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## Abstract

Rain affects electoral turnout both through a direct effect on the cost of voting and by changing the opportunity cost. In a panel of Norwegian municipalities I find that rain on Election Day increases turnout. As turnout affects electoral outcomes, rain provides an exogeneous source of variation, and hence an instrument, for the party composition of the municipal council. I use this to estimate the causal effect of party composition on politics. I find that an increased share to left wing parties shift spending from education to kindergartens. Beyond this, there are few strong causal effects of political composition.

JEL-Code: C260, D720, H110, H700.

Keywords: rain, electoral turnout, instrumental variables, economic policy.

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# 1 Introduction

It seems obvious that political parties affect politics. Still, politicians also listen to their voters. Hence there is necessarily a trade off between the preferences of the electorate and those of the politicians in power. Indeed, in many of the standard models in the study of political economics, such as the median voter and probabilistic voting models, there is full policy convergence so both parties propose identical platforms. Other models, such as citizen candidate models[1] represent the other extreme: once a politician has been elected, policies correspond perfectly to his preferences. There are also theories of intermediate case where policies are determined as a compromise between voter preferences and political ideologies.[2]

Knowing whether political parties really matter is important to gain a proper understanding of policy making in democratic societies. A society where voters get their preferred outcome independently of which party is in power is a different society from one where policy is perfectly determined by the party in power. The former corresponds more to a consensual approach to policymaking where one can also expect policies to be fairly stable over time.

It is not trivial to determine the extent to which policies depend on politician characteristics or party is in power. Simply comparing politics in constituencies run by policies with different ideological basis may not be sufficient to answer the question.[3] One reason is that politicians at least partially may listen to their voters, and the elected candidates also depend on the orientation of the voters.

To identify the causal effect of parties on policies, I suggest an instrumental variables approach. If an instrument for election outcomes were available, estimation would be straightforward. But as most factors affecting electoral outcomes also affect political decisions, such instruments are not abundant. In this paper, I suggest to look for an instrument for electoral turnout. As there is typically a relationship between turnout and electoral outcomes, such an instrument would also be a valid instrument for political outcomes.

One exogeneous factor that is believed to affect turnout is the weather. There are at least two channels through which this may happen: On the one hand, when it's raining it is more unpleasant to get to the polling station, indicating a negative relationship between rain and turnout. On the other hand, rain may also affect the utility of alternative activities, and hence increasing turnout by reducing the opportunity cost.

[1] See Besley and Coate (1997) and Osborne and Slivinski (1996).

[2] This class of models were initiated by Wittman (1983).

[3] Such approaches have a long tradition though. See Erikson et al. (1989) and the references therein for some approaches along these lines and Sørensen (1995) and Borge and Sørensen (2002) for studies on Norwegian data. Besley and Case (2003) survey the literature on the US and Blais et al. (1993) the cross country evidence. Generally they find fairly weak effects of parties on policies.

There has recently been several papers documenting a relationship between weather[4] and electoral turnout, starting with Gomez et al.'s (2007) study of the effect of rain and snow on US electoral turnout.This approach was further elaborated by Hansford and Gomez (2010) and Fraga and Hersh (2011), and similar results are found in Japanese, Dutch, and Spanish data (Horiuchi and Saito, 2009; Eisinga et al., 2012b; Artés, 2014). For Sweden, however, Persson et al. (2014) find no robust relationship between turnout and the weather.[5]

In Norwegian municipal elections, I find that rain on election day has a negative impact on turnout, so the opportuniy cost effect dominates the unpleasant to vote-effect. In general, rain reduces turnout by about 0.7 percentage points. Moreover, an increase in turnout due to rain on election day seems to hurt the left wing parties and advantage the right wing and local parties. Using rain to instrument for political composition of the municipal council, I find that a positive shock to the left wing share shifts expenditures from education to child care. Otherwise, I find no robust causal effects of the political composition on neither expenditure patterns nor other political outcomes.

Two other main approaches have been suggested to study the effect of parties on policies. The most widely used is varieties of regression discontinuity designs, pioneered virtually simultaneously by Lee et al. (2004) and Pettersson-Lidbom (2008).[6] Lee et al. (2004) use narrow elections to the US House. They claim that when elections are sufficiently narrow, the outcome is almost random. With this approach, they fint that voters have an impact on who are elected but little influence beyond that. Ferreira and Gyourko (2009) study US cities with a similar design and find little effect of party affiliation. They explain this by a higher level of homogeneity at the local level than the national level. With a similar design on Swedish data, Pettersson-Lidbom (2008) find that municipalities controlled by left leaning politicians have both higher levels of spending and taxation. Sweden, as many other countries, has a multi party system, so it is not clear how we should define a "close election". Petterson-Lidbom solves the problem by grouping parties, hence forming an artificial two party system. Folke (2013) is critical to the validity of his findings: first he estimates the effect of getting a majority which may differ from actually getting the power. Second, he may miss some ways in which parties may affect politics. Instead, Folke advocates a procedure where he uses the randomness in close races between any two parties for any seat in the council. He finds that party composition has

[4]A massive literature studying the effect of the weather on a range of economic outcomes such as agricultural and industrial output, health, and conflict has also appeared in recent years. See Dell et al. (2014) for a survey.

[5]Weather has also been used to instrument for participation in other political events. Collins and Margo (2007) use rainfall in April 1968 to instrument for participation in the 1960s riots. Madestam et al. (2013) use rainfall to instrument for participation in Tea Party rallies and find that higher participation led to more conservative policies. Along similar lines, Kurrild-Klitgaard (2013) looks at temperature and participation in May day demonstrations.

[6]Both have working paper versions from 2001.

a major impact on environmental and immigration policy in Sweden, but only a small effect on tax policy. Fiva et al. (2014) use a similar technique to analyze Norwegian data. They find that a larger left-wing block leads to more property taxation, higher child care spending and less elderly care spending. Other approaches to handle multi party systems have also been suggested by Freier and Odendahl (2012) and Kotakorpi et al. (2013), although the latter with somewhat different objectives in mind.[7]

The second approach is varieties of natural experiments. Chattopadhyay and Duflo (2004), for instance, use the random allocation of seat reservation in Indian Gram Panchayats to identify the effect on politician gender. Fujiwara (2013) use a random phase-in of electronic voting technology in Brazil to show the effect of increased political power to poor voters. In a similar vein, Montalvo (2011) study the effect of the 2004 terrorist attacks on Madrid as a random shock to the elections. He argues that this helped the socialist party and had an impact on subsequent policies. There are furthermore attempts at using randomized trials, particularly to study the determinants of turnout (Green et al., 2012). Gerber et al. (2009), for instance, randomly assigned newspaper subscriptions to voters in the 2005 gubernatorial elections in Virginia. They found that this increased both turnout and support for the Democrats. Galasso and Nannicini (2013) distributed differentiated electoral information. They found that this has an effect on turnout, but that the effect differs between men and women.

Both approaches have shortcomings, though. The approaches based on natural experiments are interesting, but suitable natural experiments are not always at hand, making this approaches less generally applicable. Regarding regression discontinuity designs, it seems plausible that the outcomes of close elections are almost random. Still, there are signs of systematic sorting. Caughey and Sekhon (2011) find that the winners of close elections systematically were the predicted winners, and also that the winners had financial, experience, and incumbency advantages over their opponents in US elections. Vogl (2014) find that in mayoral elections between black and white candidates, black victories are more common than black losses in the US South. Moreover, Grimmer et al. (2011) argue that elections that are predicted to be close draw more resources, so winners in these elections are different form other electoral winners. They also provide empirical evidence of structurally advantaged candidates being more likely to win US House elections. This is also supported by Galasso and Nannicini (2011), who find that parties tend to allocate better politicians to closer races. Finally, as typically few elections are very close it is necessary to use a wider window to get an appropriate sample. Then the randomness of the outcome is jeopardized. Some of these critiques have been refuted by Eggers et al.

[7] Regression discontinuity approaches have also been used to study other features of political outcomes. Lee (2008) uses it to study the effect of incumbency advantages, and Ade and Freier (2013) to study the the externalities from incumbency. Clots Figueras (2011; 2012) use this method to identify the effect of politician gender on political outcomes. Eggers and Hainmueller (2009), Willumsen (2011) and Kotakorpi et al. (2013) use the technique to study the economic returns from political office.

(2014). In particular, they show that the although incumbency advantage is present in close elections to the US House, the same effect is not found in a vast number of elections to other US bodies and in other countries. Still, it may be less random in which constituencies elections are narrow, so findings from such analyses may not generalize to politics in general. Hence although studies based on regression discontinuities have an irrefutable merit, it is still useful to study alternative techniques to validate the findings. This is the objective of this paper.

Finally, there is a literature studying whether changes in electoral turnout has an effect on politics. Mueller and Stratmann (2003) show that increased participation leads to a more even distribution of income, but at the expense of reduced growth rates. Fumagalli and Narciso (2012) show that higher voter participation tends to increase government expenditure, total revenues, welfare state spending, and budget deficits.

# 2 Weather and political outcomes

The weather affects political outcomes in several ways. The most important link is probably through the effect the weather has an impact on turnout, which again affects which voters turn out to vote and hence political outcomes. There could also be cases where the weather on election day has a direct impact on voters' political preferences and party choices. It has among other things been found that answers to subjective well-being surveys are affected by the weather on the day of the interview (Connolly, 2013). Also, male workers work more on rainy days (Connolly, 2008) and labor productivity is higher (Lee et al., 2014). Although I won't try to go into any exact mechanisms, we may easily imagine that the weather could have an impact on voters' mood and hence how they cast their vote. Extreme weather conditions could maybe also make voters more aware of questions of climate change and shift their vote toward parties with a greener agenda.

## 2.1 Weather and electoral turnout

There is a vast literature on the determinants of turnout. Most of the literature on rational participation in elections, going at least back to the seminal work of Downs (1957), starts with the assumption that a voter votes whenever

$$pB - C > D \tag{1}$$

In this equation, $p$ is the probability of the vote changing the outcome of the election, $B$ the utility of changing the outcome of the election in own favor, $C$ costs of voting, and $D$ the pleasure from voting beyond of its impact on electoral outcomes.

The effect of weather on turnout can mostly be explain by its impact on the cost of voting $C$. One part of this cost is the effort of going to the polling station. When it is raining or the weather is unpleasant in other ways, this task is more daunting, which may decrease turnout. An equally important, albeit less famous, cost is the opportunity cost of voting. Voting takes time, and the more valuable ones time is, the higher the cost is. When the weather is “nice”, the opportunity costs is then higher: Most importantly, the recreational value of the time is higher. In Norway, which I study in this paper, elections take place in early September. In this period, some of the last days of pleasant weather before the winter arrives usually occur. On such days, going voting may not achieve top priority. A dry day in early September may also be one of few opportunities for farmers to harvest their crops.

Hence it is likely that the weather has an impact on electoral turnout, but it is not trivial which sign such a relationship should have. Below, I find that the opportunity cost effect dominates in the case of Norway.

## 2.2 Turnout and electoral outcomes

There is a large literature on the relationship between turnout and electoral outcomes. One line of reasoning that can be traced back to Campbell et al. (1960) and Burnham (1965) argues that some groups of voters are more likely to vote than others. In the US case, Democratic support is higher in the groups that are less inclined to vote, so an increase in turnout is typically thought to benefit the Democrats. DeNardo (1980) challenges this view by pointing out that peripheral voters are both more likely to be affected by the campaign and “jump on the bandwagon” of the winning candidate.

In the classical explanation, prospective left wing voters would have higher $C$s or lower $D$s in equation (1) and hence only vote if external conditions, such as the weather, make them do so. Right wing voters, however, have sufficiently low $C$s or high $D$s that minor shocks to $C$ have no impact on their voting decisions. Econometrically, this heterogeneous effect would lead to a LATE type situation.

The empirical literature on the relationship between turnout and electoral outcomes finds mixed results, depending on period, type of elections, closeness of elections, and country. Tóka (2004) finds that the relationship between turnout and partisan advantages vary between countries. Kasara and Suryanarayan (2014) argue that the relationship between turnout and voter income depends on the conflict patterns, and a strong positive pattern is mostly found when political conflicts are focused on questions of levels of taxation.

The literature on the effects of turnout in Norway is scant. Pettersen and Rose (2007) study parliamentary elections and find that the effect of turnout on the Labor party’s vote share is “marginal at best”. Saglie et al. (2012) study local elections and also find weak support for a link between turnout and support for the Labor party.

A fundamental problem with most of this literature is that electoral turnout is an intrinsically endogeneous variable which may be affected by many of the factors also determining electoral outcomes. To solve this problem, Gomez et al. (2007) and Hansford and Gomez (2010) instrument turnout with precipitation on election day. Then they find a consistent positive effect of turnout on the Democratic vote share. Eisinga et al. (2012a) find a similar relationship in Dutch data. Finseraas and Vernby (2014) use a reform in the possibility to vote before the election to instrument for participation rates, and find a positive causal effect of participation on support for the Labor party in Norway. Artés (2014), however, find that high turnout induced by absence of rain in Spanish data hurts the left wing parties.The beneficiary is rather smaller parties than the main conservative party. His explanation for this effect is that there are two different effects of turnout changes – one volatile affected by weather shocks and another more structural effect affected by economic fundamentals. To sum up, it seems that when the endogenous nature of turnout is taken seriously, turnout may have a stronger effect than previously found. However, the direction of the relationship varies between countries.

### 2.3 Is weather a valid instrument?

Election day weather is clearly exogeneous to both political end economic outcomes in the sense that the latter cannot cause the former. For the weather to be a valid instrument to investigate the effect of political composition of the municipal council on political outcomes, however, we also need to make sure that rain has no impact on other determinants of political outcomes.

One issue could be that rain has an impact on voter preferences. There could for instance be good reasons why floods could change preferences for say infrastructure spending. Also, as noted above, rain may affect electoral outcomes in other ways that through turnout, for instance by changing voters' mood. This is unproblematic, though, as the objective is to study the effect of political composition and not the effect of turnout.

Similarly, rain is more common in some areas than others. In the case of Norway, there is more rain in the western part of the country than the eastern part. This could again be correlated with differences in both turnout, support for different parties, and actual spending patterns. Still neither of these issues challenge my empirical strategy, as I use rain on the specific day the election takes place and control for municipality fixed effects (and hence implicitly also for the average level of precipitation on election days). To believe that rain on one specific day has any real impacts beyond its effect on the electoral process is hard to imagine.

Finally, Fujiwara et al. (2013) raise the issue of habit formation, providing evidence that a shock to turnout at one election has an impact on consecutive elections. This leads to autocorrelated data, but does not pose any additional challenges to the exogeneity of precipitation as an instrument.

# 3 Institutional background, data, and estimation

## 3.1 Institutional background

To test the causal effect of parties on policies, I use a panel of Norwegian municipalities measured between 1972 and 2010. In 2010 there was a total of 430 municipalities, but due to municipal mergers a total of 478 municipalities occur in the data. Many municipalities are small – the median municipality had about 4500 inhabitants although the mean population is about 11 000.

Municipal elections take place every fourth year on a Monday in the first half of September. Some municipalities also allow for voting on the preceding Sunday. Elections to the regional council are organized at the same day, but parliamentary elections are not.

In most municipalities, politics is dominated by the national parties. There is usually a clear cleavage between the left wing and right wing parties. The left wing block is dominated by the Labor party (DNA), but the Socialist leftist party (SV) and Red (Rødt) also have representatives in a number of municipalities. The Right wing block is often dominated by the Conservative party (H) and also encompass the Centre party[8] (Sp), the Christian popular party (Krf), the Liberal party (V) and the Progress party (FrP). There are also a number of local parties in many municipalities. In most municipalities these are small; in about 27 % of municipality-years did the local parties get above 10 % of the vote.[9]

The municipal council, whose number of members range from 11 to 85, is the supreme body of the municipality. The council elects the mayor who is chairing the council meetings, as well as an executive board where large parties are all represented. The system is not parliamentary, so it is not clear that going above a 50 % vote share should have any particular impact on policies.

Municipal incomes are largely given: although municipalities in theory have some discretion on tax levels all municipalities have chosen the highest allowed tax rate. Municipalities can also increase their incomes through user charges and property taxation, but for most municipalities this accounts for a minor share of incomes. Consequently, the size of the budget carries little interest. Municipalities do have larger discretion regarding spending pattern although there are some limitations due to national standards.

[8]In recent years the Centre party has moved towards the left and was part of the Centre-Left coalition governing Norway 2005-2012. But this is a recent phenomenon and the party has often been more right wing at the local level.

[9]There are still municipalities where they are very important. An extreme case is the tiny municipality of Modalen where only local parties have been running for elections for the whole period I study.

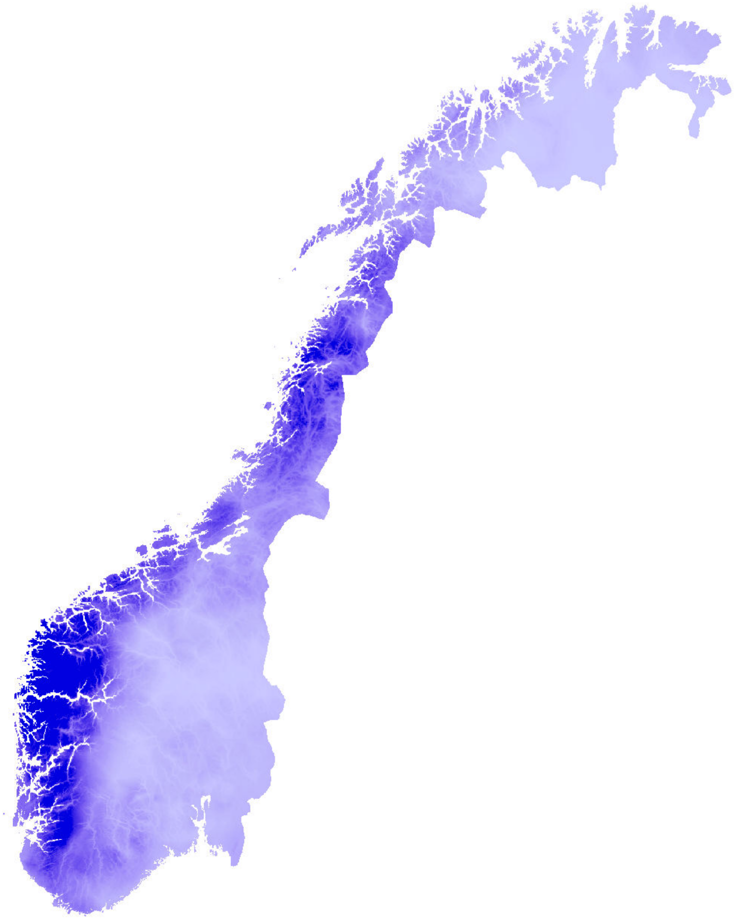


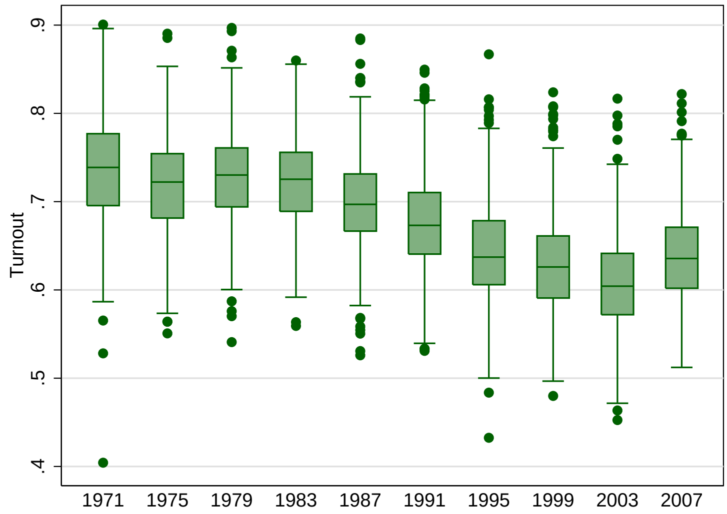
Figure 1: Average rainfall on election day

## 3.2 Data

The meteorological data used in this project were created by the Norwegian Meteorological Institute (met.no). The data are based on daily observations of precipitation at all 421 measurement stations in Norway. The data are based on spatial interpolation, which is a challenging task for a country like Norway. In some parts of the country mean annual precipitation varies between less than 300 and more than 3000 mm withing a few kilometers (Jansson et al., 2007). To solve this, a residual kriging approach is applied (Tveito and Førland, 1999). First, each observation is regressed on a number of geographic properties to separate between a deterministic and a stochastic part. The residuals are then interpolated using kriging and combined with deterministic parts to obtain a grid of $1 \times 1$ km cells for Norway. See Mohr (2008) for further details on how the data are computed. Average precitipationv values on election days are shown in Figure 1. As one would expect, average rainfall is larger along the west coast and in parts of the north.

I combine these data with GIS data on municipal boundaries to construct data on average precipitation by municipality for each election year. One challenge is that mu-

Figure 2: Evolution of turnout over time




*Notes: The figure shows the distribution of turnout per municipality for each election year.*

nicipal boundaries have changed over time, mostly due to merging of municipalities. GIS data on past municipal borders are essentially non-existent. To solve this I map municipalities that no longer exist into their current municipality and use weather data from the present day municipality. Although this removes some variation in the data, the spatial correlation in daily meteorological data is so high that this effect is negligible.

Data on electoral turnout and outcomes as well as on political outcomes are taken from the recent collection of Norwegian municipal data made available by Fiva et al. (2012), originating from Statistics Norway and the Norwegian Social Science Data Services. Their voting data include the vote share and seat share of each party as well as the turnout rate.[10] Data on political outcomes were collected from the Norwegian Social Science Data Services by Fiva et al. (2012), and comprise annual spending on eight categories taken from municipal budgets. Descriptive statistics on turnout, electoral outcomes, and policy outcomes are found in Appendix A.

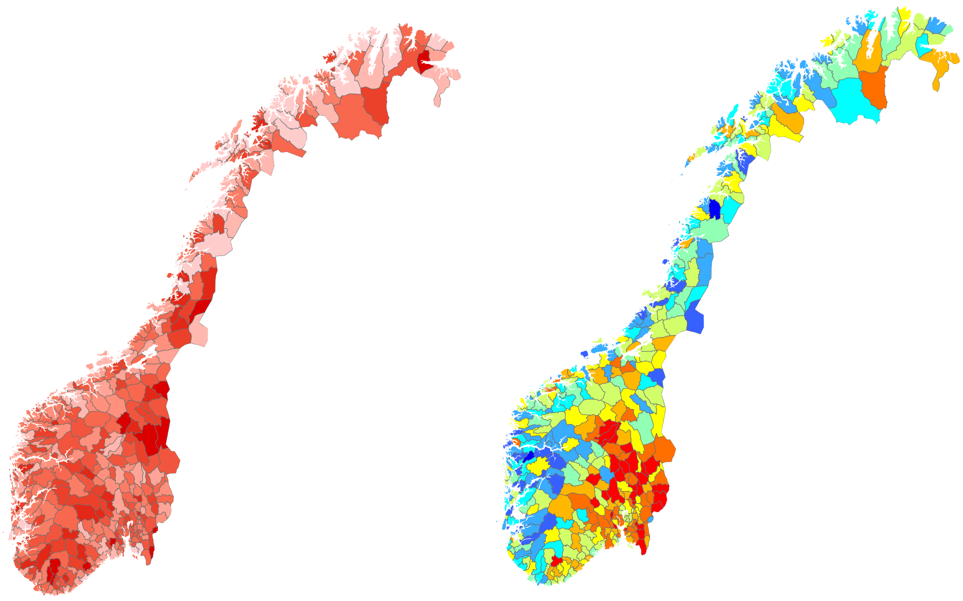
From Figure 2, we see that there is a clear downward trend in turnout over time. Figure 3 shows the geographical distribution of turnout. We see from Panel (a) that there is no clear pattern in average turnout across space. Panel (b) shows the municipality specific trends in turnout in a two ways fixed effects model, i.e. the parameter $\delta_i$ in a regression of the type

$$Turnout_{it} = \alpha_i + \tau_t + \delta_i t + \epsilon_{it}.$$

Here we see that there is a clear negative trend in the south-eastern part of the country

[10] I have supplemented their voting data with data on advance voting. These data are taken from Statistics Norway's Table 01177.

Figure 3: Turnout across space



(a) Geographical distribution of turnout (b) Geographical trends in turnout

*Notes: Panel (a) show average turnout over the period 1971-2007 by municipality. Darker colors mean higher turnout.*
*Panel (b) shows the municipality wise trends in turnout over the period 1971-2007 by municipality. Red means negative trend, blue positive.*

whereas there is a positive trend in the western and northern part. As weather necessarily has spatial dependence, failing to account for these spatial trends yields a high danger of spurious correlation between turnout and rain.

### 3.3 Estimation

One way to handle the problem of spatio-temporal trends would be to include region specific trends. But there are no reasons to believe that trends are common within regions and have jumps at regional boundaries. Instead, I control for a spatio-temporal trend $\delta_i t$ modeled as a polynomial trend surface – a technique dating at least back to Krumbein (1959) and Tobler (1969) and advocated in a similar context by Fujiwara et al. (2013). Here the trend $\delta_i$ depends on municipality $i$'s geographic location. Specifically, I specify $\delta_i$ as a tensor product of Legendre polynomials[11] (see e.g. Judd (1998, Ch. 6) for details) in municipality $i$'s location, measured by the geographical coordinates $x_i, y_i$ of the center of the municipality, i.e.

$$\delta_i = \sum_{k=0}^{K} \sum_{\ell=0}^{L} \theta_{k\ell} P_k(x_i) P_\ell(y_i) \tag{2}$$

[11]Other polynomial bases have been tried, and yield very similar results.

This provides a flexible non-parametric estimate of the spatial pattern of the trend, but can at the same time be included as linear terms in standard regression models. As the number of terms increase, it follows from standard theory that the specification approximates any smooth function (Chen, 2007). To determine the number of terms $K$ and $L$ I estimated the model

$$Turnout_{it} = \alpha_i + \tau_t + \sum_{k=0}^{K}\sum_{\ell=0}^{L} \theta_{k\ell} P_k(x_i) P_\ell(y_i) t + \epsilon_{it}.$$

for different choices of polynomial lengths and compared the fit of different specifications. The results are shown in Appendix Figure A-1. Panel (a) shows the fit as a function of the number of terms in the latitude and longitude polynomials, whereas Panel (b) shows the fit as a function of the total number of terms. If we maximize fit with a linear penalty for the number of terms, the relevant specifications are on the convex hull of Panel (b). A reasonable fit was found with a first degree polynomial in the longitude and a sixth degree polynomial in the latitude, using 13 terms and increasing the fit as measured by $R^2$ by 0.083. The total possible increase in $R^2$ seems to be around 0.11.

# 4 Weather and electoral turnout

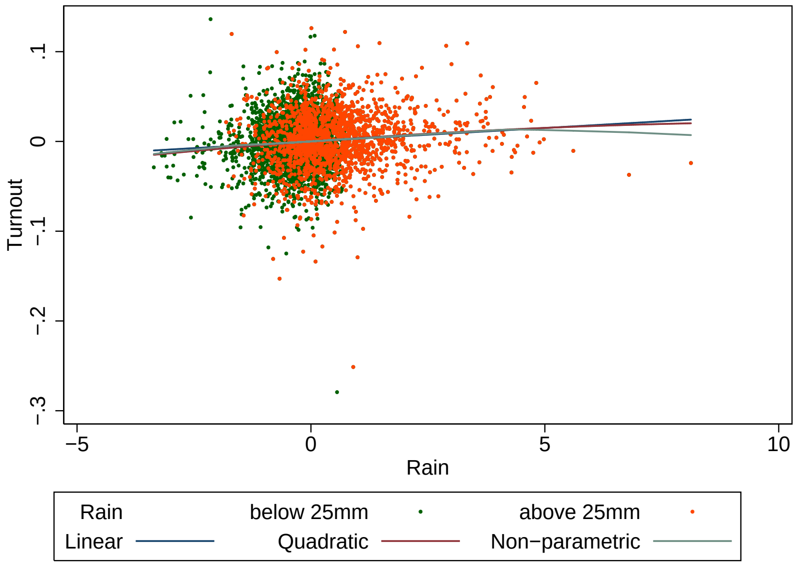
Figure 4 shows the relationship between precipitation and turnout. Panel (a) is a simple scatter plot of municipality-years with added linear, quadratic and LOWESS fits. There is a fairly clear upward trend and no signs of non-linearities in the data. Throughout most of the paper I concentrate on a dummy variable for substantial rain, defined as more than 2.5 mm (1/10 inch) of rain over the 24 hour cycle. Panel (b) of Figure 4 shows the distribution of turnout for municipality-years above and below the threshold, with and without controlling for two way fixed effects and spatio-temporal trends. In both cases, we see that turnout is clearly on average higher for municipality-years above the 25 mm threshold.

This pattern is confirmed in Table 1. Column (1) shows the linear relationship between amount of precipitation and turnout, and Columns (2) and (3) using dummies for any rain and substantial rain. In Column (4) I have a linear function where I allow for a jump at 25 mm. There are some indications of such a jump. In all four cases it is clear that rain increases turnout.

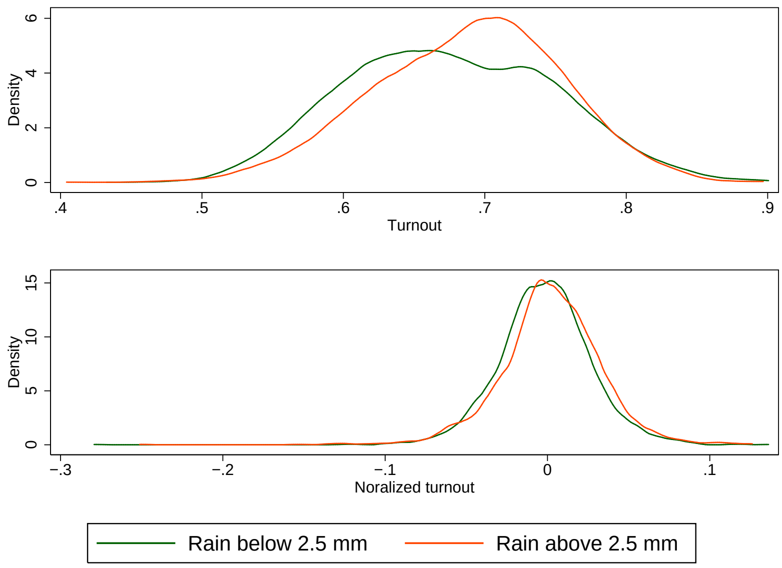
To see whether the relationship is stable over time, I interact the measure of precipitation with a time trend (Column (5)) and a dummy for being after 1990, i.e. in the second half of the sample (Column (6)). There are no signs of significant changes over time.

Finally, Columns (7) and (8) allow for a non-linear effect of precipitation. There are some signs of the marginal effect of rain going down when the amount of rain is very high,

Figure 4: Turnout and precipitation




(a) Turnout and rain




(b) Distribution of turnout with and without rain

*Notes: Panel (a) shows resdiuals of turnout and year regressed on year, municipality dummies, and spatio-temporal trends as well as the linear, quadratic and non-parametrric LOWESS fit of these data.*
*Panel (b) shows the distribution of turnout and normalized turnout, i.e. regressed on two way fixed effects and spatio-temporal trends.*

but for all reasonable values of precipitation, the relationship is increasing.

Table 2 shows the relationship between turnout and electoral outcomes. The general pattern is that higher turnout reduces the vote share of the left wing parties. In Column (1), I control for spatio-economic trends with the non-parametric approach described above. First, we notice that rain on election day is associated with reduced support for the left wing parties. The OLS results show that high turnout is associated with a reduced support for the left wing parties although the effect is not significant. When we instrument turnout with precipitation, the estimated effect of turnout becomes stronger and turns significant.

This may seem surprising, as the conventional wisdom is that high turnout is good for the left win parties. But as discussed in Section 2.2, the evidence for this relationship is mixed. As levels of taxation are mostly determined at the national level and municipal politics is more about where to spend the money, this also resonates well with the findings of Kasara and Suryanarayan (2014). They find that the positive relationship between income (and hence right wing voting) and turnout only holds when taxation is a key conflict line. My findings are also in line with the findings of Artés (2014).

In Column (2) I estimate similar parameters using county specific time trends instead of the non-parametric approach. Results are comparable albeit slightly smaller. Specification (3) shows the minimum specification that yields similar results: Here the trend depends on longitude, latitude, and the product of the two. In specification (4), I do not controlling for any trends. The first stage is comparable to the finding above. However, now the association between turnout and left wing support turns positive[12] and the 2SLS effects yields huge but insignificant results. These findings resemble those of Finseraas and Vernby (2014), who do not control for spatio-temporal trends either, and can help explain the discrepancy between their findings and mine.

In Appendix Table A-3, I break the effect down on the effects on individual parties. The effect on the left wing vote share is mostly driven by changed support for the Labor party, which is unsurprising as it is by far the largest party on the left wing.

# 5 The effect of political party

## 5.1 Expenditure shares

As already noted, Norwegian municipalities have limited discretion over the size of their budgets as most taxes are given at the national level. There is more scope for politicians to effect spending policies, so this is where we may expect to find the most important effects. In Table 3, I study the determinants of spending on a decomposition of municipal

[12]This positive association seems to be mostly driven by a spatial trend whereby the eastern part of the country has has falling turnout rates and reduced support for left wing parties. Consequently, almost any control for spatio-temporal or regional time trends changes the sign of this effect.

Table 1: 1st stage turnout 1971-2007

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Rain (in cm) | 0.00299*** | | | 0.00244*** | 0.00283*** | 0.00284*** | 0.00387*** | 0.00943*** |
| | (5.34) | | | (3.58) | (5.29) | (3.95) | (3.86) | (4.01) |
| Rain positive | | 0.00742*** | | | | | | |
| | | (5.31) | | | | | | |
| Rain above 2.5 mm | | | 0.00511*** | 0.00215* | | | | |
| | | | (4.94) | (1.69) | | | | |
| Rain×Year | | | | | -0.000356 | | | |
| | | | | | (-1.56) | | | |
| Rain×After 1990 | | | | | | 0.000416 | | |
| | | | | | | (0.44) | | |
| Rain squared | | | | | | | -0.000170 | -0.00429*** |
| | | | | | | | (-0.96) | (-2.85) |
| Rain cubed | | | | | | | | 0.000843*** |
| | | | | | | | | (2.79) |
| Rain quart | | | | | | | | -0.0000497*** |
| | | | | | | | | (-2.70) |
| Obs | 4417 | 4417 | 4417 | 4417 | 4417 | 4417 | 4417 | 4417 |
| $R^2$ | 0.698 | 0.697 | 0.697 | 0.698 | 0.698 | 0.698 | 0.698 | 0.699 |

*Notes: Outcome variable is the proportion of turnout. All specifications include municipal and year fixed effects. Standard errors are clustered at the municipality level (using 2010 structure).*
*t-values in parentheses,and *, **, and *** denotes significant at the 10%, 5%, and 1% levels.*

Table 2: Turnout and electoral outcomes

| | (1)<br>Non-parametric | (2)<br>County trends | (3)<br>Long. and lat. | (4)<br>No trends |
|---|---|---|---|---|
| Reduced form | -0.0105*** | -0.0108*** | -0.0119*** | -0.0165*** |
| | (-4.58) | (-4.70) | (-5.03) | (-6.87) |
| OLS | -0.0881 | -0.0725 | -0.0440 | 0.186*** |
| | (-1.44) | (-1.18) | (-0.70) | (3.13) |
| 2SLS | -0.950* | -2.245*** | -3.257*** | 115.4 |
| | (-1.77) | (-3.36) | (-2.86) | (0.12) |

*Notes: First stage is the coefficient of rain on the vote share of the party group, OLS and 2SLS the coefficient on turnout.*
*Specification (3) has a trend depending on longitude, latitude, and the product of the two. All specifications include municipal and year fixed effects. Standard errors are clustered at the municipality level (using 2010 structure).*
*The 2SLS estimates instrument turnout with the dummy for rain above 2.5 mm.*
*t-values in parentheses,and *, **, and *** denotes significant at the 10%, 5%, and 1% levels.*

expenditures into eight categories. The outcome is the share of total expenditures going to each sector.[13] The explanatory variable of interest is the seat share of the left wing block. We could equally well have used the vote shares as in Table 2 as the two have a correlation coefficient of .99, but the seat share is in many ways the most proper measure of power within the municipal council.

Panel A of Table 3 shows results from a standard two way fixed effects OLS estimation, with and without a set of demographic controls. From Column (1), we see that the vote share of left wing parties is correlated with a higher expenditure share on child care, which mostly encompass kindergartens. From the reduced form reported in Panel B, we also see that rain on election day, measured as rain above 2.5 mm,[14] decreases the expenditure share on kindergartens in the following electoral term. This is a clear indication that turnout and hence a random shock to voting patterns on election day has a causal on municipal policies. Finally, in the 2SLS results reported in Panel C, we see that there appears to be a positive effect of the seat share of left wing parties on the expenditure share on child care, although the effect is not significant in one of the specifications. From the specification with controls, we see that a 10 % increase in the left share would lead to an increase in the expenditure share of 0.8 percentage point. This is quite large as the average expenditure share on child care was 9.7 % in 2010.

Column (2) shows the expenditure share on education, mostly primary and lower

[13]Appendix Table A-4 shows the same results for absolute spending. However, as absolute spending depends on incomes as well as how resources are allocated, this table is less straightforward to interpret.

[14]Using a continuous measure of rain yields similar results; see Appendix Tables A-5 and A-6.

secondary schooling. Panel A reveals that expenditures on schooling is negatively correlated with the left wing seat share. Panels B and C indicate that this effect is also causal. Expenditures on elderly care, reported in Column (3), are positively correlated with the left seat share, but there are few indications of this relationship being causal. Finally, Columns (4) to (8), reporting the expenditure shares on health and social, culture, transportation, administration, and other expenditures, do not seem to be related to the political composition of the municipal council at all when we control for two way fixed effects and spatio-temporal trends.

In all specifications, the eight coefficients add to zero as the sum of expenditure shares add to unity. The clearest result is that a positive shock to the left wing vote share increases spending on child care, and this seems to mostly come at the expense of educational spending.

## 5.2 Other outcomes

Table 4 reports similar estimation results studying a number of other outcomes. The general picture is that there are not very strong relationships.

In Column (1) I study total expenditures. This is mainly financed by municipal income taxation whose rate is determined at the national level. Still municipalities have some ways to vary their expenditures both through smaller taxes and loan funding. In both the OLS and the 2SLS there does not seem to be a significant relationship between the seat share of the left parties and total expenditures and estimates seem to depend on the inclusion of control variables. However, the reduced form gives significant negative effects of rain on election day on total expenditure, giving some indication of the left wing parties increasing total expenditures.

It is sometimes believed that left wing parties have a larger focus on public consumption but invests less than right wing parties. In Column (2) I investigate this claim by studying the share of municipal expenditures going to investments. These data are only available until year 2000 as the accounting system was changed after this date. The hypothesis is not supported by the estimates, if anything it goes the other way. Another claim that is sometimes made is that right wing parties sell off public property to finance tax cuts. This is investigated in Columns (3) and (4) where I look at total income from sales as well as a dummy for any sales in the current period (sales are reported in about 63 % of municipality-years). Again there are no robust findings, but some tendency for left wing parties to be more eager to sell off assets.

Municipalities have principally two means of increasing their tax incomes, residential property taxation and user charger for infrastructure services (sewage, water supply, and collection and management of garbage). Data for the two variables are available from 1991 and 1984. In Column (5) I study whether municipalities have introduced property

Table 3: Political composition and expenditure patterns: Shares

A: OLS estimates

| | (1) Child care | (2) Education | (3) Elderly care | (4) Health, social | (5) Culture | (6) Transport | (7) Central adm | (8) Other |
|---|---|---|---|---|---|---|---|---|
| *Without controls* | | | | | | | | |
| Seat share left | 0.00760** | -0.0284** | 0.0282** | -0.00779 | -0.00219 | -0.00498 | 0.000586 | 0.00699 |
| | (2.10) | (-2.29) | (2.24) | (-0.78) | (-0.45) | (-0.94) | (0.10) | (0.46) |
| Obs | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 |
| $R^2$ | 0.804 | 0.356 | 0.744 | 0.218 | 0.0821 | 0.219 | 0.273 | 0.722 |
| *With controls* | | | | | | | | |
| Seat share left | 0.00211 | -0.0403*** | 0.0251** | -0.00545 | 0.000544 | -0.00556 | 0.00243 | 0.0211 |
| | (0.65) | (-3.64) | (2.01) | (-0.54) | (0.11) | (-1.05) | (0.43) | (1.43) |
| Obs | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 |
| $R^2$ | 0.828 | 0.408 | 0.748 | 0.222 | 0.0881 | 0.222 | 0.279 | 0.732 |

B: Reduced form estimates

| | (1) Child care | (2) Education | (3) Elderly care | (4) Health, social | (5) Culture | (6) Transport | (7) Central adm | (8) Other |
|---|---|---|---|---|---|---|---|---|
| *Without controls* | | | | | | | | |
| Rain | -0.00125*** | 0.00355*** | -0.00113 | -0.00190 | 0.000109 | 0.000471 | 0.000167 | -0.0000161 |
| | (-2.89) | (3.10) | (-0.94) | (-1.50) | (0.17) | (0.78) | (0.26) | (-0.01) |
| Obs | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 |
| $R^2$ | 0.804 | 0.355 | 0.744 | 0.218 | 0.0821 | 0.219 | 0.273 | 0.722 |
| *With controls* | | | | | | | | |
| Rain | -0.000878** | 0.00313*** | -0.000714 | -0.00179 | -0.0000846 | 0.000529 | 0.000135 | -0.000333 |
| | (-2.17) | (2.94) | (-0.58) | (-1.41) | (-0.13) | (0.87) | (0.22) | (-0.20) |
| Obs | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 |
| $R^2$ | 0.828 | 0.407 | 0.748 | 0.222 | 0.0881 | 0.222 | 0.279 | 0.732 |

C: IV estimates

| | (1) Child care | (2) Education | (3) Elderly care | (4) Health, social | (5) Culture | (6) Transport | (7) Central adm | (8) Other |
|---|---|---|---|---|---|---|---|---|
| *Without controls* | | | | | | | | |
| Seat share left | 0.0177 | -0.508*** | 0.141 | 0.199 | 0.00376 | -0.0654 | 0.0298 | 0.182 |
| | (0.43) | (-2.72) | (0.77) | (0.44) | (0.07) | (-1.27) | (0.52) | (0.93) |
| Obs | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 |
| $R^2$ | 0.799 | 0.0265 | 0.738 | 0.132 | 0.0831 | 0.195 | 0.270 | 0.705 |
| Cragg-Donald F | 76.78 | 76.78 | 76.78 | 76.78 | 76.78 | 76.78 | 76.78 | 76.78 |
| *With controls* | | | | | | | | |
| Seat share left | 0.0804** | -0.201 | 0.201 | 0.177 | -0.00974 | -0.0796 | -0.0111 | -0.135 |
| | (2.08) | (-1.49) | (1.25) | (1.45) | (-0.17) | (-1.43) | (-0.19) | (-0.62) |
| Obs | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 |
| $R^2$ | 0.805 | 0.375 | 0.734 | 0.158 | 0.0904 | 0.186 | 0.281 | 0.724 |
| Cragg-Donald F | 71.12 | 71.12 | 71.12 | 71.12 | 71.12 | 71.12 | 71.12 | 71.12 |

*Notes: Rain measured as a dummy for substantial rain (above 2.5 mm). All estimations control for two way fixed effects and spatio-temporal trends. Estimates with controls also control for the population share of children, young, elderly, women and unemployed and include two way fixed effects.*
*Standard errors are clustered at the present day municipality level. * significant at 10%; ** at 5%; *** at 1%.*

taxation. An increased left share reduces the probability of having property taxation, but the coefficient is not always significant. From Column (6) we see that there is essentially no effect of political composition on the size of user charges.

Finally, it could be interesting to have an overall measure of the business climate in the municipality. It is not trivial to compare profitability across municipality. But we can get some indications using growth in employment – if employment is growing it would usually indicate that business is expanding. In Column (7) I look at annual growth in industrial employment. There is a slight tendency for this to be higher when the share of left wing politicians is higher, but the effect is far from significance at conventional levels. Hence it seems that there are no major differences in business friendliness as the share of left wing politicians varies.

# 6 Robustness

## 6.1 A placebo study

As discussed above, rainfall is necessarily spatially correlated. Hence when using daily rainfall as an instrument with moderate samples, it is crucial to check that there are no other spatially correlated processes that interfere. Daily rainfall is uncorrelated with most other outcomes of interest, but may have spatio-temporal patterns that makes it correlate with other variables with spatio-temporal trends. To check the validity of the instrument, I replicate the analysis from Table 1 using rainfall on all days from 600 days before election day to 600 days after election day. The results are shown in Figure 5. Panel A shows detailed estimates for the 50 days before and after election day. There is a clear time pattern, probably due to the temporal dependency of precipitation. Still, the effect of rain on the election day is the strongest in this close window. Panels B and C show analyses of the whole set of 1201 days. Although high estimates occur, the effect observed on election day is unusually high. Only 2.5 % of observation are above the one observed on election day.[15] Hence it is seen that the actual estimates of rain on election day are much stronger than the results of rain on a random day. This indicates that the effect studied is a true effect of rain on turnout and not simply a random coincidence.

## 6.2 Advance voting

Another placebo can be obtained by looking at advance voting. Since 1920 it has been possbile to vote before the election day for individuals who were not able to vote on that day. As rain on election day does not affect turnout ahead of the election,[16] we should

[15]4.4 % are higher in absolute value.

[16]There could be a minor effect: If extreme weather is predicted for the election day several days ahead, this could affect early voting on the last allowed days. Still, this effect should be weak.

Table 4: Political composition and various political outcomes

A: OLS estimates

| | (1) Expenditures | (2) Invest. share | (3) Toal sales | (4) Has sales | (5) Has prop. tax | (6) User charges | (7) Growth ind. empl. |
|---|---|---|---|---|---|---|---|
| *Without controls* | | | | | | | |
| Seat share left | -2.251 | -0.0141 | 2.275 | 0.00373 | 0.0292 | -0.0538 | 0.109 |
| | (-0.49) | (-0.80) | (1.22) | (0.08) | (0.34) | (-0.17) | (0.77) |
| Obs | 17071 | 12779 | 12828 | 17619 | 8663 | 11821 | 5161 |
| $R^2$ | 0.784 | 0.282 | 0.0637 | 0.725 | 0.144 | 0.316 | 0.0137 |
| *With controls* | | | | | | | |
| Seat share left | 0.170 | -0.0161 | 2.167 | 0.0181 | 0.0201 | 0.428 | 0.114 |
| | (0.04) | (-0.92) | (1.17) | (0.38) | (0.23) | (1.48) | (0.80) |
| Obs | 17071 | 12779 | 12828 | 17619 | 8663 | 11821 | 5161 |
| $R^2$ | 0.789 | 0.284 | 0.0634 | 0.726 | 0.148 | 0.396 | 0.0207 |

B: Reduced form estimates

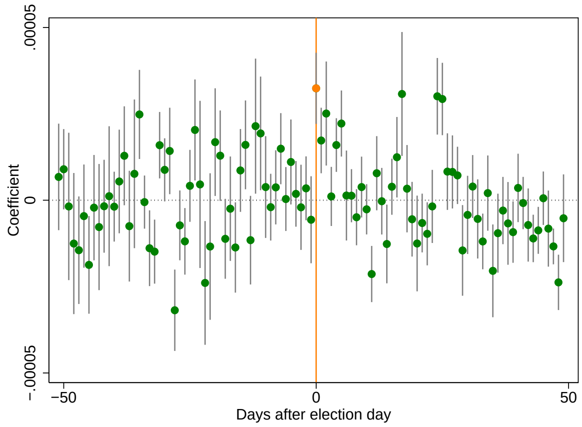
| | (1) Expenditures | (2) Invest. share | (3) Toal sales | (4) Has sales | (5) Has prop. tax | (6) User charges | (7) Growth ind. empl. |
|---|---|---|---|---|---|---|---|
| *Without controls* | | | | | | | |
| Rain | -0.958*** | -0.00159 | -0.288 | -0.0132*** | 0.0143 | -0.0728*** | -0.0181 |
| | (-2.86) | (-0.88) | (-1.45) | (-2.76) | (1.39) | (-2.60) | (-1.43) |
| Obs | 17071 | 12779 | 12828 | 17619 | 8663 | 11821 | 5161 |
| $R^2$ | 0.784 | 0.281 | 0.0637 | 0.725 | 0.144 | 0.317 | 0.0137 |
| *With controls* | | | | | | | |
| Rain | -1.037*** | -0.00192 | -0.284 | -0.0131*** | 0.0140 | -0.0524* | -0.0103 |
| | (-3.14) | (-1.04) | (-1.45) | (-2.74) | (1.36) | (-1.93) | (-0.85) |
| Obs | 17071 | 12779 | 12828 | 17619 | 8663 | 11821 | 5161 |
| $R^2$ | 0.790 | 0.284 | 0.0634 | 0.726 | 0.149 | 0.396 | 0.0204 |

C: IV estimates

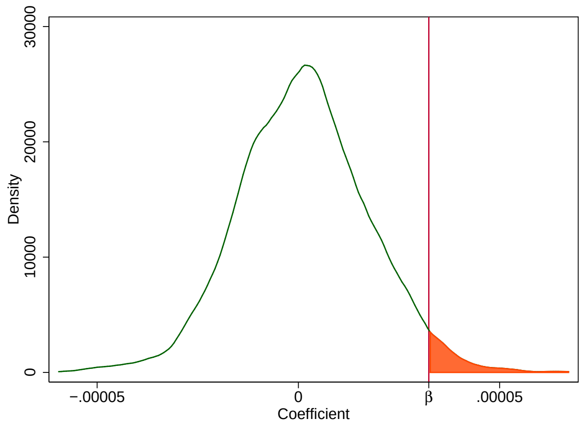
| | (1) Expenditures | (2) Invest. share | (3) Toal sales | (4) Has sales | (5) Has prop. tax | (6) User charges | (7) Growth ind. empl. |
|---|---|---|---|---|---|---|---|
| *Without controls* | | | | | | | |
| Seat share left | -47.11 | 0.286 | 53.39 | 0.253 | -2.369 | -4.641 | 1.244 |
| | (-1.04) | (0.61) | (1.52) | (0.42) | (-1.60) | (-0.67) | (1.49) |
| Obs | 17071 | 12779 | 12828 | 17619 | 8650 | 11821 | 5161 |
| $R^2$ | 0.775 | 0.240 | -0.0139 | 0.725 | -0.177 | 0.225 | -0.0138 |
| Cragg-Donald F | 77.32 | 22.57 | 22.23 | 79.65 | 24.12 | 2.350 | 40.91 |
| *With controls* | | | | | | | |
| Seat share left | 29.61 | 0.286 | 57.56 | 0.355 | -3.014* | 2.760 | 0.794 |
| | (0.82) | (0.96) | (0.39) | (0.75) | (-1.80) | (0.33) | (1.12) |
| Obs | 17071 | 12779 | 12828 | 17619 | 8650 | 11821 | 5161 |
| $R^2$ | 0.785 | 0.242 | -0.0273 | 0.725 | -0.360 | 0.373 | 0.0150 |
| Cragg-Donald F | 71.68 | 20.21 | 19.98 | 73.91 | 23.38 | 3.355 | 42.45 |

*Notes: Rain measured as a dummy for substantial rain (above 2.5 mm). Total expenditures, total sales, and user charges are deflated to 2011 prices using the CPI. All estimations control for two way fixed effects and spatio-temporal trends. Estimates with controls also control for the population share of children, young, elderly, women and unemployed and include two way fixed effects.*
*Standard errors are clustered at the present day municipality level. * significant at 10%; ** at 5%; *** at 1%.*

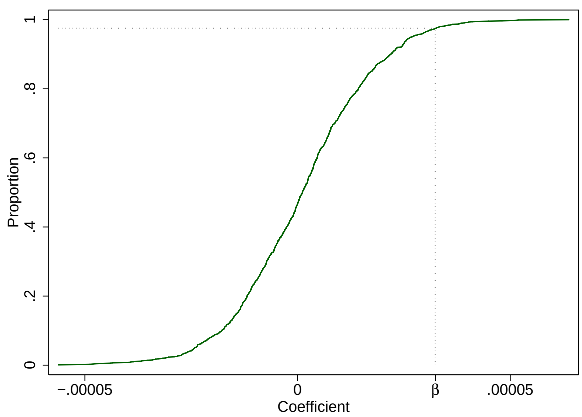
Figure 5: Distribution of parameter estimates




(a) Estimates 50 days before and after election day




(b) Distribution of parameters 600 days before and after election day




(c) CDF of parameters 600 days before and after election day not see any relationship between the two and this works as a placebo to verify the validity of rain on election day.

Early voting is possible from August 10 (July 1 for individuals living abroad) until Friday before election day, which is a Monday. Until 1979, a justification for early voting had to be given and approved by the local electoral commission. For most of the period early voting took place in locations designated by the local electoral commission, typically the town hall. In the 1999 election, early votes too place in post offices.[17]

Digitalized data on advance voting is only available from 1975. Table 5 shows results of rain on election day on the share of the eligible population voting before election day using the same specifications as Table 1. As we would expect, rain has very little effect on early voting both regarding magnitudes and statistical significance. This strengthens the belief that the findings reported above actually stem from rain affecting the turnout decision.

## 6.3 Heterogeneity

To see whether rain has a uniform impact on political outcomes throughout the country, Table 6 estimates separate regression coefficients for each of the five regions of the country.[18] Columns (1) shows the effect of rain on turnout. Although there is a positive effect of rain on turnout in all regions, the coefficient is only statistically significant in the eastern and the western parts of the country. However, as the east have among the lowest amount of rain and the west clearly the largest amounts, finding comparable numbers in these two regions is reassuring. Column (2) shifts the focus to the effect of rain on the vote share going to the left wing parties. There is a negative effect in all regions but the south. The effect is significant in the east and the west as well as in the north.

Columns (3) to (10) decompose the effect on all the policy outcomes. These estimates correspond to the reduced form estimates shown in Panel B of Table 3. Effects are not perfectly homogeneous – the F-test for homogeneity is rejected in almost all specifications. But most of the significant effects of rain tend to go in the same direction for each outcome. However, it seems that although the effect of rain on turnout and the left share is fairly homogeneous, the effect of the left share on policy outcomes is more heterogeneous.

## 6.4 Close elections

In an idealized two party systems, a party matters if and only if it has at least 50 % of the vote. Even in real world two party systems this conclusion has to be moderated in many cases, and in multi party systems like Norway the 50 % threshold is at best a soft threshold. Still, we might expect that the effect of an increase in a block's vote share

[17]This system was abandoned in 2003 due to the declining number of post offices.

[18]Region 1 is the east, 2 is the south, 3 the west, 4 the center, and 5 the north.

Table 5: Advance voting in elections 1975-2007

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Rain (in cm) | 0.000299 | | | 0.000707* | 0.000316 | 0.000457 | 0.000514 | -0.00396* |
| | (0.90) | | | (1.71) | (0.88) | (0.99) | (0.59) | (-1.74) |
| Rain positive | | -0.000692 | | | | | | |
| | | (-0.84) | | | | | | |
| Rain above 2.5 mm | | | -0.000683 | -0.00157* | | | | |
| | | | (-0.90) | (-1.67) | | | | |
| Rain×Year | | | | | 0.0000534 | | | |
| | | | | | (0.38) | | | |
| Rain×After 1990 | | | | | | -0.000423 | | |
| | | | | | | (-0.56) | | |
| Rain squared | | | | | | | -0.0000418 | 0.00227 |
| | | | | | | | (-0.32) | (1.63) |
| Rain cubed | | | | | | | | -0.000304 |
| | | | | | | | | (-1.21) |
| Rain quart | | | | | | | | 0.00000985 |
| | | | | | | | | (0.69) |
| Obs | 3972 | 3972 | 3972 | 3972 | 3972 | 3972 | 3972 | 3972 |
| $R^2$ | 0.585 | 0.585 | 0.585 | 0.585 | 0.585 | 0.585 | 0.585 | 0.586 |

*Notes: Outcome variable is the proportion of turnout. All specifications include municipal and year fixed effects. Standard errors are clustered at the municipality level (using 2010 structure).*
*t-values in parentheses,and *, **, and *** denotes significant at the 10%, 5%, and 1% levels.*

Table 6: Decomposition of the effect of rain by region

| | (1) Turnout | (2) Left share | (3) Child care | (4) Education | (5) Elderly care | (6) Health, social | (7) Culture | (8) Transport | (9) Central adm | (10) Other |
|---|---|---|---|---|---|---|---|---|---|---|
| Rain×Region 1 | 0.00823*** | -0.0102*** | 0.000822 | 0.00298 | -0.00178 | -0.00789*** | -0.000824 | 0.000813 | 0.000550 | 0.00533* |
| | (4.73) | (-2.73) | (1.28) | (1.43) | (-0.82) | (-3.78) | (-0.95) | (1.05) | (0.54) | (1.67) |
| Rain×Region 2 | 0.00338 | 0.00911 | -0.000912 | 0.0174*** | 0.00945* | -0.00110 | -0.00151 | 0.00160 | 0.000986 | -0.0260*** |
| | (1.22) | (1.28) | (-0.56) | (4.28) | (1.68) | (-0.21) | (-0.58) | (0.99) | (0.47) | (-4.98) |
| Rain×Region 3 | 0.00709*** | -0.0101** | 0.000479 | -0.000628 | -0.00363* | 0.00590*** | 0.000935 | -0.000914 | -0.00183 | -0.000307 |
| | (3.46) | (-2.58) | (0.56) | (-0.29) | (-1.68) | (3.04) | (0.72) | (-0.75) | (-1.59) | (-0.11) |
| Rain×Region 4 | 0.00362 | -0.00310 | -0.00185 | 0.00206 | 0.00152 | 0.00349 | 0.00203 | 0.000198 | 0.000507 | -0.00797** |
| | (1.18) | (-0.47) | (-1.39) | (0.67) | (0.44) | (1.01) | (1.47) | (0.12) | (0.25) | (-2.00) |
| Rain×Region 5 | 0.000690 | -0.0182*** | -0.00568*** | 0.00597** | 0.00673*** | -0.00514** | -0.000360 | -0.00210 | 0.000161 | 0.000422 |
| | (0.27) | (-2.67) | (-5.14) | (2.22) | (2.92) | (-2.02) | (-0.24) | (-1.54) | (0.12) | (0.16) |
| Obs | 4417 | 4417 | 17126 | 17126 | 17126 | 17126 | 17126 | 17126 | 17126 | 17126 |
| $R^2$ | 0.696 | 0.238 | 0.806 | 0.357 | 0.744 | 0.221 | 0.082 | 0.220 | 0.272 | 0.723 |
| F | 7.39*** | 4.66*** | 6.00*** | 5.47*** | 3.44*** | 5.42*** | 0.68 | 0.98 | 0.62*** | 6.82*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.005] | [0.000] | [0.636] | [0.429] | [0.685] | [0.000] |

*Notes: Region 1 is the east, 2 is the south, 3 the west, 4 the center, and 5 the north. Columns (3) to (10) are expenditure shares. All coefficients are from regression on rain measured as a dummy for substantial rain (above 2.5 mm). All estimations control for two way fixed effects and spatio-temporal trends. Standard errors are clustered at the present day municipality level. The F-test is a test for no regional heterogeneity with p-values in square brackets. * significant at 10%; ** at 5%; *** at 1%.*

to be largest around the point where it acquires a majority. To study this, I split the sample in three in Table 7. Panel A studies elections where the left wing parties have a clear minority, Panel B elections close to a tie, and Panel C elections where the left wing parties have a majority.

We notice that there is some tendency for effects to be stronger in the elections close to ties, but the effect is far from clear. This indicated that an increase in the vote share has an effect even if the party is far from flipping between being in and out of majority, probably through an increased bargaining power in the municipal council. This also reveals the dangers of reducing a real world multi party system to an idealized two party system analyzable through standard regression discontinuity approaches.

# 7 Conclusion

There is obviously selection of parties into power. As voter preference affect both electoral outcomes, political platforms, and politician behavior, it is unsatisfactory to study the effect of political composition of municipal councils by simply comparing composition and political outcomes. To overcome this, I instrument the political composition of the municipal council using election day precipitation. The dominant causal chain is that precipitation affects different voters' turn out decisions differently, leading to an effect of rain on electoral outcomes.

In Norwegian data on municipal elections, the effect of precipitation on electoral turnout is found to be positive: When the weather is nice on election day, the opportunity cost of voting is higher and voters abstain. Furthermore, a weather induces positive shock to turnout seems to reduce the share of left wing voters.

There is a statistically significant association between election day precipitation and political outcomes over the electoral period. This should demonstrate quite clearly that there is an effect of the composition of parties in the municipal council beyond what is given by the preferences of the voters. Hence voter preferences are not the sole drivers of policies. The effect is mainly that a positive shock to the share of left wing representatives increases spending on kindergartens, mostly at the expense of educational spending.

Several other approaches to estimate causal effects of politicians have been proposed in the literature. They all provide valuable insight, but no technique proposed so far comes without drawbacks. For this reason, my new approach provides useful insight, at least to ensure the validity of other approaches. Reassuringly, my findings are much in line with the findings of Fiva et al. (2014) who use a regression discontinuity approach on similar data as mine.

Table 7: Results by closeness of elections

| | (1) Child care | (2) Education | (3) Elderly care | (4) Health, social | (5) Culture | (6) Transport | (7) Central adm | (8) Other |
|---|---|---|---|---|---|---|---|---|
| *A: Left vote share below 45%* | | | | | | | | |
| SeatShareLeft | 0.129** | -0.263 | 0.333* | 0.0279 | -0.0924 | -0.108 | -0.103 | 0.0765 |
| | (2.11) | (-1.51) | (1.66) | (0.18) | (-1.13) | (-1.54) | (-1.16) | (0.08) |
| Obs | 10721 | 10721 | 10721 | 10721 | 10721 | 10721 | 10721 | 10721 |
| $R^2$ | | | | | | | | |
| *B: Left vote share between 45% and 55%* | | | | | | | | |
| SeatShareLeft | 0.310* | 0.0281 | -0.325 | 1.116 | 0.0343 | -0.258 | -0.259 | -0.645 |
| | (1.79) | (0.04) | (-0.54) | (0.61) | (0.16) | (-0.26) | (-0.91) | (-0.83) |
| Obs | 3531 | 3531 | 3531 | 3531 | 3531 | 3531 | 3531 | 3531 |
| $R^2$ | | | | | | | | |
| *C: Left vote share above 55%* | | | | | | | | |
| SeatShareLeft | 0.206 | 1.470 | 0.288 | 0.262 | -0.351 | 0.297 | 0.0785 | -2.250 |
| | (0.63) | (0.77) | (0.41) | (0.43) | (-0.73) | (0.61) | (0.39) | (-0.81) |
| Obs | 2816 | 2816 | 2816 | 2816 | 2816 | 2816 | 2816 | 2816 |
| $R^2$ | | | | | | | | |

*Notes: Rain measured as a dummy for substantial rain (above 2.5 mm). All estimations control for two way fixed effects and spatio-temporal trends. Estimates with controls also control for the population share of children, young, elderly, women and unemployed and include two way fixed effects.*
*Standard errors are clustered at the present day municipality level. * significant at 10%; ** at 5%; *** at 1%.*

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# A Descriptive statistics

Table A-1: Descriptive statistics: Electoral behavior

| | Overall | No rain | Rain | Difference |
|---|---|---|---|---|
| Turnout | 0.681 | 0.676 | 0.688 | -0.012*** |
| | (0.071) | (0.074) | (0.067) | [0.000] |
| Vote share left | 0.396 | 0.418 | 0.366 | 0.052*** |
| | (0.154) | (0.149) | (0.155) | [0.000] |
| Vote share DNA | 0.338 | 0.353 | 0.317 | 0.036*** |
| | (0.134) | (0.131) | (0.135) | [0.000] |
| Vote share SV | 0.050 | 0.055 | 0.043 | 0.012*** |
| | (0.053) | (0.053) | (0.052) | [0.000] |
| Vote share Rødt | 0.004 | 0.004 | 0.003 | 0.001*** |
| | (0.012) | (0.012) | (0.011) | [0.004] |
| Vote share right | 0.528 | 0.518 | 0.542 | -0.024*** |
| | (0.171) | (0.163) | (0.180) | [0.000] |
| Vote share Sp | 0.162 | 0.159 | 0.167 | -0.008** |
| | (0.124) | (0.125) | (0.123) | [0.026] |
| Vote share H | 0.151 | 0.153 | 0.147 | 0.006** |
| | (0.099) | (0.099) | (0.099) | [0.036] |
| Vote share KrF | 0.093 | 0.085 | 0.105 | -0.020*** |
| | (0.076) | (0.073) | (0.078) | [0.000] |
| Vote share V | 0.050 | 0.046 | 0.055 | -0.009*** |
| | (0.054) | (0.053) | (0.056) | [0.000] |
| Vote share FrP | 0.045 | 0.048 | 0.041 | 0.007*** |
| | (0.070) | (0.072) | (0.068) | [0.001] |
| Vote share other | 0.076 | 0.064 | 0.092 | -0.028*** |
| | (0.148) | (0.127) | (0.173) | [0.000] |
| Observations | 4417 | 2569 | 1848 | |

*Notes: The table shows means for electoral turnout and voter shares of parties and party groups. The sample is also split between municipality-years with and without substantial rain (above 2.5 mm), and a t-test on the difference between the two.*
*Standard deviations are provided in parentheses and p-values for the t-test in square brackets. *, **, and *** denotes significant at the 10%, 5%, and 1% levels.*

Table A-2: Descriptive statistics: Outcomes

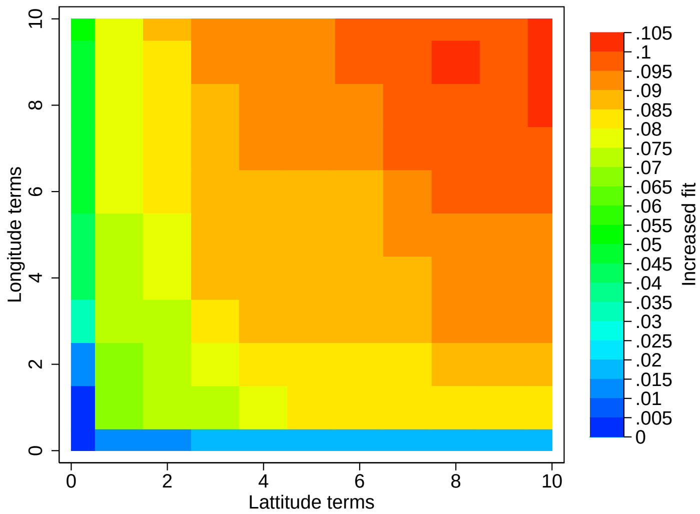
| | Overall | No rain | Rain | Difference |
|---|---|---|---|---|
| Expenditure shares | | | | |
| Child care | 0.045 | 0.049 | 0.039 | 0.010*** |
| | (0.034) | (0.034) | (0.033) | [0.000] |
| Education | 0.258 | 0.253 | 0.265 | -0.013*** |
| | (0.067) | (0.062) | (0.072) | [0.000] |
| Elderly care | 0.189 | 0.198 | 0.176 | 0.022*** |
| | (0.100) | (0.099) | (0.101) | [0.000] |
| Health and social | 0.111 | 0.112 | 0.109 | 0.003*** |
| | (0.051) | (0.049) | (0.053) | [0.000] |
| Culture | 0.050 | 0.051 | 0.049 | 0.002*** |
| | (0.028) | (0.028) | (0.027) | [0.000] |
| Transport | 0.037 | 0.034 | 0.041 | -0.008*** |
| | (0.028) | (0.026) | (0.030) | [0.000] |
| Central adm | 0.076 | 0.078 | 0.073 | 0.005*** |
| | (0.034) | (0.033) | (0.034) | [0.000] |
| Other | 0.235 | 0.226 | 0.248 | -0.022*** |
| | (0.116) | (0.116) | (0.114) | [0.000] |
| Expenditure shares | | | | |
| Expenditures | 83.406 | 81.632 | 85.831 | -4.198*** |
| | (37.292) | (35.674) | (39.270) | [0.000] |
| Investment share | 0.143 | 0.138 | 0.149 | -0.011*** |
| | (0.083) | (0.082) | (0.084) | [0.000] |
| Total sales | 2.604 | 3.068 | 2.035 | 1.033*** |
| | (10.158) | (12.630) | (5.791) | [0.000] |
| Has sales | 0.634 | 0.598 | 0.683 | -0.085*** |
| | (0.482) | (0.490) | (0.465) | [0.000] |
| Has property tax | 0.543 | 0.533 | 0.561 | -0.028** |
| | (0.498) | (0.499) | (0.496) | [0.013] |
| User charges | 2.753 | 2.859 | 2.584 | 0.275*** |
| | (1.325) | (1.365) | (1.240) | [0.000] |
| Growth in industrial empl. | 0.006 | 0.005 | 0.007 | -0.002 |
| | (0.347) | (0.383) | (0.253) | [0.809] |

*Notes: The table shows means for the outcomes. The sample is also split between municipality-years with and without substantial rain (above 2.5 mm), and a t-test on the difference between the two.*
*Standard deviations are provided in parentheses and p-values for the t-test in square brackets. *, **, and *** denotes significant at the 10%, 5%, and 1% levels.*

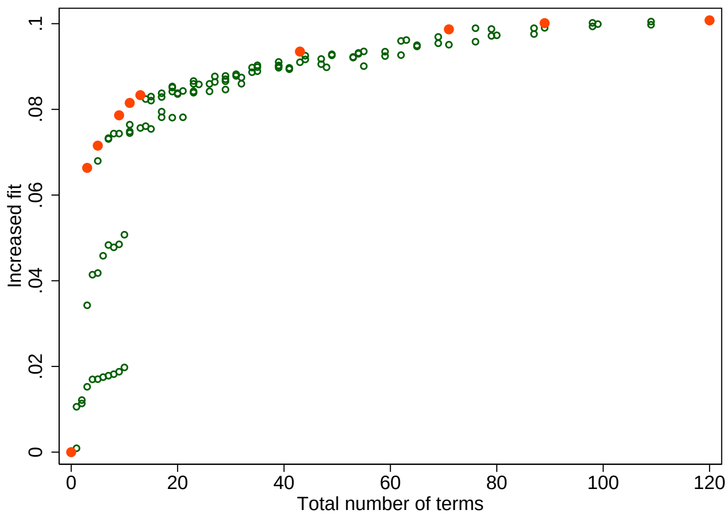
# B Additional estimation results

## B.1 Model choice

Figure A-1: The number of terms in the nonparametric trend model




(a) Increased fit and number of longiude and latitude terms




(b) Increased fit and total number of terms

*Notes: Approximation is with tensor products of Legendre polynomials of varying degrees. In Panel (b), cominations on the front are shown with solid orange dots and other combinations with hollow green dots.*

## B.2 Individual parties

Table A-3: Effect of turnout on individual parties

| | First stage | | OLS | | 2SLS | |
|---|---|---|---|---|---|---|
| Left | -0.0104*** | (-4.55) | -0.0889 | (-1.46) | -0.682 | (-1.34) |
| RV | -0.000307 | (-1.08) | -0.0114** | (-2.29) | -0.0340 | (-0.09) |
| SV | -0.00503*** | (-4.46) | -0.0550** | (-2.50) | -0.579** | (-2.05) |
| DNA | -0.00412** | (-1.97) | -0.0474 | (-0.79) | 0.169 | (0.34) |
| Right | -0.00777** | (-2.48) | -0.210** | (-2.41) | -0.876 | (-1.13) |
| V | -0.00406*** | (-3.10) | 0.0247 | (0.81) | -0.782** | (-2.15) |
| SP | 0.000428 | (0.22) | -0.107* | (-1.78) | -0.143 | (-0.28) |
| KRF | -0.00362*** | (-3.43) | -0.0765*** | (-2.59) | -0.111 | (-0.53) |
| H | -0.00133 | (-0.76) | -0.0624* | (-1.65) | -0.958** | (-2.39) |
| FRP | 0.00555*** | (3.95) | 0.0720** | (2.11) | 1.240*** | (2.72) |
| Other | 0.0182*** | (5.03) | 0.298*** | (2.67) | 1.555* | (1.94) |

*Notes: First stage is coefficient on dummy for rain above 2.5 mm, OLS and 2SLS coefficient on turnout.*
*All specifications include municipal and year fixed effects and spatio-temporal trends. Standard errors are clustered at the municipality level (using 2010 structure).*
*The IV estimates instrument turnout with rain.*
*t-values in parentheses,and *, **, and *** denotes significant at the 10%, 5%, and 1% levels.*

## B.3 Absolute expenditure by sector

Table A-4: Political composition and expenditure patterns: Totals

A: OLS estimates

| | (1) Child care | (2) Education | (3) Elderly care | (4) Health, social | (5) Culture | (6) Transport | (7) Central adm | (8) Other | (9) Total |
|---|---|---|---|---|---|---|---|---|---|
| *Without controls* | | | | | | | | | |
| Seat share left | 0.649*** | 0.215 | 0.608 | -0.207 | -0.0426 | -0.365 | 0.0471 | 0.0336 | 0.947 |
| | (2.67) | (0.23) | (0.69) | (-0.36) | (-0.11) | (-1.18) | (0.08) | (0.03) | (0.36) |
| Obs | 17148 | 17154 | 17145 | 17144 | 17148 | 17154 | 17145 | 17145 | 17071 |
| $R^2$ | 0.830 | 0.585 | 0.815 | 0.492 | 0.219 | 0.0355 | 0.567 | 0.169 | 0.782 |
| *With controls* | | | | | | | | | |
| Seat share left | 0.553** | 0.428 | 1.805** | 0.259 | 0.247 | -0.309 | 0.618 | 0.786 | 4.419* |
| | (2.28) | (0.47) | (2.28) | (0.46) | (0.69) | (-0.99) | (1.22) | (0.74) | (1.78) |
| Obs | 17148 | 17154 | 17145 | 17144 | 17148 | 17154 | 17145 | 17145 | 17071 |
| $R^2$ | 0.838 | 0.596 | 0.839 | 0.507 | 0.233 | 0.0387 | 0.604 | 0.198 | 0.810 |

B: Reduced form estimates

| | (1) Child care | (2) Education | (3) Elderly care | (4) Health, social | (5) Culture | (6) Transport | (7) Central adm | (8) Other | (9) Total |
|---|---|---|---|---|---|---|---|---|---|
| *Without controls* | | | | | | | | | |
| Rain | -0.0765*** | -0.0350 | 0.0839 | -0.167** | -0.0916* | -0.00331 | -0.0119 | -0.306*** | -0.638*** |
| | (-3.21) | (-0.62) | (1.12) | (-2.52) | (-1.80) | (-0.09) | (-0.34) | (-3.07) | (-3.03) |
| Obs | 17148 | 17154 | 17145 | 17144 | 17148 | 17154 | 17145 | 17145 | 17071 |
| $R^2$ | 0.830 | 0.585 | 0.815 | 0.493 | 0.219 | 0.0352 | 0.567 | 0.170 | 0.782 |
| *With controls* | | | | | | | | | |
| Rain | -0.0724*** | -0.0922 | 0.00553 | -0.184*** | -0.116** | -0.0100 | -0.0496 | -0.334*** | -0.883*** |
| | (-3.03) | (-1.64) | (0.08) | (-2.79) | (-2.17) | (-0.27) | (-1.53) | (-3.32) | (-4.29) |
| Obs | 17148 | 17154 | 17145 | 17144 | 17148 | 17154 | 17145 | 17145 | 17071 |
| $R^2$ | 0.838 | 0.596 | 0.838 | 0.507 | 0.234 | 0.0385 | 0.604 | 0.199 | 0.810 |

C: IV estimates

| | (1) Child care | (2) Education | (3) Elderly care | (4) Health, social | (5) Culture | (6) Transport | (7) Central adm | (8) Other | (9) Total |
|---|---|---|---|---|---|---|---|---|---|
| *Without controls* | | | | | | | | | |
| Seat share left | 4.971* | -3.317 | 2.207 | 5.258 | 0.396 | -0.297 | -0.324 | 0.0203 | -11.85 |
| | (1.90) | (-0.56) | (0.20) | (0.93) | (0.10) | (-0.08) | (-0.03) | (0.00) | (-0.47) |
| Obs | 17148 | 17154 | 17145 | 17144 | 17148 | 17154 | 17145 | 17145 | 17071 |
| $R^2$ | 0.815 | 0.583 | 0.815 | 0.478 | 0.221 | 0.0384 | 0.568 | 0.170 | 0.780 |
| Cragg-Donald F | 77.29 | 77.73 | 77.73 | 78.05 | 77.57 | 78.45 | 77.63 | 77.82 | 77.32 |
| *With controls* | | | | | | | | | |
| Seat share left | 5.415** | -4.577 | 14.89* | 10.12 | 5.160 | 0.511 | 2.348 | 9.137 | 50.07** |
| | (2.16) | (-0.80) | (1.72) | (1.61) | (0.20) | (0.17) | (0.46) | (0.44) | (2.22) |
| Obs | 17148 | 17154 | 17145 | 17144 | 17148 | 17154 | 17145 | 17145 | 17071 |
| $R^2$ | 0.819 | 0.591 | 0.824 | 0.458 | 0.211 | 0.0407 | 0.603 | 0.182 | 0.781 |
| Cragg-Donald F | 71.78 | 72.26 | 72.36 | 72.48 | 72.06 | 72.89 | 72.02 | 72.33 | 71.68 |

*Notes: Rain measured as a dummy for substantial rain (above 2.5 mm). All estimations control for two way fixed effects and spatio-temporal trends. Estimates with controls also control for the population share of children, young, elderly, women and unemployed and include two way fixed effects.*

*Standard errors are clustered at the present day municipality level. * significant at 10%; ** at 5%; *** at 1%.*

## B.4 Continuous measures of rain

Table A-5: Political composition and expenditure patterns: Totals

A: OLS estimates

| | (1) Child care | (2) Education | (3) Elderly care | (4) Health, social | (5) Culture | (6) Transport | (7) Central adm | (8) Other | (9) Total |
|---|---|---|---|---|---|---|---|---|---|
| *Without controls* | | | | | | | | | |
| Seat share left | 0.649*** | 0.215 | 0.608 | -0.207 | -0.0426 | -0.365 | 0.0471 | 0.0336 | 0.947 |
| | (2.67) | (0.23) | (0.69) | (-0.36) | (-0.11) | (-1.18) | (0.08) | (0.03) | (0.36) |
| Obs | 17148 | 17154 | 17145 | 17144 | 17148 | 17154 | 17145 | 17145 | 17071 |
| $R^2$ | 0.830 | 0.585 | 0.815 | 0.492 | 0.219 | 0.0355 | 0.567 | 0.169 | 0.782 |
| *With controls* | | | | | | | | | |
| Seat share left | 0.553** | 0.428 | 1.805** | 0.259 | 0.247 | -0.309 | 0.618 | 0.786 | 4.419* |
| | (2.28) | (0.47) | (2.28) | (0.46) | (0.69) | (-0.99) | (1.22) | (0.74) | (1.78) |
| Obs | 17148 | 17154 | 17145 | 17144 | 17148 | 17154 | 17145 | 17145 | 17071 |
| $R^2$ | 0.838 | 0.596 | 0.839 | 0.507 | 0.233 | 0.0387 | 0.604 | 0.198 | 0.810 |

B: Reduced form estimates

| | (1) Child care | (2) Education | (3) Elderly care | (4) Health, social | (5) Culture | (6) Transport | (7) Central adm | (8) Other | (9) Total |
|---|---|---|---|---|---|---|---|---|---|
| *Without controls* | | | | | | | | | |
| Rain | -2.694*** | 2.943 | 2.558 | -3.247 | 1.227 | 1.041 | 6.114*** | -7.748* | -1.180 |
| | (-2.60) | (0.74) | (0.57) | (-1.04) | (0.70) | (0.54) | (2.64) | (-1.80) | (-0.11) |
| Obs | 17205 | 17211 | 17202 | 17201 | 17205 | 17211 | 17202 | 17202 | 17128 |
| $R^2$ | 0.830 | 0.585 | 0.815 | 0.494 | 0.220 | 0.0351 | 0.567 | 0.168 | 0.781 |
| *With controls* | | | | | | | | | |
| Rain | -2.850*** | 2.041 | -0.123 | -3.384 | 0.788 | 0.726 | 5.233** | -8.748** | -7.432 |
| | (-2.88) | (0.52) | (-0.03) | (-1.13) | (0.43) | (0.38) | (2.41) | (-2.07) | (-0.76) |
| Obs | 17205 | 17211 | 17202 | 17201 | 17205 | 17211 | 17202 | 17202 | 17128 |
| $R^2$ | 0.838 | 0.596 | 0.838 | 0.508 | 0.234 | 0.0385 | 0.604 | 0.197 | 0.809 |

C: IV estimates

| | (1) Child care | (2) Education | (3) Elderly care | (4) Health, social | (5) Culture | (6) Transport | (7) Central adm | (8) Other | (9) Total |
|---|---|---|---|---|---|---|---|---|---|
| *Without controls* | | | | | | | | | |
| Seat share left | 3.818 | -17.87** | 3.749 | -3.634 | -1.433 | -2.078 | -13.42* | -5.138 | -25.18 |
| | (1.57) | (-2.03) | (0.39) | (-0.53) | (-0.05) | (-0.59) | (-1.89) | (-0.46) | (-0.85) |
| Obs | 17148 | 17154 | 17145 | 17144 | 17148 | 17154 | 17145 | 17145 | 17071 |
| $R^2$ | 0.822 | 0.503 | 0.814 | 0.487 | 0.219 | 0.0333 | 0.452 | 0.164 | 0.773 |
| Cragg-Donald F | 76.66 | 76.78 | 77.26 | 77.00 | 76.40 | 77.15 | 76.68 | 77.17 | 76.40 |
| *With controls* | | | | | | | | | |
| Seat share left | 4.385 | -14.31* | 14.43 | 15.13* | -2.784 | -1.582 | -7.579 | 1.692 | 4.223 |
| | (1.56) | (-1.81) | (1.58) | (1.94) | (-0.77) | (-0.50) | (-1.51) | (0.16) | (0.18) |
| Obs | 17148 | 17154 | 17145 | 17144 | 17148 | 17154 | 17145 | 17145 | 17071 |
| $R^2$ | 0.826 | 0.543 | 0.825 | 0.361 | 0.227 | 0.0392 | 0.563 | 0.200 | 0.811 |
| Cragg-Donald F | 76.72 | 76.87 | 77.40 | 76.99 | 76.51 | 77.20 | 76.67 | 77.29 | 76.39 |

*Notes: Rain measure is amount of rain (in m).Notes: All estimations control for two way fixed effects and spatio-temporal trends. Estimates with controls also control for the population share of children, young, elderly, women and unemployed and include two way fixed effects.*

*Standard errors are clustered at the present day municipality level. * significant at 10%; ** at 5%; *** at 1%.*

Table A-6: Political composition and expenditure patterns: Shares

A: OLS estimates

| | (1) Child care | (2) Education | (3) Elderly care | (4) Health, social | (5) Culture | (6) Transport | (7) Central adm | (8) Other |
|---|---|---|---|---|---|---|---|---|
| *Without controls* | | | | | | | | |
| Seat share left | 0.00760** | -0.0284** | 0.0282** | -0.00779 | -0.00219 | -0.00498 | 0.000586 | 0.00699 |
| | (2.10) | (-2.29) | (2.24) | (-0.78) | (-0.45) | (-0.94) | (0.10) | (0.46) |
| Obs | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 |
| $R^2$ | 0.804 | 0.356 | 0.744 | 0.218 | 0.0821 | 0.219 | 0.273 | 0.722 |
| *With controls* | | | | | | | | |
| Seat share left | 0.00211 | -0.0403*** | 0.0251** | -0.00545 | 0.000544 | -0.00556 | 0.00243 | 0.0211 |
| | (0.65) | (-3.64) | (2.01) | (-0.54) | (0.11) | (-1.05) | (0.43) | (1.43) |
| Obs | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 |
| $R^2$ | 0.828 | 0.408 | 0.748 | 0.222 | 0.0881 | 0.222 | 0.279 | 0.732 |

B: Reduced form estimates

| | (1) Child care | (2) Education | (3) Elderly care | (4) Health, social | (5) Culture | (6) Transport | (7) Central adm | (8) Other |
|---|---|---|---|---|---|---|---|---|
| *Without controls* | | | | | | | | |
| Rain | -0.0611*** | 0.146*** | -0.0757 | -0.00640 | 0.0375 | -0.0168 | 0.0645* | -0.0882 |
| | (-3.46) | (2.69) | (-1.32) | (-0.11) | (1.52) | (-0.56) | (1.91) | (-1.17) |
| Obs | 17126 | 17126 | 17126 | 17126 | 17126 | 17126 | 17126 | 17126 |
| $R^2$ | 0.805 | 0.356 | 0.744 | 0.218 | 0.0820 | 0.219 | 0.273 | 0.722 |
| *With controls* | | | | | | | | |
| Rain | -0.0559*** | 0.139*** | -0.0755 | 0.00188 | 0.0351 | -0.0164 | 0.0652* | -0.0932 |
| | (-3.35) | (2.79) | (-1.31) | (0.03) | (1.43) | (-0.55) | (1.96) | (-1.28) |
| Obs | 17126 | 17126 | 17126 | 17126 | 17126 | 17126 | 17126 | 17126 |
| $R^2$ | 0.829 | 0.407 | 0.747 | 0.222 | 0.0878 | 0.222 | 0.278 | 0.731 |

C: IV estimates

| | (1) Child care | (2) Education | (3) Elderly care | (4) Health, social | (5) Culture | (6) Transport | (7) Central adm | (8) Other |
|---|---|---|---|---|---|---|---|---|
| *Without controls* | | | | | | | | |
| Seat share left | 0.119*** | -0.148 | 0.248 | 0.0362 | -0.0832 | -0.00545 | -0.0950 | -0.0717 |
| | (2.62) | (-1.11) | (1.58) | (0.34) | (-1.48) | (-0.10) | (-1.40) | (-0.41) |
| Obs | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 |
| $R^2$ | 0.756 | 0.338 | 0.721 | 0.216 | 0.0376 | 0.221 | 0.231 | 0.721 |
| Cragg-Donald F | 75.62 | 75.62 | 75.62 | 75.62 | 75.62 | 75.62 | 75.62 | 75.62 |
| *With controls* | | | | | | | | |
| Seat share left | 0.0860** | -0.123 | 0.263 | 0.0501 | -0.0688 | -0.0121 | -0.0861 | -0.114 |
| | (2.48) | (-1.00) | (1.62) | (0.43) | (-1.31) | (-0.23) | (-1.33) | (-0.55) |
| Obs | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 | 17069 |
| $R^2$ | 0.801 | 0.399 | 0.721 | 0.218 | 0.0569 | 0.224 | 0.244 | 0.726 |
| Cragg-Donald F | 75.57 | 75.57 | 75.57 | 75.57 | 75.57 | 75.57 | 75.57 | 75.57 |

*Notes: Rain measure is amount of rain (in m).Notes: All estimations control for two way fixed effects and spatio-temporal trends. Estimates with controls also control for the population share of children, young, elderly, women and unemployed and include two way fixed effects.*
*Standard errors are clustered at the present day municipality level. * significant at 10%; ** at 5%; *** at 1%.*