clear theoretical predictions of whether, or how, party representation affects policy in proportional election systems. But the assumption that individual parties affect policy is central in many theoretical models. In models comparing proportional and majoritarian representational systems, the predicted differences often rest on the assumption that individual parties, representing minorities or special interests, shape policy outcomes; see for example Persson et al. (2007). Similarly, the literature on the emergence of new parties over new policy issues, often taking its starting point in Lipset and Rokkan (1967), frequently rests on the implicit assumption that the legislative representation of a party will affect policy. This is not obvious, however. Special-interest parties, such as green parties and anti-immigration parties, are generally not part of the traditional political establishment and seldom belong to governing coalitions. Furthermore, anti-immigration parties often meet strong opposition in the public debate from parties taking an opposite stance. From this perspective, estimating the effect of legislative representation is essential

[5] For studies on the emergence and success of anti-immigration parties, see, for example, Jackman & Volpert (1996), Golder (2003) and Rydgren (2005).

for understanding policy and party formation under proportional representation.

The scant knowledge about how party representation shapes policy outcomes is due to challenging methodical problems. Clearly, we expect voter preferences and characteristics to affect both party representation and policy outcomes. Thus, a positive relationship between the representation of a green party and stricter environmental regulation does not necessarily mean that the green party has a causal effect on policy. It might simply be the case that when voters have strong environmental preferences, and vote for a green party, all parties become more "green". Since only a subset of covariates that could affect both representation and policy outcomes is easily observable, or measurable, it is not possible to credibly estimate the effect of party representation by including a wide set of control variables. A credible estimation requires some exogenous variation in party representation. Since it is not possible to randomly assign party representation, the remaining option is to try to find some part of the party representation that can be considered to be as good as random.

A common solution to estimating the causal effect of legislative outcomes has been to adopt a regression discontinuity design (RDD). Common to all previous studies is that they rely on the assumption that a majority of political power is assigned in a random function close to the threshold for winning a majority of either the vote share or the seat share. Examples of such studies include Lee et. al. (2004), Ferreira & Gyorko (2009), Pettersson-Lidbom (2009) and Warren (2008). However, applying this approach to legislative representation in proportional election systems is not possible, as individual parties are rarely close to holding a majority of neither the vote share nor the seat share. This motivates the development of a new methodological framework, in which identification of causal effects is based on being close to a threshold for a shift in the seat allocation instead of the threshold for a majority change.

To test the effect of legislative representation on immigration policy, environmental policy and tax policy, I use almost 300 Swedish municipalities (local governments). This has several advantages. Parties focusing on these policy areas have been electorally successful in Swedish municipalities. Swedish municipalities also have large opportunities to politically influence all three policy areas that I examine. Finally, the municipalities are homogeneous with respect to both the political system and the institutional framework.

My results show that changes in legislative representation have large and significant effects on immigration policy, measured as the number of actively admitted refugee immigrants. The representation effects closely correspond to how voters perceive the parties. New Democracy, a

party which had a clear and strong anti-immigration position, also has the largest negative effect on immigration policy, while the party with the strongest pro-immigration position, the Liberal Party, has the largest positive effect. A one-percentage-point shift in seat shares between these two parties would lead to the average municipality, which has a population of 30 000, actively admitting ten more, or less, refugee immigrants per year during a four-year election period.

The results for environmental policy, measured through a survey-based environmental policy ranking, also show large and statistically significant effects of changes in legislative representation. The Environmental Party, with the strongest green profile in Sweden, has a large positive effect on the ambition level of municipalities' environmental policies. As in the case of immigration policy, the estimated effects of the other parties also correspond to how voters perceive the parties. The estimated effects suggest that an increase in the seat share of the Environmental Party of five percentage points, at the expense of most other parties, could make a municipality undertake environmental initiatives such as buying "green" energy or carrying out environmental information campaigns.

The results for tax policy, measured through the municipal tax rate, also follow the voter perceptions of the parties. The estimated effects are too imprecise to be statistically significant, however. Pettersson-Lidbom (2009) finds a large significant effect on the tax rate from left-wing parties holding a seat majority, which suggests that legislative majorities, and not individual party representation, constitute the relevant dimension for primary left-to-right policies such as the tax rate.

Several mechanisms might potentially explain the representation effects that I uncover. Party representation could affect what, and how, coalitions are formed; see for example Austen-Smith & Banks (1988). The degree of representation could also be decisive for the voting power of a party; see, for example, Banzhaf (1964) and Holler (1982). The legislative presence of a party could affect what, and how policies, are discussed in the legislature. Out of these mechanisms, I can only examine the third. My results show that legislative presence cannot explain the representation effects.

Section 2 of the paper describes the identification strategy, while Section 3 describes the data and defines the parties' policy positions. Section 4 presents the results of the baseline specification. Section 5 shows results of alternative specifications and provides tests of the identifying assumption. Section 6 covers some extensions to the baseline specification and discusses the mechanisms behind the results. Finally, Section 7 discusses the findings and concludes the paper.

2. Identification Strategy

In this section, I first describe in detail why it is difficult to estimate the policy effects of party representation in legislatures. Then, I propose a solution to this problem that involves comparing outcomes in close elections.

Let me introduce some notation that is used throughout the paper. There are P parties indexed by $p = \{1, 2, 3, ..., P\}$. The number of votes for party p is denoted v_p, and the total number of votes is $V = \sum_1^P v_p$. The vector $\mathbf{V}_P = (v_1, v_2, v_3, ..., v_P)$ contains the votes for all parties. Analogously, the number of seats of party p is denoted $\widetilde{s}_p$, and the total number of seats is $S = \sum_1^P \widetilde{s}_p$. The seat share of party p is denoted $s_p = \frac{\widetilde{s}_p}{S}$, and $\mathbf{S}_P = (s_1, s_2, s_3, ..., s_P)$ is a vector of the seat shares of all parties.

For simplicity, I use three parties in all models and examples in this section. This is the simplest setting that captures the specific characteristics of proportional election systems. Extending the models and examples to more than three parties is straightforward and does not require any changes in the model.

Given an allocation of votes, seats are allocated by the function $\widetilde{s}_p = f(\mathbf{V}_P, S)$ based on, for example, the Sainte-Laguë or the d'Hondt method. A detailed description of seat allocation methods in proportional election systems and how to adopt the method developed in this paper to different seat allocation methods can be found in the Appendix.

2.1. Identification problem

I wish to estimate the effect of party representation, defined as the seat shares, $\mathbf{S}_P$, of parties, on some policy, y, in municipality i. Let us assume that I wish to estimate the effect of party representation with a linear model:

$$y_i = \alpha + \beta_1 s_{1i} + \beta_2 s_{2i} + \varepsilon_i. \tag{2.1}$$

In this specification with three parties, Party 3, $p = 3$, is omitted and used as the reference case. Thus, what I estimate are the effects of Party 1 or Party 2 when their representation increases at the expense of Party 3.

The identification problem arises because party representation is likely to be correlated with the error term because voter preferences may directly affect policy, $\varepsilon_i = k(\mathbf{V}_P) + u_i$, where $k(\mathbf{V}_P)$ is an unknown function of the vote shares of the parties. Inserting this error term into the above

equation yields

$$y_i = \alpha + \beta_1 s_{1i} + \beta_2 s_{2i} + k\left(\mathbf{V}_P\right) + u_i. \tag{2.2}$$

Omitting or misspecifying $k\left(\mathbf{V}_P\right)$ implies that $\mathbf{S}_{Pi}$ will be correlated with the error term and the estimated coefficients in β will be inconsistent.

The effect of voter preferences on policy, described by $k\left(\mathbf{V}_P\right)$, might arise in many ways. For example, conservative politicians get a larger seat share in conservative districts. Conservative districts are different from less conservative ones in many respects - presumably higher income, higher education, etc.- and we do not know how to disentangle the policy effects of seat allocations from these other characteristics. There could also be a direct effect of voting on policy outcomes. Since voting for a party signals voter preferences to politicians, an increase in votes for a green party might signal a rise in environmental awareness amongst voters, which affects the environmental policies pursued by all other parties. A final problem is that the policy outcome can influence voting behavior. A large inflow of refugee immigrants could, for example, affect voting on anti-immigration parties.

To solve this identification problem, I will compare policy outcomes when a party barely received or did not receive an extra seat. The fundamental identifying assumption is that the marginal seat is randomly allocated when we are sufficiently close to a threshold for a seat change.

2.2. Seat thresholds, distance and closeness

Before specifying the model to be estimated, we must first precisely define seat thresholds, vote distances to thresholds, and being close to a threshold.

I illustrate these concepts graphically in Figure 1, which shows the allocation of three seats between three parties in a simplex. Each contiguous region in the simplex represents a specific seat allocation. This allocation is displayed by three numbers at the center of each region in the simplex. For example, in the region in the bottom left corner, Party 3 receives all seats, $\widetilde{S}_P = (0, 0, 3)$, since the other parties get too few votes. The seat thresholds are the boundaries between the contiguous regions, drawn as solid lines. Crossing such a threshold changes the seat allocation. For example, suppose that we start from the bottom left corner and move right along the "bottom" line of the simplex, along which Party 2 holds a vote share of zero. Moving along this line, Party 1 will gain its first seat when its vote share surpasses 17 percent. This seat was previously held by Party 3. In other words, the seat allocation changes from $\widetilde{S}_P = (0, 0, 3)$ to $\widetilde{S}_P = (1, 0, 2)$.

Note that the number of seats of a party is affected by the votes of *all* parties. Consequently, the distance to a seat change cannot be measured only using the vote share of an individual party. For example, the vote share at which Party 1 will receive its first seat depends on how the remaining votes are distributed across Party 2 and Party 3. This implies that Party 1 may experience a seat change while keeping its vote share constant.

I define the *distance* between two vote vectors, $\mathbf{V}_P^0$ and $\mathbf{V}_P^1$**,** as the sum across parties of the absolute vote differences, measured in vote shares. That is, the distance between $\mathbf{V}_P^0$ and $\mathbf{V}_P^1$ is

$$d\left(\mathbf{V}_P^0, \mathbf{V}_P^1\right) = \sum_{p=1}^{p=P} \left|v_p^1 - v_p^0\right|. \tag{2.3}$$

I then define the *minimal distance to a seat change* for party p. Suppose that the election outcome is $\mathbf{V}_P^0$, and the associated seat allocation to party p is $s_p^0 = f\left(\mathbf{V}_P^0, S\right)$. The *minimal distance to a seat change* for party p is the minimal distance, $d\left(\mathbf{V}_P^0, \mathbf{V}_P^1\right)$, to any point V_P^1 at which the seat allocation for party p is different than at $\mathbf{V}_P^0$, $f_p\left(\mathbf{V}_P^0, S\right) \neq f_p\left(\mathbf{V}_P^1, S\right)$.

I will define observations as *being close* to a threshold if the *minimal distance to seat change* is less than a cutoff point, denoted by λ. In Figure 1, close elections for party 1 (defined by $\lambda = 5$ percentage points) are marked in grey. The large five percent value is chosen for illustrative reasons. I use the much smaller $\lambda = 0.25$ percentage points of the vote share in most empirical specifications.

In practice, measuring the minimal distance to a seat change is somewhat complicated. A precise description of this can be found in the Appendix where I also provide a practical example.

2.3. Specification

I now return to the specification of the model to be estimated, which will compare outcomes in elections where a party has barely received an extra seat to elections where it has barely not.

To implement this specification, I need two indicator variables. One variable indicates all observations where a party is *close* to a threshold. The other variable indicates whether the party is *close* to and *above* or *below* such a threshold. This is the treatment variable. Formally, I define binary indicator variables for each party, c_p, which takes the value of $\frac{1}{2}$ for all observations where the party is within *distance* λ from a threshold, that is, for observations *close* to a threshold.[6] I also define the treatment variables t_p, which equal $-\frac{1}{2}$ if party p is *close* to and *below* a threshold,

[6] The choice of λ is a trade-off between precision and internal validity. Decreasing λ reduces the number of identifying observations, thus reducing the precision of the estimated effects. The benefit is that decreasing λ increases the certainty that the identifying assumption holds. There is no formal rule for choosing λ in this setting, making the choice of λ a call of judgement.

$\frac{1}{2}$ if p is *close* to and *above* a threshold, and zero otherwise. Figure 1 illustrates the values of these variables. The grey shading indicates close elections for Party 1 ($c_1 = \frac{1}{2}$). The horizontal stripes indicate that Party 1 is just above a threshold ($t_1 = \frac{1}{2}$), and the vertical stripes indicate that Party 1 is just below ($t_1 = -\frac{1}{2}$). I normalize this by assuming that the effect of an additional seat depends on the total number of seats in the legislature and thus, I divide the treatment and control variables by this number.

The specifications I investigate are of the form

$$y_i = \alpha + \gamma_1 \frac{c_{1i}}{S_i} + \gamma_2 \frac{c_{2i}}{S_i} + \beta_1 \frac{t_{1i}}{S_i} + \beta_2 \frac{t_{2i}}{S_i} + g\left(\mathbf{V}_{Pi}\right) + \varepsilon_i, \tag{2.4}$$

where $g\left(\mathbf{V}_{Pi}\right)$ is a function of the vote shares of all parties. This specification compares outcomes when parties are just below or just above a threshold to receive more seats. The fundamental identifying assumption is that within this range, it is essentially random whether a party receives a seat, implying that $corr(\frac{t_{1i}}{S_i}, \varepsilon_i) = corr(\frac{t_{2i}}{S_i}, \varepsilon_i) = 0$.[7] Since only observations close to the seat thresholds are used for identification, the control function, $g\left(\mathbf{V}_{Pi}\right)$, is only needed to reduce residual variation, not to get consistent estimates.

Note that the effect of a certain party gaining or losing a seat depends on what other party is on the other side of the threshold. The effect on taxes of a centrist party gaining a seat could have a different effect if it gains the seat at the expense of a right-wing party or a left-wing party. In one case, the effect is $\beta_{centrist} - \beta_{right-wing}$, in the other the effect is $\beta_{centrist} - \beta_{left-wing}$. By simultaneously estimating the effect of all parties, this possibility is taken care of.[8]

I finally discuss issues created by multiple election districts within a legislature. In this case, effects from multiple districts must be aggregated. This is done by aggregating the treatment variable, t_p, the control variable, c_p, and the vote shares $\mathbf{V}_{Pi}$, over all districts, N, using the following specification

$$y_i = \alpha + \gamma_1 \frac{c'_{1i}}{S_i} + \gamma_2 \frac{c'_{2i}}{S_i} + \beta_1 \frac{1}{S_i} \sum_{e=1}^{e=N} t_{1ie} + \beta_2 \frac{1}{S_i} \sum_{e=1}^{e=N} t_{2ie} + g\left(\mathbf{V}'_{Pi}\right) + \varepsilon_i. \tag{2.5}$$

The control variable, c'_{pi}, is now defined as the absolute value of the aggregated treatment variable:

$$c'_{pi} = abs\left(\sum_{e=1}^{e=N} t_{pie}\right). \tag{2.6}$$

[7] Note that $cov(\frac{t_{1i}}{S_i}, \varepsilon_i) = E\left[\left(t_{1i} - \bar{t}_{1i}\right)\left(\frac{1}{S_i} - \overline{\frac{1}{S_i}}\right)\varepsilon_i\right] = E\left[E\left[\left(t_{1i} - \bar{t}_{1i}\right)\varepsilon_i \mid S_i\right]\left(\frac{1}{S_i} - \overline{\frac{1}{S_i}}\right)\right] = 0$ if $E\left[\left(t_{1i} - \bar{t}_{1i}\right)\varepsilon_i \mid S_i\right] = 0$, that is if the treatment is uncorrelated with ε_i for all legislature sizes, S_i.

[8] An alternative approach would be to separately estimate the effect of crossing a seat threshold between each pair of parties. However, in the case of this paper, it would, give the same results as estimating the effect of all parties simultaneously.

This definition of the control variable controls for the fact that neither the size of the treatment effect, nor the treatment status is random.[9] The size of the treatment effect is negatively related to the size of the legislature. The number of districts has a positive effect on the potential size of the treatment effect since a party can be close to losing, or gaining, a seat in all districts of a municipality. Several factors influence the probability of being close to a threshold. District magnitude has a positive effect on the probability of being close since it decreases the interval between seat thresholds. Similarly, the number of districts has a positive effect since a party can be close to a threshold in either of the districts. Finally, as mentioned above, large parties are more likely to be close to a threshold when a highest averages method is used to allocate the seats. By using the absolute value of the treatment variable, I control for both differential probabilities of being close to a threshold and differences in the size of the treatment effect.

For aggregate vote shares, $\mathbf{V}'_{Pi}$, I use the sum of district vote shares, weighted by the relative number of seats in the district:

$$v'_p = \sum_{e=1}^{e=N} \frac{v_{pe}}{V_e} \frac{S_e}{S}. \tag{2.7}$$

This weighting is of little importance for the estimated coefficients in the regressions with policy outcomes. It is primarily used to increase efficiency when the seat shares are dependent variables (see below).

As previously, the identification is due to the random allocation of seats in close elections. The identifying assumption is that $corr(\sum_{e=1}^{e=N} t_{1e}, \varepsilon) = corr(\sum_{e=1}^{e=N} t_{2e}, \varepsilon) = 0$, for all legislature sizes, S_i. If the assumption, $corr(t_1, \varepsilon_i) = corr(t_2, \varepsilon_i) = 0$, holds at the district level, it also holds at the aggregate level. This is because within the subset of close elections, losing or gaining seats is uncorrelated across districts for the same legislature.

The approach of aggregating the treatment variable over all districts is similar to that in Warren's (2008) study of seat-share changes in US state legislatures, except that Warren gives the treatment variable the values -1 or 1, thus underestimating the treatment effect on the seat share by a factor of 2.

[9] In practice, the aggregation of the control variable does affect the results. Defining the control variable as the sum of close seats for a party over all districts, or as a dummy for being close in one of the districts, gives basically identical results.

3. Data Description

In this section of the paper, I provide background information on Swedish municipalities, including the most important institutional features of the political system. I also describe outcome variables and political parties. Finally, I show what importance the parties attach to the three examined policy dimensions and how they position themselves on them.

3.1. Political Institutions of Swedish Municipalities

Swedish politics take place at three geographical levels: the national, the county, with 20 counties, and the municipal, with 290 municipalities. Municipalities differ widely in land area, from 9 to 19 447 square kilometers, and population, from 2 558 to 780 817 inhabitants. The municipalities have a large freedom in organizing their activities. They have the right to levy income taxes, which account for roughly two thirds of municipal government income. Day care, education and the care of elderly and disabled are the most important expenditure posts. Expenditures are, on average, around 20 percent of GDP.

The municipalities are governed by elected councils. The councils appoint subcommittees that are responsible for different policy areas such as education and city planning. The municipalities have a "quasi parliamentary" system where the heads of the subcommittees are appointed by the governing majority, which is the equivalent of the government at the national level. However, coalitional discipline is not binding, such that parties of the governing majority are not required to vote together on all policy issues. This implies that alternative coalitions can be formed on specific policy areas and issues.

Elections to the municipal councils are held every fourth year (before 1994 every third year). The members of the governing councils are elected from multimember electoral districts. Around two thirds of the municipalities only have one electoral district, but the large municipalities have multiple districts. The election law dictates that a municipality with more than 24 000 eligible voters, or a legislative council with more than 50 seats, must have at least two electoral districts. When a municipality has more than one district, representatives are elected separately from each district.

Within each district, the modified Sainte-Laguë method is used to distribute the seats.[10] The number of seats per district is legally bound between 15 and 49. Unlike the national level, no seats

[10] The decision to use the modified Sainte-Laguë method in Sweden, taken in 1952, was supposedly made to give the Communist Party a disadvantage in the seat allocation to Swedish Parliament (Grofman & Lijphart, 2002).

are used to "even out" differences between the share of votes and seats caused the allocation of votes between the districts. There is no explicit electoral threshold for gaining representation in the municipal council.[11]

3.2. Outcome Variables

I will look at three policy outcomes in the municipalities: immigration policy, environmental policy and the tax rate. Descriptive statistics for the three outcome variables are provided in Table 1. In the estimations, each policy outcome is measured as an average over the relevant election period.

Swedish Municipalities have large possibilities of influencing the inflow of immigrants. Once refugee immigrants have been granted asylum in Sweden, they are placed in municipalities through the placement program of the Swedish Immigration Agency. The process of this national program has, in principle, remained the same from 1985 until today (Emilsson, 2008). The most important change was that refugee immigrants were able to opt out of the placement program after 1994. Each municipality must still be able to decide how many refugee immigrants should be received through the program. Importantly, there have been large annual variations in the inflow of refugee immigrants to Sweden. For example, the intake spiked in 1994 and 2006 due to the wars in former Yugoslavia and Iraq.

As the outcome variable for immigration policy, I will use the number of refugee immigrants per capita placed in the municipality through the national placement program. The number placed in each municipality is negotiated between the immigration agency and the municipalities. The inflow through the placement program is relatively large, see Table 1, with an annual average of 1.9 immigrants per 1000 inhabitants, or 58.6 immigrants in absolute terms. Moreover, immigration is often a highly contentious issue in municipal politics, sometimes even leading to the formation of new local parties. The distribution of placed refugee immigrants per capita between municipalities is skewed to the right. For this reason, I use a logarithmic transformation in the estimation.

When it comes to environmental policy, the municipalities have numerous responsibilities and freedoms. Their responsibilities include wastewater treatment, waste collection, zoning, building permits, giving permissions for, and controlling, smaller and medium sized industries. In each of these areas, the municipalities also have large freedoms in deciding and carrying out their own policies.[12]

[11] Naturally, there is an implicit electoral threshold that is determined by the number of seats in each district. The large variation in seats among the districts gives a large variation in the implicit threshold, ranging from around 1.5 to 5 %.

[12] I add one immigrant to all municipalities to be able to include all observations in the estimations. Excluding

As the outcome variable for environmental policy, I will use an environmental ranking of all Swedish municipalities made by a Swedish environmental magazine (Miljö Eko, 1993-2001) in every year between 1993 and 2001. This measure has previously been used by Dahlberg & Mörk (2002) and Forslund et. al. (2008). The ranking is based on the initiatives undertaken by the municipality and not the environmental outcomes. Thus, it is more appropriate to consider the environmental ranking as an approximation, rather than as an absolute measure of the environmental policy performance. The indicators used in the ranking include measures of sustainable procurement, recycling programs, doing environmental audits, and "green" information to the inhabitants. The contents and the maximum score of the survey changed somewhat over the years. For this reason, I use the municipal score relative to the maximal score in the estimation.

The municipalities are free to set the tax rate as they see fit, as long as the budget deficit is not too large.[13] The tax rates vary considerably between municipalities, which can be seen in Table 1. They also vary considerably over time, with a large increase between 1991 and 1992 caused by a shift in responsibility for the care of the elderly from counties to municipalities. Tax rate expressed as a percentage is used as the outcome variable.

3.3. Parties, Policy Position and Importance

Currently, there are seven parties in Swedish parliament and those parties also dominate municipal politics, although many municipal councils also have representatives from local parties. The parties are traditionally divided into two blocks with the *Social Democrats* and the *Left Party* in the left block and the *Conservative Party*, the *Center Party*, the *Liberal Party* and the *Christian Democrats* in the right block. At the municipal level, the formation of governing coalitions does not always follow this division. For example, it is common that the parties from the middle of the left-right political spectrum form governing coalitions. The *Environmental Party* can either be classified as belonging to the left block, as in Svaleryd & Vlachos (2009) for example, or as independent, as in Pettersson-Lidbom (2008) for example. While the Environmental Party nowadays sides with the left block in national politics, the picture is more subtle in municipal politics. Data on governing coalitions from the elections in 1994, 1998 and 2002 suggest that it is appropriate to classify the Environmental Party as block independent in municipal politics.

Apart from the seven national parties, the populist *New Democracy* had a successful election

observations with no immigrants does not change the results, nor does using alternative transformations.

[13] In the election period between 1991 and 1993, the municipalities were not allowed to raise taxes. The results are only marginally affected by excluding this election period from the estimations.

in 1991, when it won 6.7 percent of the votes in the parliamentary elections and 2.8 percent in the municipal elections. Even though the party collapsed at the national level in 1994, it maintained seats in 37 municipal councils before it more or less vanished from Swedish politics in the election of 1998. New Democracy had four core issues: to reduce immigration, reduce taxation, make the public sector more efficient and "politics should be fun" (Rydgren, 2002).

Descriptive statistics for the parties are provided in Table 2, along with notation[14] and how the voter perceived policy position and importance. The size of each party is illustrated in Figures 2 and 3, where the seat share and the seat distribution for each party is shown in a histogram. Both seat shares and seats for the three largest parties, the Social Democrats, the Conservative Party and the Center Party, vary considerably across municipalities. Still, it is only the Social Democrats that frequently hold a majority of the seats. The other parties rarely hold more than ten percent of the seat share, or more than five seats.

To form a prior on how parties might affect policy, it is vital to know both what policy areas are important for each party and the party positions in these areas. There are no studies that have quantified the importance attached by Swedish parties to specific policy areas. While there is an extensive literature on the positions of Swedish parties in the left-right policy space,[15] there are no studies that have quantitatively measured their positions on immigration and environmental policies. Consequently, I construct my own measures of these features using survey data from the Swedish National Election Studies Program (Statistics Sweden, 1982-2002).[16] The results are presented in Table 2 and Figure 5.

To measure policy importance, I use a set of questions where the respondents list the five most important policy issues for each party. My index of importance of policy area y for party p is the share of respondents that have listed an issue in policy area y as important for party p. These questions are part of the survey in every election, which means that I can use data from every election period[17] covered by data on the outcome variables.

To measure policy positions, I take the commonly used approach of measuring how voters, on average, place the parties on pre-constructed policy scales.[18] I use a set of questions where the respondents place each party on a policy scale, from 1 to 10, in various policy areas. For immigration

[14] All election data have been collected from Statistics Sweden.
[15] Gilljam & Oscarsson (1996), for example.
[16] The studies are survey based and have been carried out by the Department of Political Science at Göteborg University and Statistics Sweden in conjunction with each election since 1950. Each study has about 4000 respondents.
[17] New Democracy was only included in 1991 and 1994. The Environmental Party is included in the survey from 1988 and onward. The Christian Democrats were not included in 1982 and 1988.
[18] Used in Macdonald et. al. (1991), Westholm (1997) and Kedar (2005), for example.

policy, parties were positioned according to their preferences for admitting more refugee immigrants, with the score of 10 being most pro-immigration. For environmental policy, the parties were positioned on a "green scale", with 10 as the score for being the most green. There is no explicit question in the election survey where the parties are positioned on taxes. Instead, I use the parties' position on the left-right scale as a proxy for their position on taxes. Questions on environmental policy and immigration policy were only included in the 1994 election, so I can only use that survey.

Figure 5 illustrates the measures for each respective policy area. In the figure, the perceived policy positions are illustrated by the parties' position on the horizontal axis, while the perceived policy importance is illustrated by the size of the markers.

New Democracy is, by far, most anti-immigration and also the party for which immigration is most important. On the other side of the policy spectrum, the Liberal Party is most pro-immigration and gives the second highest importance to immigration policy. This is consistent with Green-Pedersen & Krogstrup (2008) who argue that New Democracy and the Liberal Party are the only two parties with wide-spread support that brought up immigration policy as a central policy issue in Sweden during the period studied in this paper. New Democracy used limiting immigration as one of its core election issues, while the Liberal Party was the only party to properly engage in a debate against New Democracy about immigration. This was something manifested in public by the former leader of the Swedish Liberal Party, Bengt Westerberg, who after the Center-Right victory in the election of 1991, refused to appear on TV with the leaders of New Democracy. This was met by New Democracy's leader Bert Karlsson wishing Westerberg's daughter to be given AIDS by an African immigrant.

Figure 5 also shows that the Environmental Party has the most "green" policy position and gives environmental policy the highest importance. The Center Party also stands out from the other parties both in "greenness" and high policy importance, even though this importance was greater before the Environmental Party gained widespread support. There is no party on the opposite side of the green scale that also placed importance on environmental policy.

The positions on the left-right policy scale, also illustrated in Figure 5, follow the division of the blocks. The Left Party and the Conservative Party take opposite positions at the extremes of the scale and are also the parties placing most importance on taxes. The positions are basically the same as in Gilljam & Oscarsson (1996).

4. Baseline Specifications

In this section, I first estimate the effect of the treatment variable, t_p, on the seat share of each party in the legislature. To see if the seat shares influence policy, I then use the treatment variable to estimate the effect on policy outcomes.

4.1. Results for seat shares

I start with a graphical analysis of the average effect of a party moving over a seat threshold on a party's seat share at the electoral-district level.[19] I then regress the treatment variable, t_p, on seat share at the municipal level. Data from all elections between 1982 and 2002 are used in the analysis.

The graphical analysis follows the standard RD design procedure. I plot the binned averages of party seat shares against the distance to a seat change, using a bin bandwidth of 0.1%. To investigate whether the treatment effect is affected by the size of the party, I split the sample into two groups below and above the sample median of 7.3 percentage points.

The results are displayed in Figure 4. The seat shares clearly jump at the thresholds. This jump is less distinct for the larger parties, even though it is of the same magnitude in percentage points. This is because there is a larger variation in the seat share for large parties and, most importantly, a large party is often close to both winning and losing a seat. The size of the jump is almost three percentage points. This is because the average district magnitude is 30, so winning one extra seat means, on average, an increased seat share of 1/30.

Turning to the regression analysis, I regress the seat share of each party on treatment variable, t_p, controlling for being close to a threshold by c_p. I use three definitions of close elections, with cut-off distances to a threshold of 0.5%, 0.25% and 0.1%. The model is estimated both with and without a fourth-order polynomial of the vote share, v'_p.[20]

The results in Table 3 show a clear effect of the treatment variable, t_p, on the seat share for all parties. The effect is always positive and often close to 1. Including the fourth-order polynomial vote share control function greatly enhances the precision of the estimates, even though it does not significantly change their size. After controlling for vote shares, the effect is always highly significant and close to 1, but decreases when observations further from the threshold are included

[19] It is not possible to make a graphical analysis at the municipality level when municipalities have multiple electoral districts.

[20] Using another polynomial to define $g(\mathbf{v}'_{Pi})$ affects neither the size nor the precision of the estimates.

(λ increased). The latter can also be seen in Figure 4, as the average difference in seat shares above and below the threshold decreases with the distance to the threshold.

Table 3 shows the number of identifying observations for each party (observations where $t_p \neq 0$). There are more identifying observations for the larger parties, since they have a higher probability of being close to a threshold. The share of identifying observations is relatively large. In total, there are about 2000 observations for the elections between 1982 and 2002. Out of these between 500 and 1000, depending on the size of the party, are identifying observations for $\lambda = 0.25\%$.

4.2. Results for policy

I now estimate the effects of party representation on policy. When discussing the results, I focus on parties with the largest expected influence on each policy area, which are those perceived as having the most extreme policy positions and as giving high importance to the policy areas.

In the baseline specification, corresponding to equation 5, I estimate the effect of party representation on policy outcomes in reduced form, using the treatment variable, t_p. To define closeness, I use the cut-off distance to a threshold of 0.25 percentage points of the vote share, $\lambda = 0.25\%$. The control function of the vote share, $g(\mathbf{V}'_{Pi})$, is defined as a fourth-order polynomial. I also include election-period and municipality fixed effects. The Social Democrats, S, is used as the reference (omitted) party in this and all other specifications. That is, all estimated effects on policy refer to a seat share gain of party p at the expense of the Social Democrats: $\beta_p - \beta_S$.

To evaluate if there are any significant party effects, it is instructive to look at comparisons between all pairs of parties. For example, regarding immigration policy, it is natural to compare what happens if New Democracy, ND, gains a seat from the Liberal party, FP, ($\beta_{ND} - \beta_{FP} = (\beta_{ND} - \beta_S) - (\beta_{FP} - \beta_S)$), because these are the parties with the most extreme policy positions.

The estimation results are presented in Table 4. In Figures 6-8, I plot the point estimates for each policy against the parties' policy positions, as perceived by the voters. The size of the markers in these figures is weighted by perceived importance of the policy area for each party. Finally, Table 5 shows the cross-party comparisons ($\beta_p - \beta_{p'}$) together with p-values for the hypothesis ($\beta_p \neq \beta_{p'}$) for the two parties that are perceived as giving most importance to the respective policy areas. Table 4 also includes the results from OLS[21] and 2SLS regressions. In the latter, the treatment variable t_p is used to instrument the effect of seat shares on policy outcome.[22]

[21] The OLS specification is defined by equation 2.1 and includes election period and municipality fixed **effects.**

[22] More specifically, I use equation 2.5 in the first stage to instrument the seat share of each party with the treatment variable, t_p. In the second stage, I once **more** use equation 2.5, but replace the treatment variables with

Immigration Policy The results for immigration policy are presented in Tables 4 and 5 and Figure 6. What stands out in Column 1 of Table 4 is the large negative point estimate of New Democracy. The Liberal Party has the largest positive point estimate. Recall that these are the only national parties that have profiled themselves on immigration policy and are perceived by voters as having the most extreme policy positions. Figure 6 plots the estimated policy effects against the perceived policy positions and shows a striking correspondence between the perceived policy positions and the estimated effects of New Democracy and the Liberal Party. The figure also shows that the estimated effects of the other parties are in line with voter perceptions.

Table 5 shows that the effect of New Democracy is significantly negative as compared to all seven national parties. This can be seen in Column 1, which shows the effect of New Democracy relative to each individual party, specified in the first column. Furthermore, the effect of an increased seat share for the pro-immigration Liberal Party is positive and significant as compared to all parties except the Environmental Party and the Social Democrats. This can be seen in Column 2. Note that the coefficients in the row for the Social Democrats are the same as the regression coefficients in Table 4, in which the Social Democrats are used as the reference party. That none of the other parties significantly affects immigration is quite expected, given that they have not profiled themselves in this dimension of policy.

The estimated effects are fairly large. The estimated difference between New Democracy and the other parties is between 11 and 22. A difference of 10 between a pair of parties suggests that the placement of refugee immigrants would change by ten percent due to a seat share shift of one percentage point between the parties. This corresponds to a change of six placed refugee immigrants per year in the average municipality.

To exemplify these effects, I compare the placement of refugee immigrants after the election in Oxelösund, in the county of Stockholm, in 1991 to the placement after the election in nearby Nynäshamn in 1994. In these elections, New Democracy and the Liberal Party were close to (using $\lambda = 0.25\%$), and on opposite sides of, seat thresholds. In Oxelösund, New Democracy received 7.82 percent of the votes and two seats (out of a legislature total of 31), while the Liberal Party received 7.92 percent of the votes and three seats. Obviously, with a vote share shift of 0.1 percentage points, the seat allocation between the parties would have shifted. In Nynäshamn, New Democracy received 1.70 percent of the votes and one seat (out of a legislature total of 45), while the Liberal Party received 5.52 percent of the votes and two seats. With a vote share shift of only 0.14 percentage

the fitted values of the seat shares from the first stage.

points, New Democracy could have been left without a seat and the Liberal Party would then have gained a third seat. It turned out that Oxelösund placed an average of 69 refugee immigrants, while Nynäshamn placed an average of 40. The estimated effects suggest that about three quarters of this difference can be explained by the differences in marginal seat share allocations for New Democracy and the Liberal Party which are as good as random.

Simple OLS estimates of the effect of seat shares on policy produce misleading results, as can be seen in Column 2 of Table 4. OLS estimates suggest a negative and significant effect when the Liberal Party wins seats from several other parties. Given that the estimated effect of the treatment variable on the seat share is close to one, the 2SLS estimation should provide results that are only marginally different from the baseline specification. This is indeed what I find in Column 3 of Table 4.

Environmental Policy I now move on to discuss the results for environmental policy, presented in Tables 4 and 5 and Figure 7. The Environmental Party, the only party with a clear green profile, has the largest positive point estimate in Column 4 of Table 4. The other party with a relatively green image, the Center Party, has a point estimate that corresponds to the median effect of all parties. New Democracy, which is perceived as being the least "green", has the largest negative point estimate, albeit with a large standard error. As in the case of immigration policy, Figure 7 shows a striking correspondence between the estimated effects and the perceived policy positions. The exception is the large positive point estimate for the Conservative Party, which is not consistent with the voters perceiving the Conservative Party as one of the least "green" parties.

Column 3 of Table 5 shows that an increased seat share for the Environmental Party has a positive and significant effect on environmental policy when the seats are taken from all parties except the Conservative Party. The voters perceive the Center Party as second to the Environmental Party in both "greenness" and the importance given to environmental policy. This party does not have a positive significant effect vis à vis any party, as shown in Column 4. Not shown in the table is the fact that the Conservative Party has a significantly positive effect as compared to several parties. The negative effect of New Democracy is, however, only significant as compared to the Environmental and the Conservative Party.

As in the case of immigration policy, the estimated effects are large. The estimated difference between the Environmental Party and most other parties is around two. This implies that the relative environmental ranking would change by two percentage points from a seat share shift of

one percentage point between the parties. That the policy effect is relatively large is not surprising. Some of the policies required to increase the environmental ranking are easily implemented. A shift in the relative ranking by ten percentage points could, for example, be achieved by implementing a information campaign to the citizens and companies of the municipality.

To exemplify the estimated effects, I will compare the environmental rankings after the 1994 elections in the municipalities of Forshaga and Årjäng in the rural county of Värmland in Eastern Sweden. In Forshaga, the Environmental Party received 3.69 percent of the votes and two seats (out of a legislature total of 41), while in Årjäng it received 3.55 percent of the votes and one seat (out of a legislature total of 41). In both elections, it would have been sufficient with a vote share shift of less than 0.1 percentage points to change the seat allocation for the Environmental Party. The seat share difference between the two municipalities for the Environmental Party of 2.5 percentage points suggests that the environmental ranking would be five percent higher in Årjäng, and five percent lower in Forshaga if the Environmental Party had ended up on the other side of the seat threshold. The relative environmental ranking during the election period was 46 percent for Forshaga and 35 percent for Årjäng. Half of this difference (five percentage points) can thus be explained by the difference in seat share for the Environmental Party which is as good as random. The estimated difference also corresponds to the fact that in each year during the election period, Forshaga performed better at providing environmental information to its citizens.

The OLS estimates in Column 6 of Table 4 fail to identify any effect of the Environmental Party, or any other party. This provides further evidence of the OLS providing misleading results. As for immigration policy, the 2SLS specification (Column 5 in Table 4) provides results that are only marginally different from the baseline specification.

Tax Rate The results for the tax rate are presented in Tables 4 and 5 and Figure 8. Column 7 of Table 4 shows that the Conservative Party has the largest negative point estimate. This is indeed the party that voters perceive as the right-most party on the left-right policy spectrum, and as the party that gives the highest importance to tax policy. Even though the Left Party is furthest to the left, it is not the party with the largest positive point estimate on tax policy. Figure 8 shows a clear correspondence between the estimated effects of the parties. The correspondence is not nearly as striking as for the two previous policies, however.

When looking at cross-party comparisons, the standard errors are sufficiently large to eliminate all significant differences between any pair of parties. This is shown for the Left Party and the

Conservative Party in Table 5. Even though the effects are in line with voter perceptions, they are not sufficiently large to compensate for the large standard errors.

The point estimates are actually quite large. The difference in effects between the Left Party and the Conservative Party is three. This implies that a ten percentage point shift in seat shares between the two parties would change the tax rate by 0.3 percentage points. This magnitude is in line with the effects found by Petterson-Lidbom (2008) from the traditional left-wing parties holding a majority of the seats. Hence, I cannot really draw any firm conclusion that party representation does not have any effect on the tax rate.

There are no substantial differences between the baseline, 2SLS and OLS specifications (see Columns 8 and 9 in Table 4).

5. Alternative Specifications and Robustness Checks

In this section, I evaluate the validity of the identifying assumption by testing alternatives to the baseline specification and conducting several robustness checks.

5.1. Alternative Specifications

Are the estimated effects of party representation on policy sensitive to using alternative specifications? To corner this question, I will test specifications with different cut-off values to define close elections, λ, and specifications with alternative sets of covariates. I start by defining the alternative specifications. Then, I discuss the general findings for each alternative specification. Finally, I discuss results that are specific to each policy outcome.

In Tables 6, 7 and 8, I investigate eight alternative specifications for each policy outcome. I test two alternative cut-off values to define close elections, $\lambda = 0.5\%$, in Columns 1-2 of each table, and $\lambda = 0.1\%$, in Columns 8-9 of each table. For each of the two cut-off values, I use specifications both with and without municipality fixed effects. Using the cut-off value from the baseline specification, $\lambda = 0.25\%$, I examine four alternative specifications. In the first specification (Column 3), I do not include any control variables. I then add the vote share control function (Column 4) and election period fixed effects (see Column 5). As a point of reference, I show the results of the baseline specification, which includes municipality fixed effects (Column 6). Finally, I add a vector of control variables[23], including education level, demographic composition and population size (Column 7).

[23] Data for the control variables are collected from Statistics Sweden.

As for the cut-off points for defining close elections, λ, the standard errors decrease when λ increases. This is intuitive, since the number of identifying observations increases as λ increases. Changing the interval also changes the point estimates, even though no changes are statistically significant. The coefficients change has two explanations. A higher value of λ expands the sample of identifying observations and eventually makes the treatment endogenous. Using $\lambda = 0.5\%$, the difference in the vote share for a small party on opposite sides of the "close interval" is not arbitrary, implying that the interval might be too wide. The results are also more sensitive to including municipality fixed effects for $\lambda = 0.5\%$ than for the two smaller intervals. The results suggest that $\lambda = 0.5\%$ is too wide a definition of close elections, while the large standard errors make $\lambda = 0.1\%$ too narrow a definition.

If the identifying assumption holds, the covariates should only affect the standard errors and not the point estimates. This is indeed the case. The most important reduction in standard errors is achieved by including election-period fixed effects; see the difference between Columns 4 and 5. There is also a fairly large reduction in standard errors from including the vote share control function $g(\mathbf{V}'_{Pi})$, compare Columns 3 and 4, and municipality fixed effects, compare Columns 1 and 2, Columns 5 and 6, and Columns 8 and 9. Including the vector of control variables has minimal effects on both the point estimates and the standard errors, as seen in Columns 6 and 7.

I now discuss the specific results for each policy area, starting with immigration policy. The main results, shown in Table 6, are not sensitive to the alternative specifications. The reduction in standard errors, obtained by including the covariates, is important for getting statistically significant results, however.

The alternative specifications for environmental policy in Table 7 show that the positive estimated effect of the Environmental Party, MP, is not very sensitive. When using $\lambda = 0.5\%$, the point estimate decreases, but the effect is still significant as compared to several other parties. For the Conservative Party, M, the positive estimated effect is more sensitive both to changing the definition of close elections and using different sets of covariates.

The results of the alternative specifications for the tax rate are shown in Table 8. Here, the reduction in standard errors when including covariates is much larger than for the two other policies. The large reduction when including municipality fixed effects is likely to be caused by long-term differences in economic conditions between municipalities. Even though the point estimates are sensitive to using alternative specifications, none of the alternative specifications indicate that representation of individual parties affects the tax rate.

5.2. Robustness Checks

To check the validity of the identifying assumption, I take two approaches. I graphically examine if there is a shift in the vote share when moving over a seat threshold. I also regress the treatment variable, t_p, on municipal background characteristics that should not be affected by political factors in the short run.

First, I graph the balancing of vote shares close to seat thresholds. Since the distance to a seat threshold is not only dependent on the vote share of the individual party, this analysis is important to validate that the distance measure is correctly defined. A shift in the vote share when moving over a threshold would indicate an invalid distance measure and a biased treatment variable.

In the graphs, I plot the vote share, instead of the seat share, against the distance to a seat threshold. As before, I use binned averages with a width of 0.1%. To investigate whether the identifying assumption holds irrespective of party size, I split the sample into two groups, below and above the sample median of 7.3 percentage points. Figure 9 clearly shows that there is no "jump" in the vote share at the seat threshold, irrespective of party size. This suggests that the identifying assumption holds.

In the regression analysis, I test if the treatment variable, t_p, has an effect on background variables that should not be affected by short-term political outcomes. A significant outcome would indicate an invalid identifying assumption. The background variables I examine are real income per capita, population share with higher education, population share of children and the municipal population in logarithmic form. The vector of control variables is not included since some of the control variables are now used as outcome variables. I estimate the model both with and without municipality fixed effects.

The results are presented in Table 9. Some of the parties are found to have significant effects on the background variables in comparison to other parties; see, for example, the Environmental Party, MP, in Column 1, the Center Party, C, in Columns 2 and 8, and the Conservative Party, M, in Column 8. Unlike the estimates for the effects on policy outcomes, however, these estimates are very sensitive and disappear when municipality fixed effects are included or excluded. This suggests that the significant effects are random findings. Thus, the results do not provide any evidence against the identifying assumption.

6. Mechanisms of representation

The results in the baseline specification clearly show that party representation affects policy outcomes. But the results provide little guidance regarding the mechanisms behind the representation effects. In this section, I will carefully test one of the potential mechanisms, which is legislative representation. Then, I discuss other potential mechanisms.

6.1. Legislative Representation

The methodology of this paper allows me to examine if legislative presence is an important mechanism behind the estimated representation effects. Such a mechanism could reflect the presence of a party affecting the salience of a given policy area in the legislature. For example, having a green party in the legislature might raise the awareness of environmental issues amongst all parties. If legislative presence is an important mechanism, we would expect representation effects to be larger for the first seat won by the party.

To estimate if the representation effect is larger for the first seat**,** I add a second treatment variable to the baseline specification, defined by equation 2.5. I define the second treatment variable as an interaction term between the representation treatment variable**,** $\frac{1}{S_i}\sum_{e=1}^{e=N} t_{pe}$, and a dummy for being close to the threshold for the first seat, cr_p. In practice, this means that I estimate the representation effect conditional on being close to the threshold for the first seat. As previously, being close to a threshold is defined by the cut-off value λ. In the estimations, I use the same definition of close elections, $\lambda = 0.25\%$, as in the baseline specification. Since it is not random if the party is close to the threshold for the first seat, I also include, cr_p, as a control variable. The results are presented in Table 10. The estimates for the linear representation effects are presented in the rows labeled *Seat Share*, while the representation effect for gaining the first seat are presented in the rows labeled *First Seat*. I also show the share of the identifying observations for each treatment variable.

In general, the results suggest that none of the key findings from the baseline specification can be explained by legislative presence. For some parties and policies, the representation effects are actually larger when the party is not close to the threshold for the first seat. This suggests that there could be some type of increasing returns to scale for small parties influence on policy. Explanations for this include that representatives can argue more forcefully when having the support of fellow party members, or that very small parties are very likely to be dummy players in forming coalitional

majorities.[24]

The results for immigration, shown in Column 1 of Table 10, suggest that the representation effects are not larger at the threshold for the first seat. The representation effect of the Liberal Party is basically the same at the threshold as away from it. For New Democracy, the point estimates suggest that the effect is actually larger away from the threshold for the first seat. This might suggest that New Democracy had better possibilities of influencing policy in municipalities where they had more voter support. One interesting finding is that the Left Party seems to have a large negative effect away from the threshold for the first seat. The huge negative effect of the Conservative Party at the threshold for the first seat is a product of the fact that there are only a couple of observations close to this threshold.

The results for environmental policy, see Column 2 of Table 10, show that the estimated representation effect of the Environmental Party is larger away from threshold for the first seat. As in the case with New Democracy's effect on immigration, it could be the case that the Environmental Party has better possibilities of influencing policy when it has stronger support. As for immigration, the effect of the Left Party seems to be larger when not close to the threshold for the first seat. The large and significant effect of the Center Party around the threshold for the first seat is likely to be a product of few identifying observations.

The results for the tax rate, shown in Column 3 of Table 10, do still not show a statistically significant effect of party representation on the tax rate. The large effect of the Center Party at the threshold for the first seat is, as above, likely to be a product of few identifying observations.

6.2. Other Potential Mechanisms

As mentioned in the introduction, there are at least two other potential mechanisms whereby representation can affect policy. First, party representation affects what, and how, coalitions are formed; as in e.g., Austen-Smith & Banks (1988). In this sense, an increased seat share might increase the probability of a party being in a governing coalition. Second, party representation affects the voting power of a party; as in e.g. Banzhaf (1964) and Holler (1982). The idea of the voting-power indexes is to measure how pivotal a party is for forming legislative majorities relative to other parties. The more pivotal a party, the larger its influence be on policy should be. Let me briefly discuss each of these two potential mechanisms.

Estimating representation effects within a framework of governing coalitions requires a method

[24] A dummy player is a party that is not pivotal for any possible coalition of parties gaining a seat majority.

for simultaneously estimating the effect of shifts in seat shares of individual parties and seat majorities for coalitions of parties. This, in turn, requires a new method for defining close elections. Developing this is part of my ongoing work.[25] Preliminary results suggest that only parts of the representation effects can be explained by changes in coalition majorities.[26] The main representation effects on immigration and environmental policy cannot be explained by the possibility of forming left- or right-wing coalitions. Holding the balance of power between the traditional left- and right-wing blocks does not explain the effect of New Democracy on immigration policy and only a third of the Environmental Party's effect on environmental policy.

Estimating representation effects within a voting power framework also requires methodological developments. This is also part of my ongoing work.[27] If changes in voting power, as defined by for example the Banzhaf index, were the main mechanism behind the representation effects, changes in voting power would be a better predictor of policy outcomes than changes in seat shares. Preliminary results suggest this not to be the case.

7. Discussion

I have developed a method for measuring how changes in the legislative representation of small parties affect policy outcomes in multi-party proportional election systems. Applying the method to Swedish municipalities, I show that changes in the representation of anti-immigration and green parties have a causal effect on the key policies for these parties. However, party representation does not seem to affect the tax rate.

My causality interpretation of the results is supported by various robustness checks. A graphical analysis of moving across a seat threshold clearly shows that there is only a shift in the seat share and not in the vote share. Similarly, the regressions testing the effect of the treatment variables on background variables provide support for the identifying assumption. My results show that using a simple OLS to estimate the effect of party representation gives misleading results; the OLS results suggest that party representation has no, or little, effect on policy outcomes.

The estimated effects basically agree with voter perceptions of the parties. Those parties that are found to affect immigration and environmental policy the most are also those parties that voters identify with the most extreme policy positions and with giving most importance to each

[25] Contact the author for a more detailed description.

[26] Such as the left or right block holding a majority of seats, or either the Environmental Party or New Democracy holding the balance of power between the two blocks.

[27] There are several complicating factors for doing this. The most important being that there are there are multiple thresholds for voting power changes, which also are of different sizes.

policy area. The positive effect of the Liberal Party and the negative effect of New Democracy on immigration are thus exactly what we would expect. The estimated effects are fairly large and not sensitive to using alternative specifications.

That New Democracy had a negative effect on immigration suggests that the large growth of anti-immigration parties in Western Europe *could* have affected immigration policy. However, New Democracy was a relatively moderate anti-immigration party (Rydgren, 2002) and the effects that I find might be conditional on this. More extreme parties might have had smaller (or larger) possibilities of affecting policy. As an additional qualification, the political institutions of Swedish municipalities might provide favorable conditions for anti-immigration parties affecting policy. It may thus be premature to extrapolate the results to other countries and contexts.

The positive effect of the Environmental Party on environmental policy is consistent with the voter perceptions of the party as the most "green" party with a large weight on environmental policy. That a small single-issue party, like the Environmental Party, is able to influence policy provides support for reduced-form studies which find that proportional election systems lead to stricter environmental policies than majoritarian systems, such as Fredriksson & Millimet (2004a) on environmental policies and Fredriksson & Millimet (2004b) on environmental taxes. One argument behind such results is that a proportional election system allows environmental interests to be represented in legislatures. In this study, I show that representation can indeed have an effect on environmental policy.

Even though the estimated party effects on the tax rate conform with the way how voters place the parties on a left-right policy scale, there are no statistically significant results. This indicates that marginal shifts in party representation are not sufficient to substantially affect the tax rate. Pettersson-Lidbom's (2008) finding of a positive effect on the tax rate from the parties of the left block holding a legislative majority suggests that legislative majorities may be the relevant political dimension when estimating the effect of legislative outcomes on general-interest policies.

In terms of underlying channels, my results in Section 6 suggest that the representation effects are not larger for the first seat than for subsequent seats. This suggests that the representation effects cannot be explained by legislative presence as such. An extension where the effects of coalition majorities are estimated simultaneously with the representation effects would be an important development of this paper. To do this well, some methodological problems would have to be solved. But the preliminary results indicate that the effects on immigration and environmental policy are not driven by the possibility of forming left- or right-wing coalitions. Neither are the results driven

by New Democracy or the Environmental Party holding the balance of power between the two traditional blocks. In ongoing work, I am developing a method for estimating the effect of voting power in a Banzhaf/Shapley-Shubik framework, which also has a potential for clarifying the mechanism through which party representation affects policy.

Interesting dimensions of heterogenous representation effects that could be examined in further work include municipality characteristics, election periods and governing coalitions. In general, there are too few observations to get precise estimates of heterogeneous effects. Nonetheless, preliminary results indicate that some effects could be heterogeneous over both municipality characteristics and party size. A general problem with estimating heterogeneous effects is that the variables used to define the heterogeneity are likely to be endogenous. For example, the population of the municipality is correlated with both the education and the income level. If we observe heterogenous effects with respect to the size of municipalities, we would not know if it is population, education or income that drives the results.

Strictly speaking, this study only tells us how party representation affects policy in Swedish municipalities. To draw some general conclusions about policy effects of party representation in proportional election systems, it is important to apply the method to other countries. Given that the method is suitable for all types of seat-allocation methods, this is another natural extension of my study.

References

[1] Alesina, Roubini A.M, N., and Cohen G., 1997, Political Cycles and the Macroeconomy, Cambridge: MIT Press.

[2] Austen-Smith,D. & Banks, J. 1988. Elections, Coalitions, and Legislative Outcomes. American Political Science Review, 82:2, 405-422.

[3] Banzhaf, JF. 1964. Weighted Voting Doesn't Work: A Mathematical Analysis. Rutgers Law Review 19:2, 317-343 .

[4] Burchell, J. 2002. The evolution of green politics : development and change within European Green Parties. Earthscan, London

[5] Dahlberg, M & Mörk, E. 2004. On the Vote-Purchasing Behavior of Incumbent Governments. American Political Science Review, 96:1.

[6] Duverger, M, 1954. Political Parties. Methuen, London.

[7] Edin P.-A., Fredriksson, P and Åslund, O. Settlement policies and the economic success of immigrants, Journal of Population Economics 17:1, 133-155.

[8] Emilsson, Henrik. 2008. Introduktion och integration av nyanlända invandrare och flyktingar: Utredningar, granskningar,resultat och bristområden. Asylmottagande i Fokus 2008:7, NTG-asyl & integration i FOKUS

[9] Ferreira, F. & Gyorko, J., 2009. Do Political Parties Matter? Evidence from U.S. Cities. Quarterly Journal of Economics.124:1, 399-422.

[10] Forslund, J., Samakovlis. & Vredin Johansson, M. 2008. Is it wise to combine environmental and labour market policies? An analysis of a Swedish subsidy programme" Ecological Economics 65:3, 547-558.

[11] Fredriksson, P.G., & Millimet, D.L. 2004a. Comparative politics and environmental taxation. Journal of Environmental Economics and Management, 48:1,705-722.

[12] Fredriksson, P.G., & Millimet, D.L. 2004b. Electoral rules and environmental policy. Economics Letters, 84, 237–244.

[13] Gilljam, M. & Oscarsson, H. 1996. Mapping the Nordic Party Space. Scandinavia Political Studies 19:1, 25 - 44.

[14] Golder, M. 2003. Explaining Variation In The Success Of Extreme Right Parties In Western Europe. Comparative Political Studies, 36:4, 432-466.

[15] Green-Pedersen, C & Krogstrup, J. 2008. Immigration as a political issue in Denmark in Denmark and Sweden. European Journal of Political Research 47,610-634.

[16] Grofman, Bernard and Lijphart, Arend. 2002. The Evolution of Electoral and Party Systems in the Nordic Countries. New York Algora Publishing, 2002.

[17] Holler, M. 1982. Forming Coalitions and Measuring Voting Power. Political Studies, 30:2, 262 - 271.

[18] Imbens, G.W. and Lemieux, T, 2008, Regression Discontinuity Designs: A Guide to Practice, Journal of Econometrics 142, 615-635.

[19] Jackman, R & Volpert, K. 1996. Conditions Favouring Parties of the Extreme Right in Western Europe. British Journal of Political Science, 26:4, 501-521.

[20] Kedar, O. 2005. When Moderate Voters Prefer Extreme Parties: Policy Balancing Parliamentary Elections. American Political Science Review, 99:2,185-199.

[21] Kitschfelt, H. 1989,The Logics of Party Formation: Ecological politics in Belgium and West Germany. Cornell University Press, Ithaca and London.

[22] Lee, D., Moretti, E., and Butler, M., 2004. Do Voters Affect or Elect Policies? Evidence from the U.S. House, Quarterly Journal of Economics, 119:3 ,807-859.

[23] Lijphart, A, 1990. The Political Consequences of Electoral Laws, 1945-85. The American Political Science Review 84:2, 481-496.

[24] MacDonald, E., Listhaug. & E, Rabinowitz, G. 1991. Issues and Party Support in Multiparty Systems. American Political Science Review, 85:4,1107-1131.

[25] Lipset, S & Rokkan, S. 1967. Party Systems and Voter Alignments: Cross-national Perspectives. Free press

[26] Persson, T, Roland, G & Tabellini, G. 2007. Electoral rules and government spending in parliamentary democracies. Quarterly Journal of Political Science, 2:2, 155-88.

[27] Pettersson-Lidbom, P 2008. Do Parties Matter for Economic Outcomes? A Regression-Discontinuity Approach, Journal of European Economic Association 6:5, 1037–1056.

[28] Rohrschneider, R. 1993. New Party versus Old Left Realignments: Environmental Attitudes, Party Policies, and Partisan Affiliations in Four West European Countries. The Journal of Politics, 55:3, 682-7011.

[29] Rydgren, J. 2005. Is extreme right-wing populism contagious? Explaining the emergence of a new party family. European Journal of Political Research 44:3, 413 - 437.

[30] Rydgren, J. 2002. Radical Right Populism in Sweden: Still a Failure, But for How Long?. Scandinavian Political Studies, 25:1, 27 - 56.

[31] Statistics Sweden. Swedish National Election Studies, 1982-2002. Swedish National Data Service, Gothenburg (distributor)

[32] Svaleryd, J & Vlachos, J. 2009. Political rents in a non-corrupt democracy. Journal of Public Economics. 93: 3-4, 355-372.

[33] SOU. 2003. Etablering i Sverige. Möjligheter och ansvar för individ och samhälle. Swedish Government Official Reports 2003:75.

[34] Warren, P. 2008. State Parties and State Policies: A Double Regression Discontinuity Approach. (unpublished manuscript)

[35] Westholm, A. 1997. Distance versus Direction: The Illusory Defeat of the Proximity Theory of Electoral Choice. American Political Science Review, 91:4, 865-883 .

8. Appendix

8.1. Seat allocation methods

The basic idea behind proportional elections is to make the seat shares of the parties proportional to the vote shares. For this purpose, several types of methods can be used. The most common types are highest average methods, which are most common, and largest remainder methods.

The principle behind the highest averages methods is to distribute the seats one by one in consecutive rounds using a series of divisors. The divisors are calculated using the number of seats allocated to the party in previous rounds. In each round, the seat is awarded to the party with the highest resulting quotient. The procedure is repeated until all seats have been allocated. What sets the highest averages methods apart is the divisor series used. The two most common divisor series are the d'Hondt divisor series, "$1, 2, 3, 4, ...$" and the Sainte-Laguë divisor series, "$1, 3, 5, 7, ...$". In practice, the only difference between the d'Hondt and Sainte-Laguë divisor series is that the average threshold for getting the first seat is twice as large for d'Hondt. A common modification of the Sainte-Laguë divisor series, conveniently named the modified Sainte-Laguë divisor series, uses 1.4 as the first divisor. This has the effect of increasing the relative threshold for getting the first seat.

The principle behind largest remainder methods is to first divide the votes of the party with a quota representing the number of votes required for a seat. Each party is the given the number of seats corresponding to the integer of the quota. After that, one is usually left with unallocated seats. These seats are allocated on basis of the fraction of the quota that remains after subtracting the integer; hence the name of the method. What sets larger remainder methods apart is how the quota is calculated. The two most common quotas are the Hare quota ($\frac{V}{S}$) and the Drop quota ($1 + \frac{V}{1+S}$). The basic difference between using the different quotas is that the threshold for getting the first seat is higher when using the drop quota.

In general, the differences between using highest averages methods or largest remainder methods are not larger than the differences within in each class of methods (Lijphart, 1990). Using the Hare quota gives similar results as using the Sainte-Laguë divisor series, while using the Drop quota is similar to using the d'Hondt divisor series. For the method developed in this paper, there are important differences between highest averages methods and largest remainder methods, however. What method within each class that is used is of no importance.

The key difference between highest averages methods and largest remainder methods that is

relevant for this paper is in how to consider the distance to a seat threshold. The divisor series used for a party in largest averages methods is affected by the size of a party, while it is independent of the votes for the other parties. The opposite is true for the largest remainder methods. Since the same quota is used for all parties, it is independent of the size of the party, but dependent on the votes for the other parties. The consequence of this difference is that the distance to a seat threshold for a party is easier to define for the largest remainder method. This is because the minimal distance to a seat change can always be defined in how many votes the party would need to lose or gain to experience a seat change. For largest averages methods, the distance to a seat change is instead defined as the smallest total change in vote shares that would be needed for a party to experience a vote change. This will be explained in detail in the following part of the appendix.

8.2. Measuring the distance to seat threshold

The method is formalized for largest averages methods and, specifically, for the modified Sainte-Laguë divisor series. There are two reasons for using this divisor series. First, it is the divisor used in Swedish Municipalities. Second, it is the divisor series for which it is most complicated to calculate the distance to seat changes. This means that no complexity will be added when applying the method to other divisor series. To adjust the method to other divisor series, one simply has to change how the comparison numbers are calculated. How to measure the distances to the seat thresholds for largest remainder methods is discussed at the end of the appendix.

Before showing how the distance to a seat change is calculated, I need to introduce additional notation. The comparison numbe**r** the party will have when all seats are distributed is defined as $c_p(\widetilde{s}_p) = \frac{v_p}{1+2\widetilde{s}_p}\ if\ \widetilde{s}_p > 0$, $c_p(\widetilde{s}_p) = \frac{v_p}{1.4}\ if\ \widetilde{s}_p = 0$. The comparison number for the last seat given to a party is defined as $c_p(\widetilde{s}_p - 1) = \frac{v_p}{1+2(\widetilde{s}_p-1)}\ if\ \widetilde{s}_p > 1$, $c_p(\widetilde{s}_p - 1) = \frac{v_p}{1.4}\ if\ s_p = 1$. The comparison number for the last seat given to a party is defined as $\max(c_1(\widetilde{s}_1), c_2(\widetilde{s}_2), ..., c_p(\widetilde{s}_p)$. Similarly, the comparison number for the last seat distributed to a party, $c_{\min}(\widetilde{s} - 1)$, is defined as $\min(c_1(\widetilde{s}_1 - 1), (c_2(\widetilde{s}_2 - 1), ..., c_P(\widetilde{s}_p - 1))$.

To define and measure the distance to a seat threshold, I must first formally define seat thresholds and the conditions for parties gaining or losing a seat.

I define the threshold for gaining a seat as the comparison number for the seat distributed in the final round in the seat distribution. If a party is to gain a seat**,** its comparison for the number of seats it holds, $(c_p(\widetilde{s}_p)$, must be larger than $(c_{\min}(\widetilde{s} - 1)$. The condition for Party p gaining a seat

is thus:

$$c_p(\widetilde{s}_p) > c_{\min}(\widetilde{s} - 1). \tag{8.1}$$

I define the threshold for losing a seat through the comparison number of the party next in line to receive a seat, $c_{\max}(\widetilde{s})$. For a party to lose a seat, it must be that the comparison number for the last seat it got, $c_p(\widetilde{s}_p - 1)$, becomes smaller than $c_{\max}(\widetilde{s})$. The condition for Party p losing a seat is thus:

$$c_p(\widetilde{s}_p - 1) < c_{\max}(\widetilde{s}). \tag{8.2}$$

Per definition, is must always be the case that when one condition is met for a party the other condition must be met for another party. The intuition behind this is that a party cannot gain/lose a seat without another party losing/gaining a seat.

The conditions for having a seat change are used to calculate the distance to a seat change. It is important to note that the conditions for Party p cannot only be met through changes in votes for party p, but also through changes in votes for the other parties. This is clearly seen in the three-party setting illustrated in Figure 1.

What change in votes that is required for a specific change in comparison number is dependent on the number of seats held by a party since the divisor of each party is based on the number of seats it holds. To show this, I first take the derivative of the comparison number, $c_p(\widetilde{s}_p)$, with respect to votes

$$\frac{\partial c_p(\widetilde{s}_p)}{\partial v_{p(m_i)}} = \frac{1}{(1 + \widetilde{s}_p)}. \tag{8.3}$$

Then, I take the cross derivative with respect to the number of seats

$$\frac{\partial c_p(\widetilde{s}_p)}{\partial v_p \partial \widetilde{s}_p} = -\frac{1}{(1 + \widetilde{s}_p)^2}. \tag{8.4}$$

This has important implications for how the distance to a seat change is defined, since the vote changes required for parties to fulfill the condition for a seat change are dependent on the number of seats the party holds.

I will now illustrate how to measure the distance to a seat change in practice. This is done by separately calculating the vote changes required for a seat change under different scenarios. The

smallest vote change required under each of these scenarios will define the distance to a threshold for a party.

To illustrate the different scenarios, I will show the different scenarios under which Party 1 will gain a seat in a three-party setting, illustrated in Figure 10. Five different scenarios will be illustrated, denoted by a, b, c, d and e. For each scenario, I will also show how to calculate the distance to a seat change. In the different settings, Party 1 will either be next in line to receive a seat, $c_1(\widetilde{s}_1) = c_{\max}(\widetilde{s})$, see a and b, or second in line after Party 3 $c_1(\widetilde{s}_1) < c_3(\widetilde{s}_3)$, see c, d and e. Party 2 is always next in line to lose a seat.

The scenario is that Party 1 gains enough votes such that $c_1(\widetilde{s}_1) > c_2(\widetilde{s}_2 - 1)$. This is illustrated in a) and c). This vote change is calculated as follows:

$$\begin{aligned} \frac{c_2(\widetilde{s}_2 - 1) - c_1(\widetilde{s}_1)}{1.4} \; if \; \widetilde{s}_1 &= 0 \\ \frac{c_2(\widetilde{s}_2 - 1) - c_1(\widetilde{s}_1)}{1 + \widetilde{s}_1 * 2} \; if \; \widetilde{s}_1 &> 0. \end{aligned}$$

The second vote change is that either Party 2 or 3 loses enough votes such that $c_1(\widetilde{s}_1) > c_2(\widetilde{s}_2 - 1)$ or $c_1(\widetilde{s}_1) > c_3(\widetilde{s}_3 - 1)$. This vote change is illustrated in b. Even though Party 3 has a higher comparison number than Party 2, it could be that a smaller vote change is required for Party 3 if it holds less seats than Party 3. This vote change for Party 2 is calculated as follows (and similarly for Party 3):

$$\begin{aligned} \frac{c_2(\widetilde{s}_2 - 1) - c_1(\widetilde{s}_1)}{1.4} \; if \; \widetilde{s}_2 &= 1 \\ \frac{c_2(\widetilde{s}_2 - 1) - c_1(\widetilde{s}_1)}{1 + (\widetilde{s}_2 - 1) * 2} \; if \; \widetilde{s}_2 &> 1. \end{aligned}$$

The last two scenarios of vote changes are combinations of two parties having changes in their vote change, shown in d and e. In both these cases, Party 1 gains a seat from party 2. Here two things must happen. First Party 1 must be the next party in line to receive a seat, which will be the case if $c_1(\widetilde{s}_1) > c_3(\widetilde{s}_3)$. This can either be achieved by Party 1 gaining votes, see d, or by Party 3 losing votes, see e. Second, Party 2 must lose enough votes, such that $c_1(\widetilde{s}_1) > c_2(\widetilde{s}_2 - 1)$. Note that Party 2 must lose more votes in scenario e. The distance for the combination shown in d is calculated as follows. For simplicity, I only show the calculation for $\widetilde{s}_1 > 0$ & $\widetilde{s}_2 > 1$:

$$\frac{c_3(\widetilde{s}_3) - c_1(\widetilde{s}_1)}{1 + \widetilde{s}_1 * 2} + \frac{c_2(\widetilde{s}_2 - 1) - c_3(\widetilde{s}_3)}{1 + (\widetilde{s}_2 - 1) * 2} \; if \; \widetilde{s}_1 > 0 \; \& \; \widetilde{s}_2 > 1.$$

The distance for the combination shown in d is calculated as follows. For simplicity, I only show the calculation for $\widetilde{s}_3 > 0$ & $\widetilde{s}_2 > 1$:

$$\frac{c_3(\widetilde{s}_3) - c_1(\widetilde{s}_1)}{1 + \widetilde{s}_3 * 2} + \frac{c_2(\widetilde{s}_2 - 1) - c_1(\widetilde{s}_1)}{1 + (\widetilde{s}_2 - 1) * 2} \; if \; \widetilde{s}_3 > 0 \; \& \; \widetilde{s}_2 > 1.$$

Any of the votes changes described above could be the minimum vote change required for party 1 to gain a seat. Which one it is depends on how many seats are held by each party. The distance for Party 1 losing a seat is calculated in the same manner as described above. Extending the calculations to scenarios with more than three parties is straightforward. In principle, the calculations only have to be extended to take into account that the vote changes can occur in more dimensions.

8.3. Largest remainder methods

For largest remainder methods, it is simpler to calculate the distance to a seat threshold. This is due to the fact that the same quota is used for all parties. To see this formally, we can take the derivative of both the Hare, $\frac{V}{\widetilde{S}}$, and the Drop quota, $1 + \frac{V}{1+\widetilde{S}}$, with respect to the number of seats held by party p

$$\frac{\delta \frac{V}{\widetilde{S}}}{\delta \widetilde{s}_p} = 0 \tag{8.5}$$

$$\frac{\delta \left(1 + \frac{V}{1+\widetilde{S}}\right)}{\delta \widetilde{s}_p} = 0. \tag{8.6}$$

The vote change required for a seat change is independent of the size of a party. To calculate the distance to a seat change for Party p**,** one will thus only have to look at the vote change required for Party p.

8.4. Illustration of method

To illustrate how seats are distributed and how I define close elections in practice, consider the municipal election in Sigtuna, a municipality outside of Stockholm, in 1991. In Table 11, the key statistics for the election and the seat distribution are presented. The election included all seven national parties, New Democracy, ND, and a local party, *Loc*. The Social Democrats, S, is the largest party, followed by the Conservative Party, M. Note that the Conservative Party would have to gain around one percent of the votes to win an additional seat. It would only require a combined

vote change of around 0.1 percent of the votes for the local party and the Environmental Party, MP, for the Conservative Party to gain a seat from the local party. This illustrates the importance of looking at vote changes in all dimensions to define the minimum distance to a seat change.

In this election, if $\lambda = .25\%$, $c_M = c_{MP} = c_S = c_V = c_{Loc} = 1$, $t_S = t_{Loc} = \frac{1}{2}, t_M = t_{MP} = t_V = -\frac{1}{2}$, since the M, MP and V parties were close to winning another seat while the S and Loc parties were close to losing a seat. Both c_p and t_p are zero for all the other parties, $p = C, FP, KD, ND$, since neither of these parties were close to winning or losing a seat. Identification is based on the assumption variations in vote support within the narrow interval of $\lambda = .25\%$ being random. However, it is not random in what places parties are in close competition for seats. The average policy in these places is picked up by the dummy variables. However, conditional on being in these places, the outcome of the close seat competition is random and hence, I can investigate the effects of policy from these random seat allocations.

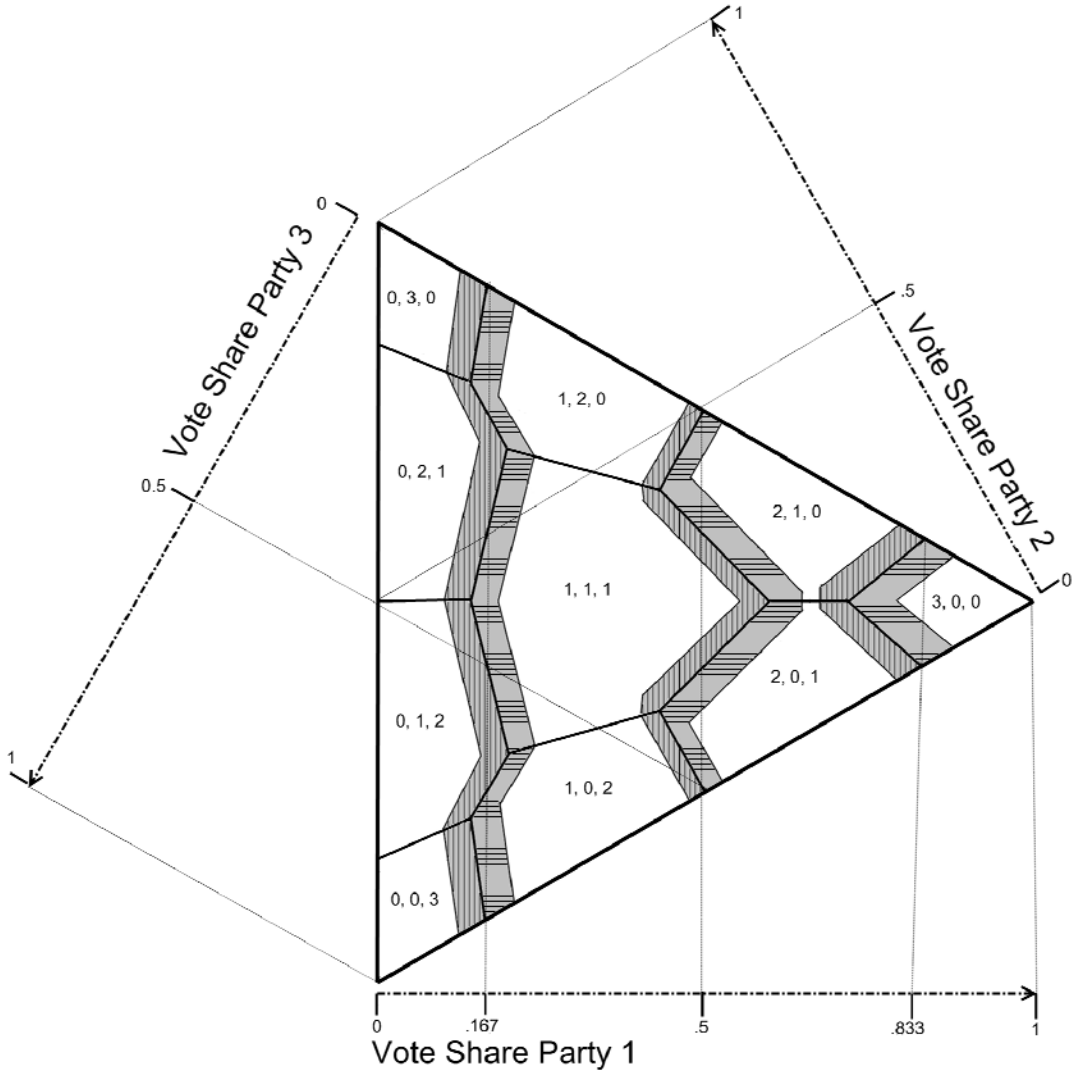

Figure 1. Distribution of three seats between three parties as a function of their respective vote shares. The number of seats of each party is written within each contiguous "seat outcome" region in the order Party 1, Party 2 and Party 3. Regions defined as close to a threshold for Party 1 are marked in grey. The vertical lines indicate that Party 1 is close to gaining a seat, while the horizontal line indicates its being close to losing a seat. The seats are allocated using the Sainte-Laguë method.

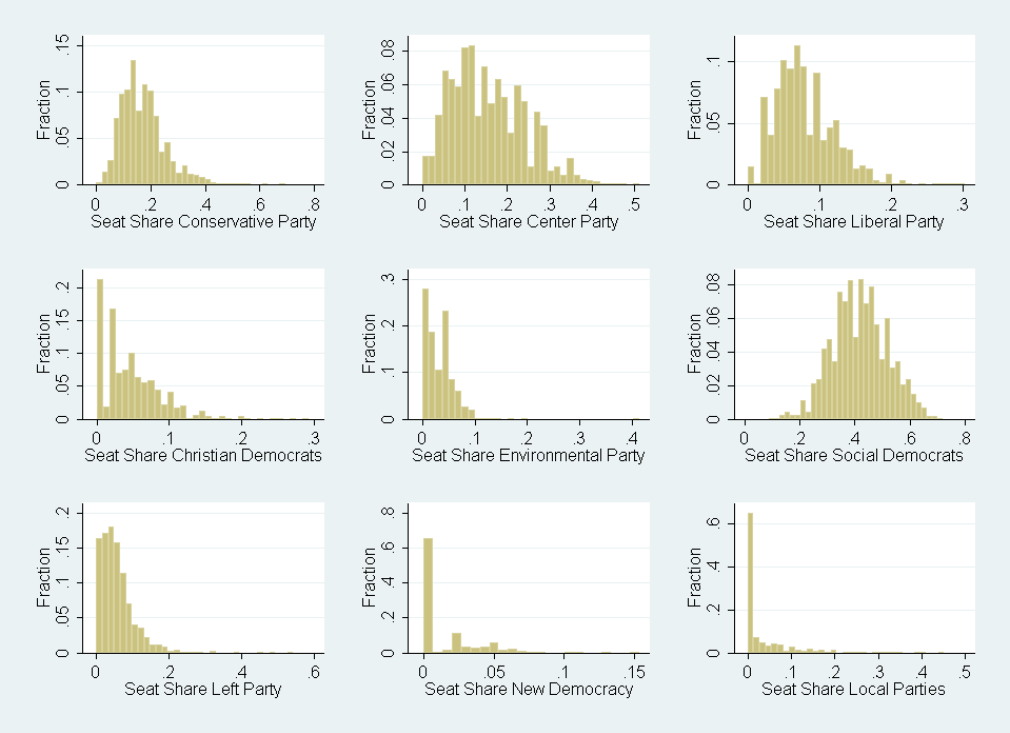

Figure 2. Histograms of the seat shares for all parties in the elections between 1982 and 2002 (only 1991 and 1994 for New Democracy).

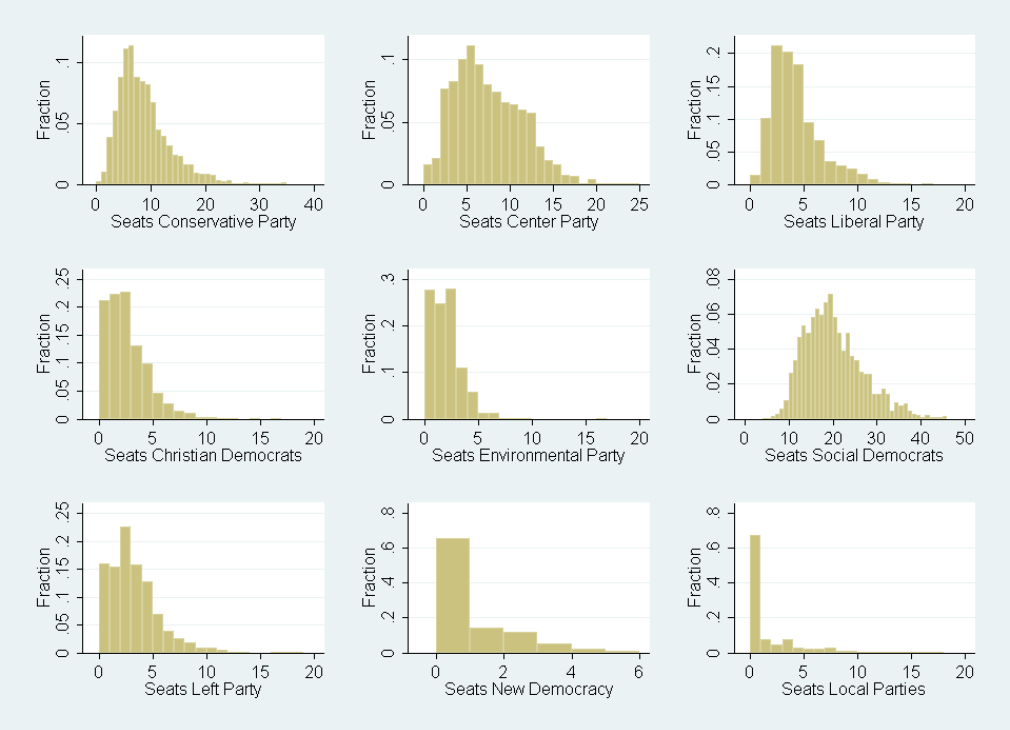

Figure 3. Histograms of the seats for all parties in the elections between 1982 and 2002 (only 1991 and 1994 for New Democracy).

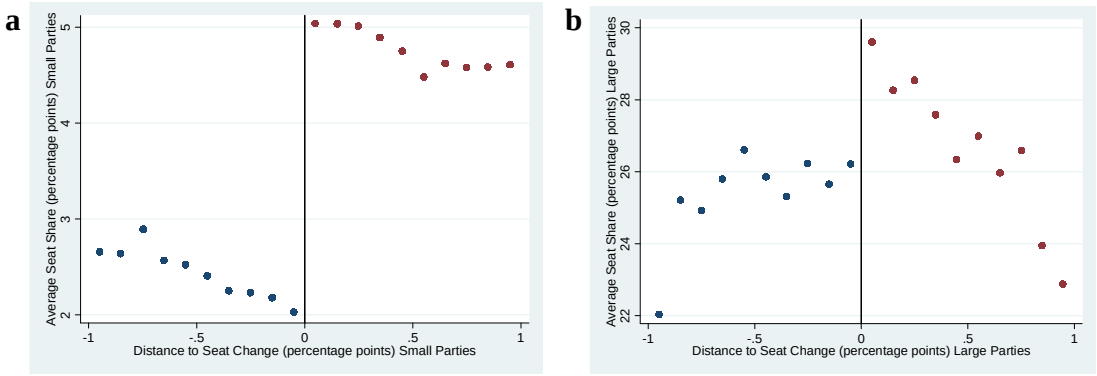

Figure 4. The average seat share by the distance to a seat change, measured in percentage points of the vote share, for parties with a vote share (a) under the median size (b) and over the median size. The width of the intervals is 0.1 percentage points.

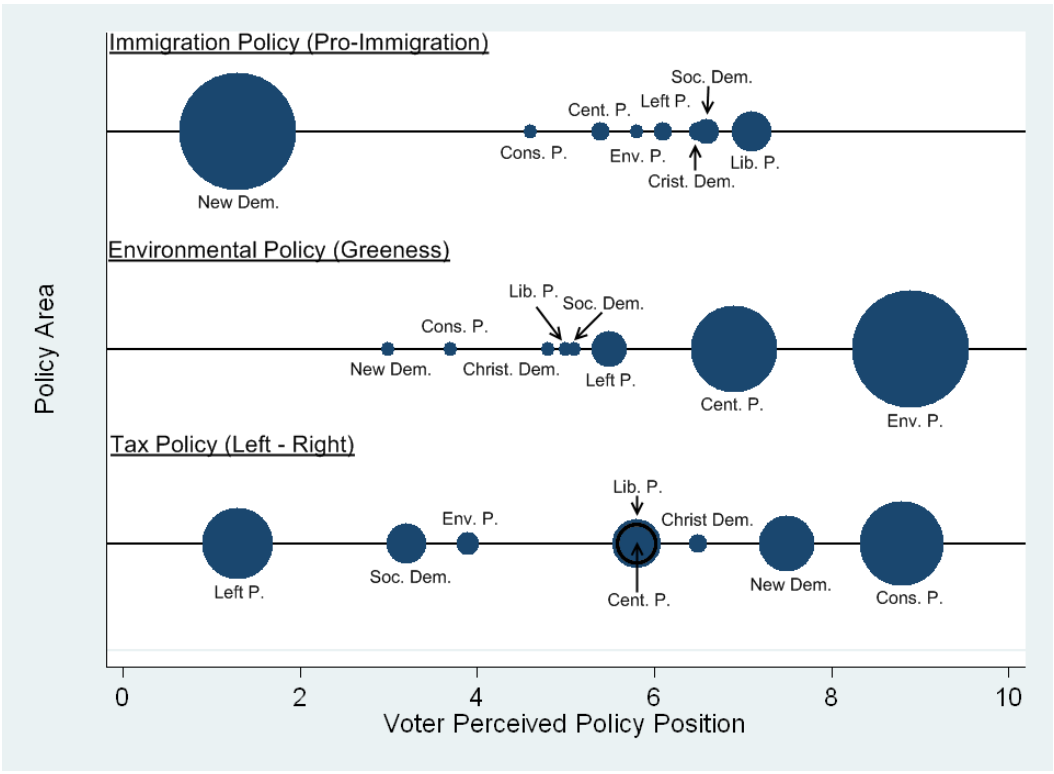

Figure 5. The voter perceived policy positions on immigration policy, environmental policy and tax policy on a scale between 0 and 10. The sizes of the markers are weighted according to the perceived importance of the policy area to each party.

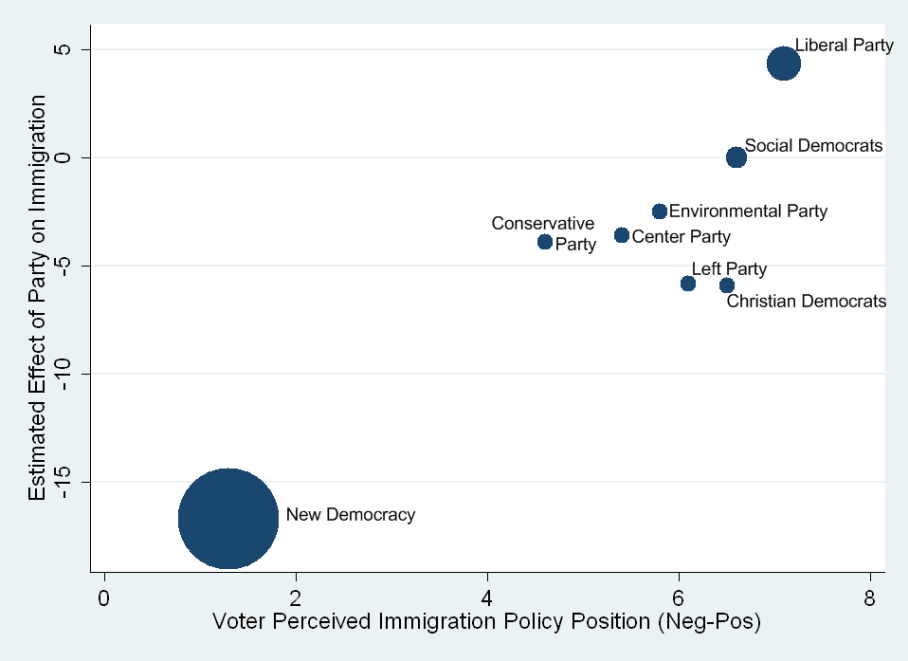

Figure 6. The point estimates for the effect on the placement of refugee immigrants of each party plotted against the voter assigned policy position on admitting more refugee immigrants to Sweden. The sizes of the markers are weighted according to the perceived importance of the policy area to each party.

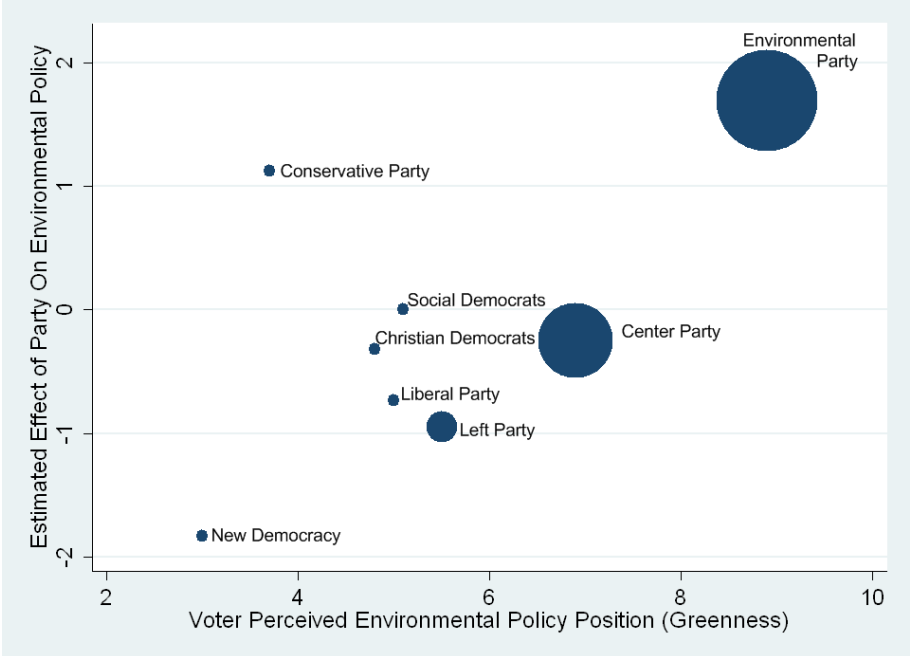

Figure 7. The point estimates for the effect on the environmental policy performance of each party plotted against the voter assigned policy position on the "green" policy spectrum. The sizes of the markers are weighted according to the perceived importance of the policy area to each party.

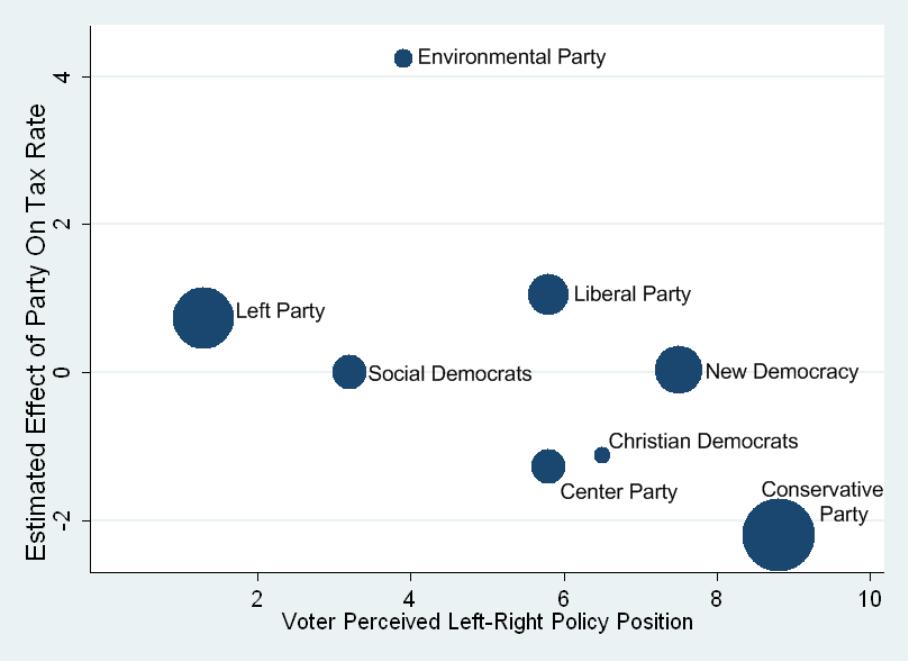

Figure 8. The point estimates for the effect on tax rate of each party plotted against the voter assigned policy position on the left to right scale. The sizes of the markers are weighted according to the perceived importance of the policy area to each party.

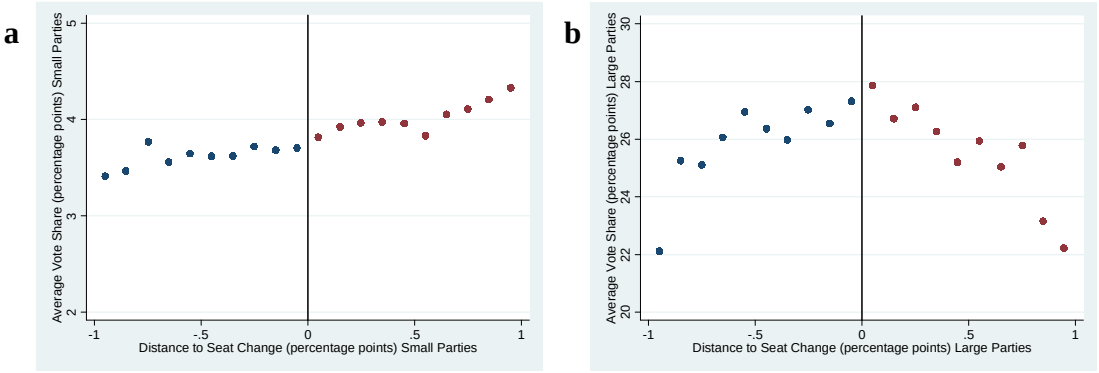

Figure 9. The vote seat share by the distance to a seat change, measured in percentage points of the vote share, for parties with a vote share (a) under the median size (b) and over the median size. The width of the intervals is 0.1 percentage points.

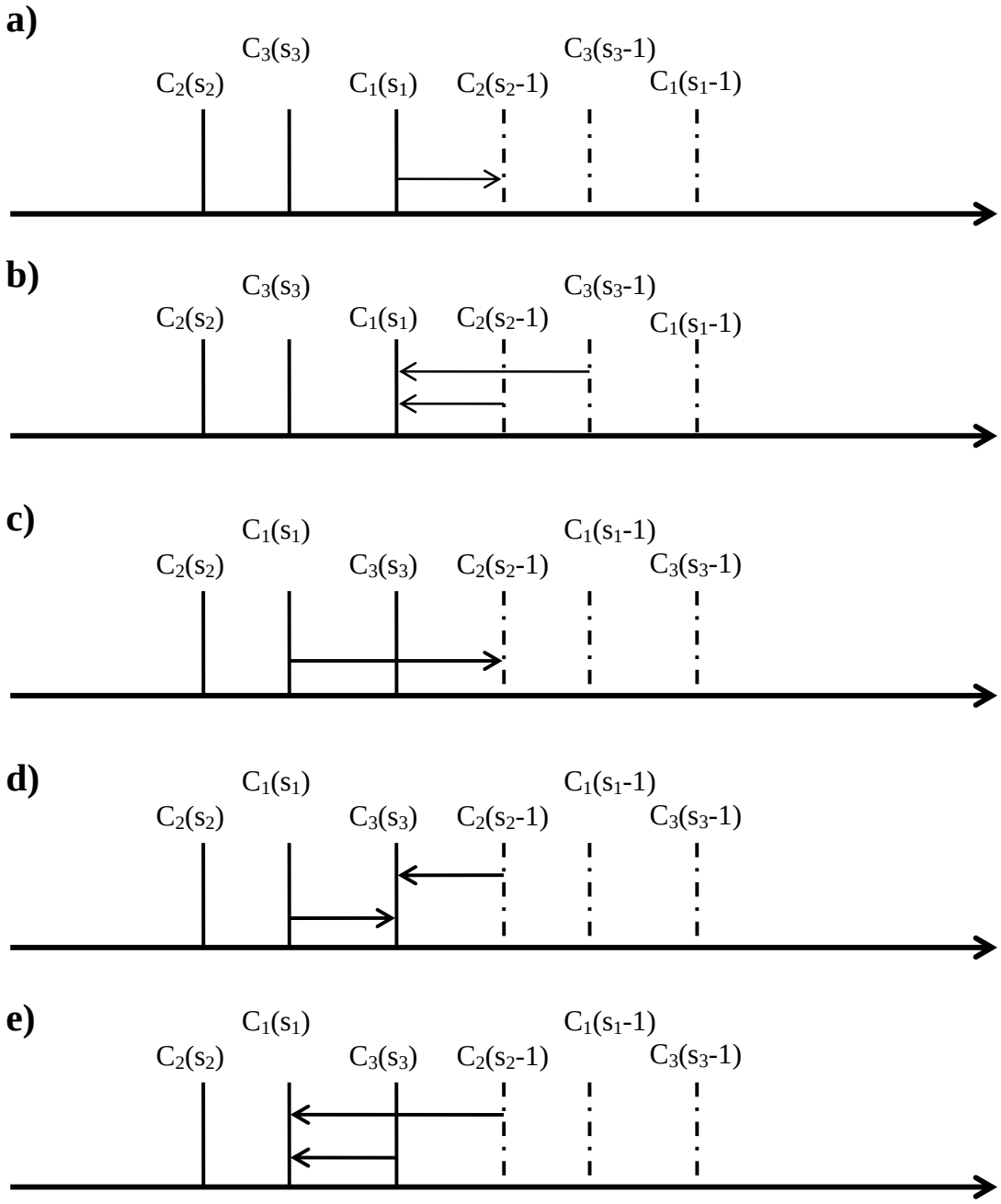

Figure 10. Illustration of different scenarios of vote changes leading to Party 1 gaining a seat. a) Party 1 increases its votes, such that $C_1(s_1) > C_2(s_2\text{-}1)$ b) **Either** Party 2 or 3 loses votes, such that $C_2(s_2\text{-}1) < C_1(s_1)$ or $C_3(s_3\text{-}1) < C_1(s_1)$. c) Party 1 increases its votes such that $C_1(s_1) > C_2(s_2\text{-}1)$. d) Party 1 increases its votes and Party 2 loses votes such that $C_1(s_1) > C_3(s_3)$ and $C_2(s_2\text{-}1) < C_1(s_1)$. e) Party 2 and 3 lose votes such that $C_3(s_3) < C_1(s_1)$ and $C_2(s_2\text{-}1) < C_1(s_1)$.

Table 1.
Descriptive statistics: Tax Rate 1983-2006, Placement of Refugee Immigrants 1986-2006, Environmental Ranking 1993-2000

Variable	Obs	Mean	Std Dev	Min	Max
Annual data					
Tax Rate	6882	19.1 %	2.6 %	9.7 %	33.3 %
Placement of Refugee Immigrants	5711	58.6	155.0	0	4023
Placement of Ref. Im. / 1000 inhabitants	5711	1.9	2.5	0	0.058
Relative environmental ranking	2494	54.7 %	18.5 %	5 %	100 %
Election Period Average					
Tax Rate	2001	18.9 %	2.6 %	10.2 %	32.9 %
Placement of Refugee Immigrants	1717	61.1	141.2	0	2426
Placement of Ref. Im. / 1000 inhabitants	1711	2.0	1.9	0	0.025
Relative environmental ranking	861	53.5 %	16.7 %	7.69 %	100 %

Table 2.
Notation, summary statistics 1982-2002

Party	Not	Vote-Share %		Left – Right		Immigration		Environment	
		Mean	*St.De.*	Pos	Imp	Pos	Imp	Pos	Imp
Conservative Party	**M**	17.4	8.6	8.8	0.45	4.6	0.00	3.7	0.01
Center Party	**C**	14.9	8.7	5.8	0.10	5.4	0.01	6.9	0.42
Liberal Party	**FP**	7.7	4.0	5.8	0.15	7.1	0.05	5.0	0.01
Christian Democrats	**KD**	5.1	3.9	6.5	0.02	6.5	0.01	4.8	0.01
Environmental Party	**MP**	3.4	2.4	3.9	0.03	5.8	0.00	8.9	0.79
Social Democrats	**S**	40.4	9.71	3.2	0.10	6.6	0.02	5.1	0.01
Left Party	**V**	6.1	5.0	1.3	0.33	6.1	0.01	5.5	0.07
New Democracy	**ND**	0.5	1.4	7.5	0.19	1.3	0.46	3.0	0.01
M, FP, KD & C	**Right**	45.2	11.7						
S, V	**Left**	46.6	11.6						

Table 3.
Estimated effects of seat share treatment variable on seat shares. Elections 1982-2002

	1	2	3	4	5	6
Seat Share of Party						
Conservative Party	0.59**	0.67**	0.50	0.77***	0.87***	0.92***
	(0.24)	(0.33)	(0.51)	(0.01)	(0.01)	(0.02)
Identifying obs	1010	605	283	1010	605	283
Center Party	0.77***	0.64*	0.95*	0.78***	0.87***	0.95***
	(0.26)	(0.35)	(0.54)	(0.01)	(0.01)	(0.02)
Identifying obs	969	574	269	969	574	269
Liberal Party	0.98***	1.16***	0.78***	0.80***	0.89***	0.95***
	(0.11)	(0.19)	(0.27)	(0.01)	(0.01)	(0.02)
Identifying obs	888	451	202	888	451	202
Christian Democrats	0.94***	0.97***	1.02***	0.82***	0.92***	0.98***
	(0.12)	(0.16)	(0.24)	(0.01)	(0.01)	(0.02)
Identifying obs	851	480	219	851	480	219
Environmental Party	0.92***	1.00***	0.89***	0.82***	0.90***	0.94***
	(0.08)	(0.14)	(0.27)	(0.01)	(0.01)	(0.02)
Identifying obs	776	453	191	776	453	191
Social Democrats	0.41**	0.38	0.19	0.70***	0.74***	0.84***
	(0.20)	(0.26)	(0.39)	(0.01)	(0.02)	(0.03)
Identifying obs	1354	961	491	1354	961	491
Left Party	0.84***	0.95***	1.57***	0.83***	0.92***	1.00***
	(0.17)	(0.24)	(0.33)	(0.01)	(0.02)	(0.03)
Identifying obs	814	441	205	814	441	205
New Democracy	0.76***	0.50**	0.44*	0.79***	0.87***	0.97***
	(0.15)	(0.24)	(0.27)	(0.04)	(0.05)	(0.08)
Identifying obs	132	68	32	132	68	32
Local Parties	0.04	-0.13	0.39	0.78***	0.86***	0.99***
	(0.36)	(0.49)	(0.69)	(0.03)	(0.04)	(0.06)
Identifying obs	365	226	98	365	226	98
Vote Share Control	no	no	no	yes	yes	yes
λ =	.5 %	.25 %	.1 %	.5 %	.25 %	.1 %

Robust standard errors, clustered on municipality, in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%. The dependent variable in each regression is the seat share of the party. The unit of observation is municipality in an election and the sample period is 1982-2002. The vote share control function is defined as a fourth-order polynomial.

Table 4.
Estimated effects of seat shares on policy outcomes

	Refugee Immigrants			Environmental Policy			Tax rate		
	1	2	3	4	5	6	7	8	9
Spec	**Base**	**2SLS**	**OLS**	**Base**	**2SLS**	**OLS**	**Base**	**2SLS**	**OLS**
Party									
Conservative Party	-3.89	-6.08	0.32	1.12	1.12	-0.09	-2.20	-2.76	-0.89
	(3.13)	(4.11)	(1.29)	(0.71)	(0.93)	(0.25)	(2.52)	(3.16)	(1.54)
Center Party	-3.59	-5.49	-1.21	-0.25	-0.42	0.07	-1.27	-1.42	-1.09
	(3.38)	(4.25)	(1.04)	(0.82)	(1.00)	(0.19)	(3.50)	(4.61)	(0.94)
Liberal Party	4.34	2.50	-2.24*	-0.73	-0.64	-0.13	1.05	1.25	0.34
	(3.67)	(4.38)	(1.25)	(0.91)	(1.04)	(0.30)	(2.46)	(3.19)	(2.50)
Christian Democrats	-5.91*	-7.43**	1.59	-0.32	-0.19	-0.12	-1.11	-1.08	-2.39
	(3.02)	(3.59)	(1.42)	(0.72)	(0.85)	(0.31)	(3.21)	(4.05)	(1.71)
Environmental Party	-2.51	-4.23	0.66	1.69**	1.97**	0.10	4.23	4.67	0.22
	(3.38)	(4.11)	(1.20)	(0.73)	(0.85)	(0.42)	(3.29)	(4.24)	(1.16)
Left Party	-5.83	-6.84	-0.64	-0.95	-0.99	0.15	0.73	0.44	0.89
	(3.95)	(4.47)	(0.97)	(1.01)	(1.06)	(0.23)	(3.85)	(4.45)	(0.90)
New Democracy	-16.7***	-19.9***	-2.28	-1.83	-2.05	-0.37	0.04	0.76	2.79*
	(6.06)	(7.48)	(1.59)	(1.31)	(1.57)	(0.42)	(6.96)	(8.24)	(1.54)
Local Party	-5.94	-8.79	1.38*	-0.21	0.02	-0.06	6.45	7.50	-0.92
	(5.33)	(6.52)	(0.76)	(0.90)	(1.08)	(0.16)	(11.51)	(13.98)	(0.67)
observations	1711	1710	1711	861	860	861	2001	2000	2001

Robust standard errors, clustered on municipality, in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%. λ = 0.25% for the reduced form and 2SLS specifications. Each specification includes a fourth-order polynomial of the vote shares, election period and municipality fixed effects. The unit of observation is a municipality in an election period, the sample period is 1985-2006 for refugee immigrants, 1993-2001 for environmental policy and 1982-2006 for the tax rate. The dependent variable for refugee immigrants is the log per capita number of placed immigrants. For environmental policy, the dependent variable is environmental ranking score relative to the maximal score and for the tax rate it is the municipal tax rate measured in percentage points.

Table 5.
Difference in representation effects between pairs of parties.

	Refugee Immigrants		Environmental Policy		Tax rate	
	1	2	3	4	5	6
	Gain					
Party	**Liberal Party**	**New Demo**	**Environ Party**	**Center Party**	**Conser Party**	**Left Party**
Lose						
Conservative Party	**8.2**	**-12.8**	0.6	-1.4		2.9
	(0.06)	**(0.04)**	(0.58)	(0.16)		(0.53)
Center Party	**7.9**	**-13.1**	**2**		-0.9	2
	(0.08)	**(0.05)**	**(0.05)**		(0.84)	(0.58)
Liberal Party		**-21**	**2.4**	0.4	-3.3	-0.4
		(0.00)	**(0.05)**	(0.68)	(0.36)	(0.94)
Christian Democrats	**10.2**	**-10.8**	**2**	0	-1.1	1.8
	(0.03)	**(0.09)**	**(0.04)**	(0.95)	(0.78)	(0.67)
Environmental Party	6.8	**-14.2**		**-2**	-6.4	-3.5
	(0.16)	**(0.05)**		**(0.05)**	(0.10)	(0.33)
Social Democrats	4.3	**-16.7**	**1.7**	-0.3	-2.2	(0.7
	(0.24)	**(0.01)**	**(0.02)**	(0.76)	(0.38)	(0.85)
Left Party	**10.1**	**-10.9**	**2.6**	0.6	-2.9	
	(0.03)	**(0.10)**	**(0.04)**	(0.58)	(0.53)	
New Democracy	**21**		**3.5**	1.5	-2.2	0.7
	(0.00)		**(0.03)**	(0.29)	(0.76)	(0.93)
Local Party	10.2	-10.8	**1.9**	-0.1	-8.7	-5.8
	(0.12)	(0.19)	**(0.08)**	(0.97)	(0.47)	(0.59)

The results from the baseline specification, shown in table 4, are used to construct the table. The effect of each party gaining a seat relative to each other party is shown in the columns, while the effect of losing a seat is shown in the rows. The differences that are significant at the 10% level are highlighted in bold. The P-values from F-tests for differences in effects between pair of parties are shown in parentheses.

Table 6.

Estimated effects of seat shares on the placement of refugee immigrants 1986-2006, alternative specifications

λ =	**0.5%**		**0.25 %**					**0.1%**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Conservative Party	-2.56	-1.30	-6.30	-4.12	-5.41	-3.89	-4.01	-3.48	-0.64
	(2.61)	(2.40)	(4.92)	(4.41)	(3.43)	(3.13)	(3.19)	(5.16)	(4.62)
Center Party	-0.31	-0.92	-4.43	-3.97	-3.33	-3.59	-3.38	0.08	-3.25
	(2.81)	(2.51)	(5.35)	(4.88)	(4.03)	(3.38)	(3.36)	(6.30)	(5.61)
Liberal Party	0.60	0.59	5.57	6.19	3.20	4.34	4.18	10.16*	8.99
	(2.63)	(2.53)	(5.36)	(4.86)	(3.92)	(3.67)	(3.61)	(5.96)	(5.87)
Christian Democrats	-2.27	-1.14	-9.3**	-8.71*	-5.92*	-5.91*	-6.24**	-8.28	-9.55**
	(2.78)	(2.49)	(4.53)	(4.43)	(3.54)	(3.02)	(3.04)	(5.79)	(4.72)
Environmental Party	0.06	-2.45	-1.90	1.57	-0.03	-2.51	-2.44	-1.96	2.53
	(2.59)	(2.37)	(5.43)	(4.60)	(3.89)	(3.38)	(3.41)	(6.78)	(5.39)
Left Party	-2.98	-1.70	-9.62*	-8.68*	-11.8***	-5.83	-5.83	-8.93	-2.53
	(2.85)	(2.69)	(5.73)	(4.89)	(4.00)	(3.95)	(3.93)	(5.81)	(5.67)
New Democracy	-8.61	-9.64**	-13.1	-14.1	-18.8**	-16.7***	-16.9***	-9.72	-13.4**
	(6.25)	(4.46)	(10.2)	(11.57)	(8.41)	(6.06)	(6.01)	(6.18)	(6.41)
Local Party	-9.23**	-7.09*	-16.7**	-14.9**	-7.00	-5.94	-6.23	0.29	2.11
	(4.45)	(3.71)	(8.29)	(7.37)	(6.47)	(5.33)	(5.38)	(8.57)	(7.79)
Vote Share Control	yes	yes	no	yes	yes	yes	yes	yes	yes
Election Period F.E	yes	yes	no	no	yes	yes	yes	yes	yes
Municipality F.E	no	yes	no	no	no	yes	yes	no	yes
Control Varaibles	no	no	no	no	no	no	yes	no	no
observations	1711	1711	1711	1711	1711	1711	1711	1711	1711

Robust standard errors, clustered on municipality, in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%. The dependent variable is the log of the number of placed immigrants per capita. The unit of observation is a municipality in an election period and the sample period is 1985-2006.

Table 7.
Estimated effects of seat shares on environmental policy performance 1993-2001

λ =	0.5%		0.25 %					0.1%	
	1	2	3	4	5	6	7	8	9
Conservative Party	0.43	0.62	0.38	1.07	1.03	1.12	1.32*	2.47*	2.82***
	(0.62)	(0.53)	(0.89)	(0.84)	(0.82)	(0.71)	(0.71)	(1.29)	(1.06)
Center Party	0.37	0.10	0.70	0.77	0.48	-0.25	-0.27	1.06	1.73
	(0.65)	(0.55)	(0.98)	(0.95)	(0.93)	(0.82)	(0.83)	(1.54)	(1.33)
Liberal Party	-0.01	-0.35	0.96	1.65	1.43	-0.73	-0.75	0.92	1.33
	(0.67)	(0.60)	(1.02)	(1.01)	(1.02)	(0.91)	(0.92)	(1.67)	(1.36)
Christian Democrats	-0.44	-0.10	-1.23	-0.61	-0.58	-0.32	-0.49	-0.48	-0.46
	(0.58)	(0.52)	(0.97)	(0.91)	(0.91)	(0.72)	(0.72)	(1.27)	(1.16)
Environmental Party	0.73	0.69	2.47***	2.18**	1.88**	1.69**	1.64**	0.66	1.60
	(0.66)	(0.60)	(0.92)	(0.85)	(0.82)	(0.73)	(0.74)	(1.26)	(1.16)
Left Party	-1.13	-0.34	-0.78	-1.27	-1.11	-0.95	-0.83	0.67	1.40
	(0.75)	(0.63)	(1.06)	(1.02)	(1.00)	(1.01)	(1.00)	(1.62)	(1.44)
New Democracy	-0.93	-1.61	-0.23	-0.02	-0.05	-1.83	-1.72	-1.30	-0.11
	(1.35)	(1.03)	(1.95)	(1.90)	(1.86)	(1.31)	(1.34)	(2.71)	(2.00)
Local Party	-0.87	-0.52	-0.76	-0.69	-0.61	-0.21	-0.08	-0.72	-0.38
	(0.94)	(0.81)	(1.33)	(1.28)	(1.24)	(0.90)	(0.88)	(1.42)	(1.42)
Vote Share Control	yes	yes	no	yes	yes	yes	yes	yes	yes
Election Period F.E	yes	yes	no	no	yes	yes	yes	yes	yes
Municipality F.E	no	yes	no	no	no	yes	yes	no	yes
Control Varaibles	no	no	no	no	no	no	yes	no	no
observations	858	858	858	858	858	858	858	858	858

Robust standard errors, clustered on municipality, in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%. The dependent variable is the score in the environmental ranking relative to the maximal score. The unit of observation is a municipality in an election period, the sample period is 1993-2001.

Table 8.
Estimated effects of seat shares on the tax rate 1983-2006

λ =	0.5%		0.25 %					0.1%	
	1	2	3	4	5	6	7	8	9
Conservative Party	-3.23	-2.50	-5.28	-5.99	-2.07	-2.20	-2.60	-7.69	-8.63*
	(3.26)	(2.40)	(10.39)	(7.72)	(5.80)	(2.52)	(2.52)	(9.45)	(4.79)
Center Party	-0.84	-0.73	5.20	1.64	1.31	-1.27	-1.50	-6.91	-4.48
	(2.66)	(1.86)	(10.83)	(7.65)	(4.59)	(3.50)	(3.34)	(8.16)	(4.31)
Liberal Party	-0.60	0.25	-9.50	-3.64	3.24	1.05	0.64	8.74	2.60
	(4.30)	(1.78)	(11.48)	(8.40)	(6.05)	(2.46)	(2.49)	(9.18)	(5.28)
Christian Democrats	-2.30	-2.05	4.89	0.68	-4.48	-1.11	-0.74	-4.15	-5.64
	(3.24)	(2.16)	(9.87)	(7.66)	(3.59)	(3.21)	(3.06)	(6.90)	(4.38)
Environmental Party	1.07	5.04***	-9.30	-5.32	3.93	4.23	3.25	-1.96	2.64
	(2.47)	(1.83)	(10.93)	(8.39)	(5.91)	(3.29)	(2.82)	(7.25)	(4.78)
Left Party	11.18**	2.09	12.94	2.78	8.30	0.73	-0.11	4.82	-1.74
	(5.45)	(2.38)	(12.30)	(9.13)	(6.53)	(3.85)	(3.06)	(10.54)	(5.40)
New Democracy	-4.98	4.48	1.47	-15.04	-0.50	0.04	-1.61	3.77	2.12
	(9.10)	(5.21)	(14.16)	(14.53)	(10.79)	(6.96)	(7.05)	(13.84)	(8.74)
Local Party	-0.82	2.24	13.19	22.1**	-0.72	6.45	5.37	3.38	13.64
	(4.98)	(6.42)	(15.79)	(10.45)	(7.62)	(11.51)	(10.15)	(12.17)	(15.55)
Vote Share Control	yes	yes	no	yes	yes	yes	yes	yes	yes
Election Period F.E	yes	yes	no	no	yes	yes	yes	yes	yes
Municipality F.E	no	yes	no	no	no	yes	yes	no	yes
Control Variables	no	no	no	no	no	no	yes	no	no
observations	2001	2001	2001	2001	2001	2001	1994	2001	2001

Robust standard errors, clustered on municipality, in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%. The dependent variable is the municipal tax rate measured in percentage points. The unit of observation is a municipality in an election period, the sample period is 1985-2006 for refugee immigrants, 1993-2001 for environmental policy and 1982-2006 for the tax rate.

Table 9.

Robustness check, Estimated effects of seat shares on real income, education, share of children and population.

Party	Real Income		Education		Share of Children		Population	
Conservative Party	-67.8*	-9.8	-1.4	0.5	-1.9	1.9	-0.67	-0.32*
	(38.9)	(16.7)	(9.6)	(3.4)	(6.9)	(2.7)	(2.54)	(0.17)
Center Party	-8.2	23.2	-4.1	1.7	-9.4	0.3	-1.25	0.34
	(42.7)	(14.7)	(9.1)	(3.2)	(6.2)	(3.1)	(2.41)	(0.22)
Liberal Party	-71.7	-6.1	-14.1*	-5.3	-3.3	1.0	3.61	-0.18
	(44.6)	(17.1)	(8.2)	(4.1)	(7.3)	(3.1)	(2.75)	(0.21)
Christian Democrats	-41.1	12.3	-3.5	4.4	-11.4*	-0.7	0.78	0.15
	(43.2)	(15.5)	(8.4)	(3.4)	(6.4)	(3.3)	(2.41)	(0.20)
Environmental Party	-64.2*	6.8	0.5	-0.0	-3.6	-2.4	-2.45	-0.21
	(37.3)	(12.9)	(7.8)	(3.1)	(7.7)	(3.1)	(2.64)	(0.18)
Left Party	-53.9	30.8	-13.9	1.3	-5.9	-1.6	-0.43	0.03
	(42.8)	(23.2)	(10.7)	(4.2)	(7.5)	(3.7)	(2.96)	(0.20)
New Democracy	57.4	-8.3	12.4	-4.8	-4.5	-1.6	6.47	-0.37
	(75.1)	(25.6)	(15.6)	(4.3)	(15.7)	(6.0)	(6.20)	(0.30)
Local Party	13.3	-10.0	3.5	7.5	3.8	5.6	-6.48	0.52
	(76.6)	(22.3)	(14.2)	(6.4)	(10.9)	(4.6)	(4.08)	(0.32)
Mun. FE.	no	yes	no	yes	no	yes	no	yes
Observations	1429	1429	1994	1994	1994	1994	1994	1994

Robust standard errors, clustered on municipality, in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%. λ = 0.25%. Each specification includes election period fixed effects and a fourth-order polynomial of the vote shares. The unit of observation is the municipality average in an election period and the sample period is 1982-2006 for all outcomes except real income, for which it is 1988-2006. The dependent variable for real income is income per capita measured in thousands of SEK in 1990 prices. For population and share, it is defined as the share of the population with tertiary education and younger than 15 years, respectively. The dependent variable for population is defined as the log of the municipal population.

Table 10.
Heterogeneous representation effects with respect to winning the first seat.

			1	2	3
	Treatment Variable	Share of Observation	**Refugee Immigrants**	**Environmental Policy**	**Tax rate**
Conservative Party	*Seat Share*	99%	-2.84	1.23	-2.53
			(3.22)	(0.76)	(2.65)
	First Seat	1%	-120***	0.00	-13.84
			(28.1)	(0.00)	(32.38)
Center Party	*Seat Share*	97%	-2.49	-0.28	-1.25
			(3.38)	(0.86)	(3.72)
	First Seat	3%	-31.04	7.48	-18.96
			(21.27)	(5.52)	(13.30)
Liberal Party	*Seat Share*	94%	3.81	-0.92	-1.34
			(3.79)	(0.95)	(2.76)
	First Seat	6%	-35.2	0.03	31.84*
			(33.2)	(7.60)	(17.00)
Christian Democrats	*Seat Share*	72%	-2.13	-0.91	0.68
			(3.71)	(0.86)	(4.02)
	First Seat	28%	-9.63	2.92*	-5.11
			(8.55)	(1.76)	(6.39)
Environmental Party	*Seat Share*	70%	-3.58	2.44**	4.05
			(3.93)	(0.94)	(3.52)
	First Seat	30%	-2.33	-6.11***	-1.71
			(6.84)	(2.04)	(5.25)
Left Party	*Seat Share*	87%	-7.14*	-1.57	1.72
			(4.33)	(1.04)	(4.51)
	First Seat	13%	15.99*	4.92**	-5.53
			(9.66)	(2.27)	(8.13)
New Democracy	*Seat Share*	43%	-22.00	-1.07	-5.37
			(13.74)	(1.98)	(12.50)
	First Seat	57%	12.86	-4.55	13.01
			(15.99)	(2.80)	(16.58)
Local parties	*Seat Share*	85%	-4.56	-0.49	12.39
			(6.07)	(1.05)	(12.26)
	First Seat	15%	18.05	1.05	-36.89
			(16.88)	(5.33)	(32.57)
Observations			1711	861	2001

Robust standard errors, clustered on municipality, in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%. $d = 0.25\%$. The treatment variable labeled seat share is the seat share treatment variable from the baseline specification. The treatment variable labeled *first seat* is the dummy for being close to the threshold for the first seat interacted with the seat share treatment variable. Each specification includes a fourth-order polynomial of the vote shares, dummy variables for each party being close to the threshold for the first seat, election period and municipality fixed effects. The unit of observation is a municipality in an election period, the sample period is 1985-2006 for refugee immigrants, 1993-2001 for environmental policy and 1982-2006 for the tax rate.

Table 11.
Election Data from Sigtuna 1991.

Party	Cons.	Cent.	Lib.	Chr.	Env.	Soc.	Left	N. D.	Local
Vote Share %	31.24	6.21	9.59	3.71	3.04	36.64	2.96	4.79	3.11
Seats	15.00	3.00	5.00	2.00	1.00	18.00	1.00	2.00	2.00
Seat Share %	3.61	6.12	1.20	4.08	2.04	36.73	2.04	4.08	4.08
Dis gain ind %	.92	1.05	1.82	1.47	.08	1.75	.16	.40	2.07
Dis gain all %	**.10**	.95	1.62	1.42	**.08**	.75	**.16**	.35	2.02
Dis lose ind %	1.88	1.15	.48	.68	1.62	1.21	1.54	1.75	.08

Note:. "Dis gain ind" and "Dis lose ind" is the distance to a threshold measured in the individual parties' votes. "Dis gain all" and "Dis lose all" are the distance to a threshold measured in percentage points. The distance measure is in bold if the party is within .25% of a threshold.