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Jørgen Juel Andersen, Jon H. Fiva and Gisle James Natvik

BI NORWEGIAN BUSINESS SCHOOL

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Jørgen Juel Andersen† Jon H. Fiva ‡ Gisle James Natvik§

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Abstract

Most theories of voter behavior predict that electoral participation will be higher in elections where more is at stake. We test this prediction by studying how participation is affected by exogenous variation in local governments' financial flexibility to provide pork for their voters. Utilizing simultaneous elections for different offices, we identify a positive effect of election stakes on participation: Higher stakes at the local level increase participation at the local relative to the regional election. Survey evidence indicates that the underlying mechanism relates to citizens' acquisition of information.

Keywords: Voter Motivation; Electoral Participation; Roll-off; Pork Barrel Spending

JEL Classification: D72; D83; H71; H72

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†BI Norwegian Business School. E-mail: jorgen.j.andersen@bi.no

‡BI Norwegian Business School. E-mail: jon.h.fiva@bi.no

§Norges Bank. E-mail: gisle-james.natvik@norges-bank.no

1 Introduction

A central question within political economy and political science is what determines voters' participation in elections. Presumably, a main reason for the massive attention directed to this issue is that election outcomes might influence policy. Furthermore, most models of voting behavior suggest that turnout should be higher in elections where more is at stake (Downs (1957); Tullock (1967); Riker and Ordeshook (1968)). Against this background it is surprising that little evidence on the effect of election stakes on electoral participation exists.[1] We aim to fill this void.

An election's stakes depend on how strongly the winning candidate can influence outcomes that voters care about. A key determinant of a politician's influence is the extent of fiscal flexibility that he or she will face in office, which in general cannot be taken as exogenous. Our approach to handling the endogeneity of fiscal flexibility is to utilize variation in local government (municipality) revenue in Norway from hydropower production, which is largely determined by topography. Higher revenue from hydropower production equips elected officials with more funds to distribute, and thus raises the stakes of the local election.[2]

Figure 1 depicts the fraction of eligible voters who view the upcoming local and regional elections as "highly important", when asked in the Local Election Survey. Moving from left to right in the figure, we clearly see that the local election is perceived as more important in municipalities with high hydropower income. In contrast, for the election to the regional government, which does not enjoy the hydropower income, no such pattern is present.[3]

[1]There is some suggestive evidence that the stakes of the election matter, particularly the fact that more people tend to vote in national than in local elections (Franklin (2004)), but this obviously does not permit claims about a causal effect. More generally, empirical studies of predictions from voter theories are mostly indirect and not constructed to uncover causality, as noted by Duffy and Tavits (2008).

[2]It is a well-known fact in Norway that hydropower can give local governments massive income streams, and that local politicians have high flexibility in choosing how to spend this money. Municipalities with high hydropower revenues are commonly referred to as "*power municipalities*" ("*kraftkommuner*") also in government white papers, see for instance `http://www.regjeringen.no/nb/dep/krd/dok/nouer/2005/nou-2005-18/6/3/3`.

[3]The same conclusion is drawn from probit analyses relating survey responses to hydropower income, controlling for municipal population size and settlement pattern (cf. online appendix).

Our identification strategy exploits that in Norway, the election for the local and the election for the regional governments are held simultaneously within the same voting booth and with identical sets of eligible voters. By focusing on the difference between participation in the local and the regional elections—the *participation difference* hereafter—we obtain estimates that are unlikely to be biased by (unobserved) population characteristics. The participation difference is closely related to the concept of "roll-off", defined by Dean (1965) as the "tendency of the electorate to vote for "prestige" offices but not for lower offices on the same ballot". As Figure 1 shows, in the context we study the office that the voters perceive as more important is the local one. This is also reflected in the fact that less than 1% of survey respondents reply that they vote in the regional election only, whereas 11% reply that they vote in the local election only.

Our main finding is that higher tax revenues from hydropower production increases participation at the local election relative to the regional election. This finding is remarkably robust. It is visible in the raw data, and it does not disappear as we gradually control for an extensive list of local characteristics known from the literature to affect voter behavior. Quantitatively, our estimates suggest that a one standard deviation increase in hydropower revenue (about USD $1,000$) stimulates the participation difference with about 0.7 percentage points, or, alternatively, that raising this income from its minimum to its maximum observed level will increase the participation difference by as much as 6 percentage points.

We extend our analysis with an instrumental variable approach, using topography as an instrument for hydropower income. The results corroborate our main findings. We also extend our analysis by studying preferential votes, which voters may cast for specific candidates in the elections we consider. Election stakes seem to stimulate this dimension of voter activity too: the higher are hydropower revenues, the more do voters alter the parties' lists of candidates.

To facilitate interpretation of our results we first explore how hydropower revenue actually is spent. We show that these revenues are not simply used to marginally im-

prove the quality of core public services, but rather to provide new goods that benefit narrower parts of the population.[4] This spending pattern supports the assumption that hydropower income raises the stakes of the local election. In addition, we focus on the leading mechanism emphasized in the roll-off-literature, namely that individuals are averse to participate in elections where they have limited information about the candidates. Two different types of evidence indicate that this mechanism might lie behind our main results: (i) Survey evidence on voter activity reveals that the higher is hydropower income, the better informed are the citizens about local relative to national politics. (ii) Hydropower income affects the participation difference primarily in those local governments where the sets of available party lists differ between the local and the regional election, which might reflect that some citizens are triggered to gather local political information and vote for independent lists at the local election, and then abstain from the regional election where this information is irrelevant.

Our study relates to key questions in the vast literature on voter behavior, surveyed by for instance Dhillon and Peralta (2002). Several studies have suggested that even though instrumental motives to vote cannot alone explain high turnout *levels* in mass elections, such motives might still matter on the *margin* (examples are Blais (2000), Dowding (2005) and Geys (2006)). Our results are consistent with that hypothesis. Second, our study relates to the literature on selective abstention and roll-off, where prominent theories emphasize information costs as determinant of electoral participation (for instance, Matsusaka (1995) and Feddersen and Pesendorfer (1996, 1999)). Our findings suggest that greater fiscal flexibility at the local level motivates citizens to gather information about local politics, and this raises their propensity to vote at the local rather than at the regional election. This effect points to a mechanism that has not yet been explored by theory: voters may be instrumentally motivated to gather information and thereby participate in elections. Interestingly, such a mechanism would be consistent also with

[4]Hydropower-rich municipalities systematically down-prioritize the two core welfare services provided by local governments (education and elderly care), relative to non-core expenditure categories such as local roads and industry support. According to the methodology of Levitt and Snyder (1995, 1997) the latter expenditure categories are identified as pork.

the recent study by Charles and Stephens Jr. (2013), who find that employment reduces electoral participation and suggest that the reason is a negative effect of employment on time available for information acquisition.

In addition our study relates to the vast literature on the politics of pork barrel spending, where seminal contributions include Ferejohn (1974) and Mayhew (1974). Central findings here have been that political parties reward their voters by targeting spending toward districts where they have a strong position, and that pork barrel spending is rewarded by voters in recipient districts (Levitt and Snyder (1995, 1997), Martin (2003)). Our results contribute by showing that fiscal flexibility to pursue pork barrel spending affects electoral participation.

The paper is organized as follows. Section 2 presents the institutional setting and the role of hydropower revenue for Norwegian municipalities. In section 3 we explain our empirical strategy. Section 4 gives our main results for electoral participation. Section 5 explores their robustness. Section 6 documents how hydropower revenues are spent, while section 7 discusses information costs and roll-off. Section 8 concludes.

2 Institutional Setting and Hydropower Income

In Norway there are three layers of government: the central government, the regional governments (19 counties) and the local governments (431 municipalities). The local governments are multipurpose authorities responsible for the provision of welfare services like schooling, elderly care, and child care. The regional governments have more limited tasks. Their primary responsibilities are providing upper secondary education, regional roads, and transportation. Together, the local and regional levels of government account for about 18 percent of mainland GDP.

2.1 Political System and Electoral Participation

The local and regional governments are headed by councils elected through open-list proportional representation.[5] Voters can affect the election outcome both by voting for a party list, and by casting preferential votes for particular candidates. Candidates are elected based on the votes they individually receive.[6]

At the Norwegian local and regional level of government there are seven main political parties. In addition there are some independent lists (local lists that are independent of the traditional political parties) that receive substantial support in some local governments. Independent lists are more issue-oriented than traditional party lists and are frequently based on internal geographic divides within the bounds of the municipality (Aars and Ringkjøb (2005)).

In Norwegian politics, the main divide is between the social democratic left bloc and the conservative right bloc. In the 2007–2011 election period, 44 percent of the mayors were from the left-wing bloc, 50 percent were from the right-wing bloc, and 6 percent were from independent lists. Fiva, Folke, and Sørensen (2013) use data from an extensive survey questionnaire aimed at establishing council members' preferences for particular spending programs and tax policy. They document large ideological differences between the parties and find little support for the notion of ideologically homogeneous local governments.

Elections for both the local and the regional governments take place at the same time *and* place, and the electorate is identical across the two elections.[7] As will be discussed

[5]The mathematical formula used to translate votes into seats in Norwegian elections is the modified Sainte-Laguë method.

[6]At the local government level parties have the option to give some candidates an increased share of the poll (a maximum of 25 percent of the total number of votes received by the party's list). Together with preferential votes, which voters may cast to candidates on *any* party list, this is the basis for the distribution of seats. At the regional level the parties cannot give candidates an increased share of the poll, and preferential votes cannot be given to candidates from other lists. The voters may however affect the ordering of candidates at different lists, but for this to overrule the ordering proposed by the party prior to the election, a candidate must receive a preferential vote from at least eight percent of the party's electors.

[7]Statistics Norway describes the eligibility rules as follows: "The right to vote is stipulated in Norway's constitution and the Election Act. Norwegian citizens aged 18 or over in the election year and who have resided in Norway for the last ten years will automatically be included in the elec-

further below, our access to voting data for one electorate who vote for two separate offices within the same voting booth is crucial for our research design. Our main analysis is based on local and regional elections held on September 9-10, 2007.[8]

In the local elections the average participation rate is 64 percent, while in the regional elections the average is 58 percent. Figure 2 shows that the difference in participation rates is positive throughout the sample.

2.2 Local Public Finance

In 2007, local governments spent on average NOK 67,000 (USD 11,500) per capita. On average, 60 percent was spent on the major welfare services that local governments are responsible for, namely schooling, elderly care, and child care, see Table 1. About 7 percent was spent on traditional local public goods (fire protection and infrastructure). The remainder was spent on central administration, social assistance, primary health care, cultural activities, industry support, planning, and local roads. Local governments have considerable flexibility concerning the composition of government spending, but do face regulations on both coverage and standards of welfare services.

The revenue side is more restricted. About 80 percent of the total local government revenues stem from central government grants and regulated income taxes.[9] The remainder stem from user charges, which are limited to cover costs only, and property taxation. In this study we focus on revenues from commercial property taxation which essentially stems from taxation of hydropower producers, as discussed in more detail below. Local

toral register. In addition, Norwegian citizens who have lived abroad continuously for the last ten years, may apply to be included in the electoral register ... Foreign nationals who have resided in Norway for the last three years are entitled to vote in county and municipal elections provided that they fulfil the conditions applicable to Norwegian nationals. Nordic citizens are entitled to vote in the 2007 county and municipal election if they have moved to Norway before 30 June in the election year (`http://www.ssb.no/vis/stemmerettkomm_en/about.html`)."

[8]We lose five observations for various reasons: Two local governments (Kristiansund and Frei) merged January 1 2008, two local governments have implemented parliamentary systems (Oslo and Bergen), and we lack data on property taxation for one local government (Torsken).

[9]The income tax rate cannot exceed a ceiling which is centrally determined, and since 1977 no municipality has deviated from this upper bound. Furthermore, revenues from income taxation are strongly equalized across governments in a rule-based revenue sharing system. Grants are also largely determined by rules and regulations, as 98-99 percent of grants are non-discretionary.

governments also have the possibility to levy property taxation on housing, studied in Fiva and Rattsø (2007). Importantly, property tax revenues are not redistributed across local governments.

2.3 Hydropower Income

Large hydropower plants are typically found in mountainous areas that receive substantial precipitation, and where glaciers have shaped the landscape so that hydropower production is technically possible. Hence, a topography that is favorable to production of hydropower facilitates large revenues for local governments through commercial property taxation.[10] In 2007, 65 percent of Norway's local governments levied such taxes. The tax rate is chosen by the local government, but cannot exceed 0.7 percent. Importantly, all local governments with substantial per capita revenue from hydropower production tax at the maximum rate.[11]

Because the maximum tax rate is low, one needs a massive tax base relative to population size for this revenue source to matter. Hydropower production has this property. Figure 3 documents that there is a strong and essentially linear relationship between hydropower production per capita in the 1970-1999 period and commercial property taxation in 2007. As revenues from commercial property taxation predominantly stem from taxing hydropower plants, we refer to this revenue source as *hydropower income (HPI)*.

Most local governments have little or no hydropower income. As seen in Table 2, 151 local governments (33 percent) received no such revenues in 2007. For some local governments, however, hydropower revenues are substantial. 37 of the local governments in our sample received hydropower income amounting to more than 10 percent of their total income, and 23 local governments received more than NOK $10,000$ (about USD

[10] Hydropower accounts for 98-99 percent of total electricity production in Norway (Statistics Norway).

[11] Across all 275 local governments levying commercial property taxation in 2007, the average tax rate is 0.62 (11 observations with missing data on the tax rate). For the 93 local governments with an income above NOK 2,000 per capita, all have a tax rate of 0.7 (3 observations with missing data on the tax rate).

1,700) per capita.[12] The maximum level of hydropower income in the sample is NOK 52,000 (about USD 9,000) per capita. This right skewness is reflected in the mean of hydropower income (about NOK 2,000, or USD 350) lying well above the median (about NOK 300, or USD 50), and only 22 percent (93 out of 426) of the local governments enjoyed more hydropower income than the sample mean. Thus, the standard deviation of hydropower income of NOK 5,760 (about USD 1,000) is mainly determined by variation in the top 20-30th percentile of the distribution.

3 Empirical Strategy

An individual's decision to vote may be influenced by a multitude of factors. The key empirical challenge for our purpose is therefore to isolate the influence of local government income on participation rates.[13]

As a starting point, consider estimating β^L in the following equation linking local participation rates in municipality l, denoted P_l^L, to local government income, denoted I_l:

$$P_l^L = \mu^L + \beta^L I_l + \varepsilon_l^L, \tag{1}$$

Obviously, the coefficient β^L does not isolate how income alters electoral participation through election-specific stakes as it will also be influenced by omitted variables correlated with both I_l and P_l^L. For instance, it might be that municipalities rich in hydropower also happen to be populated by citizens that feel particularly strongly morally obliged to vote, irrespective of what is actually at stake in any specific election. Alternatively, hydropower wealth might be used to improve roads which in turn reduce the cost of voting and thereby stimulate turnout. More generally, it is likely that across municipalities, hydropower

[12] Out of the 37 local government with more than 10 percent of their income from commercial property taxation, 30 have major power stations (capacity above 10MW per hour). Three local government have only minor hydropower stations (capacity below 10MW per hour) and four do not have any hydropower. In these cases the property tax revenues stems predominantly from taxation of natural gas production. These local governments are the outliers visible in Figure 3.

[13] For a more detailed discussion of the empirical challenges and how our approach deals with them, see the online appendix to this paper.

income correlates with the general costs and benefits of voting at any election.

To deal with this issue, we redirect attention to the difference between participation rates at the local and the regional elections in each municipality. Consider estimating the equation

$$P_l^L - P_l^R = \mu^{LR} + \beta^{LR} I_l + \varepsilon_l^{LR}, \tag{2}$$

where P_l^R is municipality $l's$ participation rate in the regional election, and the superscript LR indicates that we are studying the difference between local and regional elections. As the local and regional elections are held at the same time and place, this specification immediately cleans out any influence from factors that are common to both elections, such as the individual-specific moral obligation to vote or the physical costs of voting.[14]

However, even when focusing on the participation difference, omitted variables might in principle still be influencing our estimates. This would happen if hydropower income correlates with variables that determine individuals' incentives to vote at local rather than at regional elections. To address this concern, we may add a set of municipality-specific controls, $\mathbf{X}_l$, and estimate the following equation:

$$P_l^L - P_l^R = \mu_m^{LR} + \beta^{LR} I_l + \mathbf{X}_l \alpha + \varepsilon_l^{LR}. \tag{3}$$

With this equation, our estimate of β^{LR} will be contaminated only if there are further unobserved variables, not included in $\mathbf{X}_l$, that both are correlated with I_l *and* have a differential impact on local and regional election participation rates. We have now limited our original omitted variable problem considerably. Moreover, the severity of the potential bias we are left with can be assessed by comparing the estimates of β^{LR} from specifications (2) to the estimates from (3), as this reveals the magnitude of the bias from omitting observables. If we have included variables which we a priori expect to be important for voter behavior, and find that controlling for these variables leaves

[14]Degan and Merlo (2011) also utilize simultaneous elections to investigate the determinants of electoral participation. As part of their empirical strategy they assume that individuals' sense of civic duty is the same for the US Presidential and Congressional elections. However, they do not consider election stakes in their investigation.

β^{LR} basically unaltered, then it is unlikely that unobservable variables bias β^{LR} to any considerable extent.

Due to the considerations outlined above, we base our inference on equation (3). The literature on voting has suggested and documented a long list of variables influencing participation, and we include in $\mathbf{X}_l$ as many of these as we have available. The full list of controls is given in Appendix Table A.1.

First, we control for various municipality-specific characteristics of an economic and demographic nature. In particular, we control for the size and age distribution of the electorate, as well as the distribution of educational and marital status within the population. We also include variables capturing population size and density, and recent immigration (measured as the number of people moving into the municipality in 2006 relative to the size of the population). Furthermore, we include the average wage level (measured in NOK 100,000, approximately USD 17,000) for men and women, respectively. Finally in this category of controls we include two measures that proxy for social capital, namely donations per capita (NOK) collected during the country's annual televised charity fundraiser, and the number of church services attended per capita.

Second, we control for various institutional characteristics of each local government: whether elections were held during one or two days (dummy), whether there are direct local elections for the mayor or not (dummy), the party fragmentation of the local government based on the previous local election, and whether an independent list exists for the local election (dummy). These political institutional characteristics may be endogenous and are not included in all specifications.

Finally, we replace the generic constant term μ in equation (2) with labor market fixed effects (μ_m). The labor market regions, 90 in total, are defined by Statistics Norway on the basis of commuting flows. They correspond to the NUTS level 4 of the European Statistical Office. Labor market regions are nested within the borders of the regional governments (which correspond to NUTS level 3), hence including these fixed effects wipes out all factors that are common for local governments belonging to same regional

government.[15]

Notably, observations within regions might be non-independent for various reasons. For example, nearby local governments are often subject to the same media coverage. To allow for arbitrary correlation in the error terms within labor market regions we cluster the standard errors at this level.

4 Results

As a simple first investigation, we plot the participation difference against hydro power income. Figure 4 shows a strong positive relationship between the two variables (the correlation coefficient is 0.27). The positive correlation is not sensitive to excluding the local governments with the highest levels of hydro power income.[16]

In Table 3 we analyze the difference between participation rates in the two elections more rigorously, using Ordinary Least Squares (OLS) to estimate variants of equation (3). We start with specification (1) which does not include any control variables, equivalent to the regression line displayed in the right panel of Figure 4 and equation (2). We then add control variables in four steps: Specification (2) includes labor market fixed effects, specification (3) includes a control variable for the size of the electorate, specification (4) includes the full battery of population characteristics available to us and, finally, specification (5) is augmented with political institutional variables.

All specifications give a positive and highly statistically significant estimate for the effect of hydropower income on the participation difference. The estimated coefficients on hydropower income range from 0.11 to 0.16. In the richest specification the point estimate is 0.12, statistically significant at the 1-percent level. Quantitatively, this im-

[15]Our main results are essentially unaltered if we replace labor market fixed effects with regional government fixed effects.

[16]In the online appendix we provide plots showing how local, regional and national electoral participation relate to hydropower income. Both local and regional electoral participation are positively related to hydro power income, but the association is weaker for the regional election (the correlation coefficients are 0.24 and 0.10, respectively). At the national election, which are held in the middle of the local election cycle, participation and hydro power income show no clear relation (correlation coefficient of 0.05).

plies that if per capita revenues from hydropower taxes increase by about one standard deviation (NOK 5,790, or about USD 1,000), the participation difference rises by about 0.7 percentage points. Alternatively, when hydropower tax revenues rise from the minimum (0) to the maximum observed level (NOK 52,000, or USD 9,000), the participation difference increases by about 6 percentage points. With the average participation rate of 64 percent (cf. Table A.1) as a baseline scenario and assuming that the entire effect is driven by increased participation at the local election, this suggests that one out of six citizens who otherwise would have abstained from voting are motivated to participate in the local election. Notice, however, that the difference specification alone does not allow us to discriminate between "roll-on" at the local election, roll-off at the regional election, or a combination of the two. We return this issue in Section 7, where we discuss information theories of turnout and utilize auxiliary evidence to interpret our results.

Within the basic "calculus of voting" model of Downs (1957), a citizen's utility of voting in a specific election is determined by the probability that her vote becomes pivotal multiplied by her personal payoff from deciding the election. A straightforward prediction is that electoral participation will be negatively associated with the size of the electorate, as the probability that an individual becomes pivotal decreases when there are many voters. We find this effect in our data.

Moreover, the calculus of voting model also predicts that the impact of hydropower income should depend on the number of eligible voters. We explored this by including an interaction term between the two. The interaction term was, however, not statistically significant at conventional levels.[17] This may imply that "prize pivotalness" (Schwartz (1987); Smith and Bueno De Mesquita (2012)) is empirically more relevant than "outcome pivotalness" (Downs (1957); Tullock (1967)) in the context we examine. The idea in Schwartz (1987) and Smith and Bueno De Mesquita (2012) is that political parties depend on the continuing support of particular groups to stay in power and therefore

[17]Results are available upon request. That the benefits from voting and the probability of casting a decisive vote, in the traditional sense, matters independently, but not multiplicatively is in line with survey evidence provided by Blais, Young, and Lapp (2000).

have incentives to cater to the same interest groups by offering local public benefits. When a party allocates rewards contingent upon group-level voting results, it motivates group members to coordinate on supporting the party even if voters cannot individually influence who will win the election.

The results in Table 3, column (3), show that controlling for the size of the electorate has some leverage on the estimated effect of hydropower income, reducing the point estimate by almost 1/3.[18] This reduction can be explained by the fact that hydropower production is located in mountainous areas and along the coast of Norway where municipalities are less populous than the national average, implying a negative correlation between hydropower income and the size of the electorate. Apart from this effect of electorate size, local characteristics have limited explanatory power for the participation difference, as seen in column (4). This contrasts with regressions on participation *levels*, where population characteristics have considerable explanatory power and the hydropower income estimates are sensitive to the model specification (see online appendix). Hence, it appears that by differencing out participation in the regional elections we effectively capture the effects of observable characteristics that affect citizens' general motive to vote at both elections, such as age, gender, marital status, the level of education, income, and proxies for social capital (in our regressions, charity donations and church attendance).

Our interest in point estimates for population characteristics follows from the discussion in Section 3. When we find that observable variables have negligible effects on the participation difference, the possibility that omitted variables are driving our results becomes less of a concern: any relevant omitted variable must both be appropriately correlated with hydropower income and affect participation far more strongly than our observables do. This seems unlikely.[19]

[18] Adding non-linear transformations of electorate size does not continue to soak up the effect of hydropower income. When adding VotingPopulation quadratically, cubically or quartically, the HPI point estimate is stable at 0.12-0.13, controlling for all our other population and institutional characteristics (cf. online appendix).

[19] In contrast, the level results (cf. online appendix) are more sensitive to the inclusion of observables than the difference results are, which makes it more likely that they are influenced by unobservables.

Although it is unlikely that omitted variables drive our main result, there is one factor that potentially could impact our estimates: the cost of turning up to vote is sunk once an individual is inside the voting booth. A plausible consequence is that if hydropower income motivates individuals to participate in the local election, some of them will cast a vote in the regional election too. Hence, our point estimates might underestimate how strongly hydropower income affects participation in the local relative to the regional election.[20]

5 Robustness

5.1 Policy Endogeneity

When assessing the causal effect of election stakes, a challenge is that these stakes generally are not exogenous, but will depend on the policies chosen by politicians in response to fiscal needs, personal popularity and so on. To circumvent this problem, we have used a research design where such policy endogeneity is unlikely to be a concern since hydropower income is largely determined by topographical factors. However, as noted in Section 2.2, local governments do have the option whether or not to levy commercial property taxes, they can choose to set the tax rate below the maximum rate (even though none of the local governments with substantial hydropower income do), and there are also some local governments receiving commercial property tax revenue from non-hydropower sources (e.g.,natural gas production).

To investigate whether policy endogeneity threatens our identification strategy we rely on instrumental variable techniques where we employ measures of topographic variation as instruments for hydropower income. More specifically, we use four variables capturing variations in altitude across local governments.

As documented in our first stage regression, reported in Table 4, there is a positive relationship between altitude and hydropower income. The F-test of the excluded in-

[20] In the online appendix we elaborate more formally on this point.

struments indicate that the instruments are relevant (with an F statistic of 10.43 in the most detailed specification). Furthermore, the second stage results, reported in Table 5, lend support to our main finding: local hydropower revenues do seem to stimulate local relative to regional electoral participation. The estimated effects are stronger than what we reported in our baseline specification, and they are statistically significant at the 1-percent level.[21]

5.2 An Alternative Measure of Voter Activity

As an extension of our main analysis, we study the relationship between hydropower income and an alternative dimension of political participation: preferential votes cast for specific candidates.

We follow the empirical strategy laid out in Section 3, but we now use the share of voters who cast a preferential vote (in percentage points) as the dependent variable. In Table 6 we contrast preferential voting at the local level to preferential voting at the regional level (that is, estimates on Equation (3) with the difference in preferential vote shares as the dependent variable).

When controlling for population size, we find a positive effect of hydropower income of 0.20 to 0.27, implying that if hydropower tax revenues were to increase from the minimum to the maximum level in our sample, that is from 0 to NOK 52,000 (USD 9,000), the share of preferential votes would increase with about 10-14 percentage points.

5.3 Sensitivity Checks

Areas with substantial hydropower income typically are sparsely populated. To ensure that our findings are not driven by some omitted population size variable we have experimented with a more homogenous sample, where we only include local governments with less than 10,000 inhabitants. Results from this exercise, for specifications with all

[21] For our most elaborate specification, a Wu-Hausman test fails to reject the assumption of exogeneity of hydropower income ($p = 0.44$).

covariates included, are given in columns (2)-(4) of Table 7. To ease comparison, our baseline results are reproduced in column (1).

As is evident from the table, our results do not change much when municipalities with populations above 10,000 are excluded, as reported in column (2). Column (3) reports results from applying a robust regressions method, which illuminates the extent to which our estimates are driven by outliers. Results from robust regressions with municipalities above 10,000 excluded are given in column (4). While the point estimate is smaller in column (3) than our baseline estimate in (1), the impact of hydropower income on the participation difference always remains statistically significant at the 1-percent level.

6 Fiscal Flexibility and Pork Barrel Spending

It is not *a priori* clear whether an increase in hydropower income will increase or reduce the stakes of local elections. The effect will depend on how the revenues are utilized. Now, as explained in Section 2, since 1977 no Norwegian municipality has set income tax rates below the centrally determined tax ceiling, and all hydropower rich municipalities in our sample set property taxes at the upper limit of 0.7 percent. Hence, the answer to how hydropower income affects election stakes lies in its influence on spending priorities.[22] If hydropower income is simply used to provide more of the same basic welfare services as any local government provides, and voters have concave utility over these services, then hydropower wealth will reduce the importance of the local election to voters. On the other hand, if hydropower income triggers pork barrel spending that is targeted at specific recipients in the electorate, this income will raise election stakes.[23]

In order to assess whether the increased fiscal flexibility from hydropower is used

[22]When spending *levels* for each of the 12 main expenditure categories is regressed on hydropower income, a strong positive relationship is evident for all (cf. online appendix). Hægeland, Raaum, and Salvanes (2012) use hydro power income to identify effects of school resources on pupil achievement. They find that increased resource use improves pupil achievement considerably. Since hydro power rich municipalities provide a wide range of high quality services they discuss and empirically investigate the possibility that other local public services drive their results.

[23]We provide a simple formalization of this argument in the online appendix.

to increase the spending on core welfare services or pork, we follow Levitt and Snyder (1995, 1997) and DeBacker (2011) by using the coefficient of variation (c.v.) for different expenditures. Spending categories with relatively low c.v.'s are classified as non-pork items, while categories with relatively high c.v.'s are classified as pork barrel spending.

The third column in Table 1 shows the cross-sectional coefficient of variation for each spending category of the local governments. We see that the spending pattern can be broadly classified into three groups.[24] The first group contains the low variation, core spending programs, consisting of schooling and elderly care (c.v.'s of around 0.3). Second, child care, social assistance, health care, infrastructure, and administration constitute a middle group (c.v.'s of about 0.5 to 0.6). Finally, there is a high variation group with planning, roads, culture and industry support (c.v.'s above 0.8). Fire protection is the only type of expenditure that falls between these rough categories, lying somewhere between the medium and high variation group.

Notably, the crude ranking based on the coefficient of variation corresponds well with a more subjective evaluation of the extent to which expenditure may be targeted toward specific groups. For instance, higher spending on cultural services matters most for those who produce them or have a specific appreciation for these services. While industry support may be useful for the local community as a whole, it is particularly useful for the recipient companies. Furthermore, although roads in general tend to be considered as public goods, the roads provided by local governments in Norway typically are small and utilized only by the residents of the neighborhood where they are located, as main roads tend to be the central or regional government's responsibility.

We next assess how hydropower income affects spending priorities. To this end we regress each category's share in total spending on hydropower income. We control for population size and concentration in order to (roughly) deal with issues of scale effects and geographical costs in production, but these controls are inessential for the results, which are presented in Table 8. In the table each spending category is placed according

[24]The ranking is unaltered if we exclude municipalities with hydropower production.

to its coefficient of variation, which is repeated in the table's first line for convenience. According to our previous crude categorization, low variation categories are presented in columns (1) to (2), middle variation categories in columns (3) to (7), and high variation categories in columns (9) to (12). We see that for both low variation categories, there is a significant negative association between shares of spending and hydropower income. A one standard deviation increase in hydropower income is associated with a reduction of about 3 percentage points in the share of spending on schooling and elderly care. For high variation categories the relationship is the opposite. A one standard deviation increase in hydropower income is associated with an increase of 2.5 percentage points on planning, roads, culture and industry support. For the middle variation categories and fire protection, there are no statistically significant relationships.

A natural interpretation of the pattern in Table 8 is that hydropower income allows local politicians to allocate resources to new purposes beyond the primary welfare services that are subject to minimum standards set by the national government. Moreover, these new purposes typically benefit specific groups in the population. Hence, of the two opposing effects of hydropower income on election stakes raised above—providing more of the basics or providing more of the discretionary services—the local spending pattern implies that the effect through spending on discretionary services dominates. It is therefore likely that the relationship between hydropower income and electoral participation which we have uncovered, reflects that greater fiscal flexibility raises election stakes.

Anecdotal evidence supports this interpretation. For example, the local government of Åseral is among the richest in Norway, due to its hydro power income of NOK 23,000 per capita. Just before the 1995 local election, a conflict over the building of an expensive centre for culture led the mayor to shift from the previously dominating party over to an existing, party independent list. The independent list won the election with a landslide. Still, the conflict over the centre for culture lasted for more than a decade. In 2007, the conflict induced a local protest campaign which collected more than 200 signatures in just three days, from a population of about 900. Åseral had the seventh highest

participation rate for the local election and the fourth largest participation difference of all local governments in the 2007 election.[25]

7 Information Costs and Roll-Off

By focusing on the participation difference, we are essentially studying the phenomenon known as roll-off, once we acknowledge that the local election is generally perceived as more prestigious than the regional election in Norway. The standard explanations for roll-off involve information. In "uncertain voter" models, such as those proposed by Matsusaka (1995) and Degan and Merlo (2011), voters are assumed to suffer disutility from making "voting mistakes", and therefore to rationally abstain from voting when they are uninformed about the candidates. An alternative explanation is that less informed voters might choose to optimally delegate voting activity to citizens who are better informed than themselves, as emphasized by Feddersen and Pesendorfer (1996). Moreover, several recent empirical studies support the hypothesis that political information raises voter turnout.[26]

We explore the role of information in two different ways. First, we provide survey evidence on information acquisition by citizens. Second, we use the presence of local independent lists in Norway to test an information based prediction.

7.1 Survey Evidence

Figure 5 shows survey evidence on how eligible voters actively acquire information about local and national politics, and relates it to hydropower income. Corresponding survey evidence for the regional government level is not available. Each bar presents how many respondents who answered yes when asked if they had attempted to obtain information

[25]The case is documented by, among others, the Norwegian Broadcasting Corporation (NRK): http://www.nrk.no/nyheter/distrikt/sorlandet/1.4081358

[26]Examples are the laboratory studies of Battaglini, Morton, and Palfrey (2010) and Houser, Morton, and Stratmann (2011). Other studies have explored situations where information is arguably exogenously determined, such as Lassen (2005) and Gentzkow (2006).

about local government politics (black bars) and the national parliament politics (grey bars). In the figure, municipalities are sorted and grouped by hydropower income.

The striking pattern in Figure 5 is that when hydropower income is high, more citizens acquire information about local politics, but not about national politics.[27] This indicates that citizens in hydropower rich local governments are not particularly interested in politics per se, but that they do collect more information when the stakes are high.

While this evidence points to information seeking by voters, an alternative mechanism behind our main findings could be that greater financial flexibility motivates politicians to campaign more actively, which in turn stimulates participation in the spirit of Schachar and Nalebuff (1999). In the election survey, one question relates to this hypothesis, as it asks if voters have been in contact with local or national politicians lately. The responses do not support the campaigning hypothesis, as hydropower revenues seem unrelated to local politician contact.[28]

7.2 Independent Lists

As explained in Section 2.1, in many Norwegian municipalities there are independent local lists that participate in the local elections only. Because these independent lists do not participate in regional elections, knowledge about their platform is uninformative about candidates in the regional election. It follows that if a citizen spends time to learn about independent lists, he has less time to gather information about candidates for the regional government. Based on this argument, an empirical prediction from information theories of participation is that municipalities with independent lists will have a higher participation difference. Column 5 of Table 3 shows that this is indeed the case: When the participation difference is regressed on a dummy variable for the existence of independent

[27] The same conclusion is drawn from probit analyses relating survey responses to hydropower income, controlling for municipal population size and settlement pattern (cf. online appendix).

[28] In the raw data, there is a positive correlation between politician-contact and revenues across municipalities, but this is driven by the fact that hydropower income is high in small municipalities. Once population size is controlled for, the correlation disappears (cf. online appendix).

lists,[29] as well as the other controls, we find a statistically significant positive effect.[30]

By the same logic, if hydropower income motivates people to gather more information about local politics, the effect of hydropower on the participation difference should be stronger where independent lists are present. We test this hypothesis by including an interaction term between hydropower income and the dummy variable for independent lists in our specification for the participation difference. The results are reported in Table 9. We see that the interaction effects is positive and significant at the 5-percent level in our most elaborate specification. With fewer controls, the estimate is of comparable size, but with lower statistical significance. Moreover, if we compare these results to the baseline results in Table 3, we see that the estimates from that specification to a large extent are driven by municipalities where the candidate parties differ between the two elections. The total effect of hydropower income on the participation difference when independent lists run for the local election is 0.17, compared to 0.12 in our main specification.

8 Conclusion

We have found that in communities where windfall gains from hydropower production equip the local government with extra funds to distribute, more people vote in the local rather than in the regional election. It is plausible that this effect is causal because the eligible voting populations are identical in the two elections, hydropower income is determined by topography, the two elections are held simultaneously, and because the estimated effect hardly changes as we include a rich set of observable variables.

Our interpretation of the local revenue effect is that when more wealth is controlled by the local government, the elected officials have greater flexibility to pursue targeted

[29]The dummy PartyIndepLists equals 1 if independent lists participated, and is 0 otherwise. We only consider local party lists that got votes sufficient to gain at least one seat in the local council (41 percent of the local governments fulfilled this criteria). The results are similar if we consider local lists that got at least one vote (53 percent of the local governments).

[30]One might hypothesize that hydropower affects the participation difference by stimulating the establishment of independent lists. However, the results in Table 3 suggest that such mechanisms are not driving our main result (compare columns 4 and 5). Moreover, there is no correlation between hydropower income and the existence of independent lists.

spending programs. Thus, election stakes are higher and individuals have stronger incentives to participate in the political process so as to influence local spending priorities. Survey evidence corroborates our interpretation by showing that hydropower income is positively related to (i) voters' perception of the relative importance of local elections relative to regional elections, and (ii) the intensity with which individuals seek information about local politics.

The survey evidence suggests a specific mechanism: Higher stakes in the local election motivate citizens to gather more information about local rather than regional politics, which in turn increases citizens' propensity to vote in the local rather than the regional election. Such a mechanism is consistent with standard explanations of roll-off and selective abstention, but also goes one step further. Whereas the established literature treats voters' information as exogenously given, our findings suggest that voters are instrumentally motivated to actively gather information themselves, increasing their knowledge about local relative to regional politics. Such a mechanism bridges the "calculus of voting" model of Downs (1957), which emphasizes instrumental voting incentives, with the more recent literature which emphasizes political information. We believe that our findings motivate further empirical and theoretical research in this specific direction.

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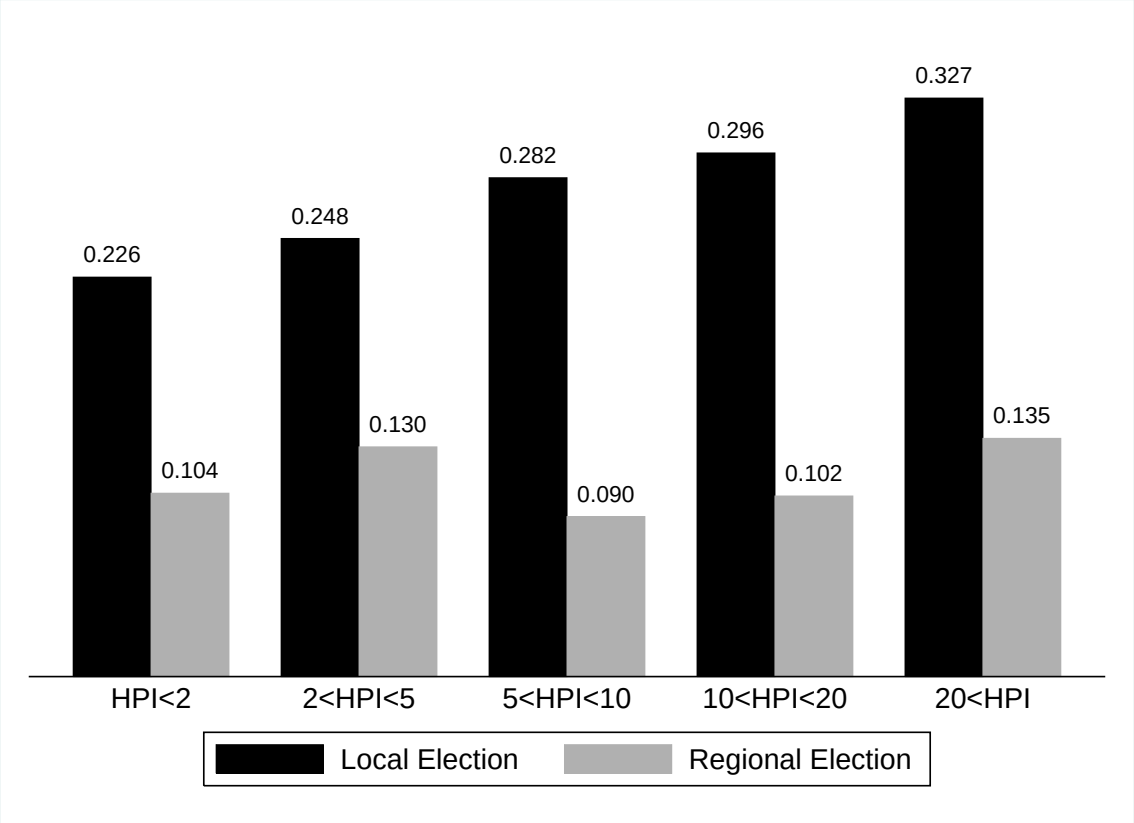
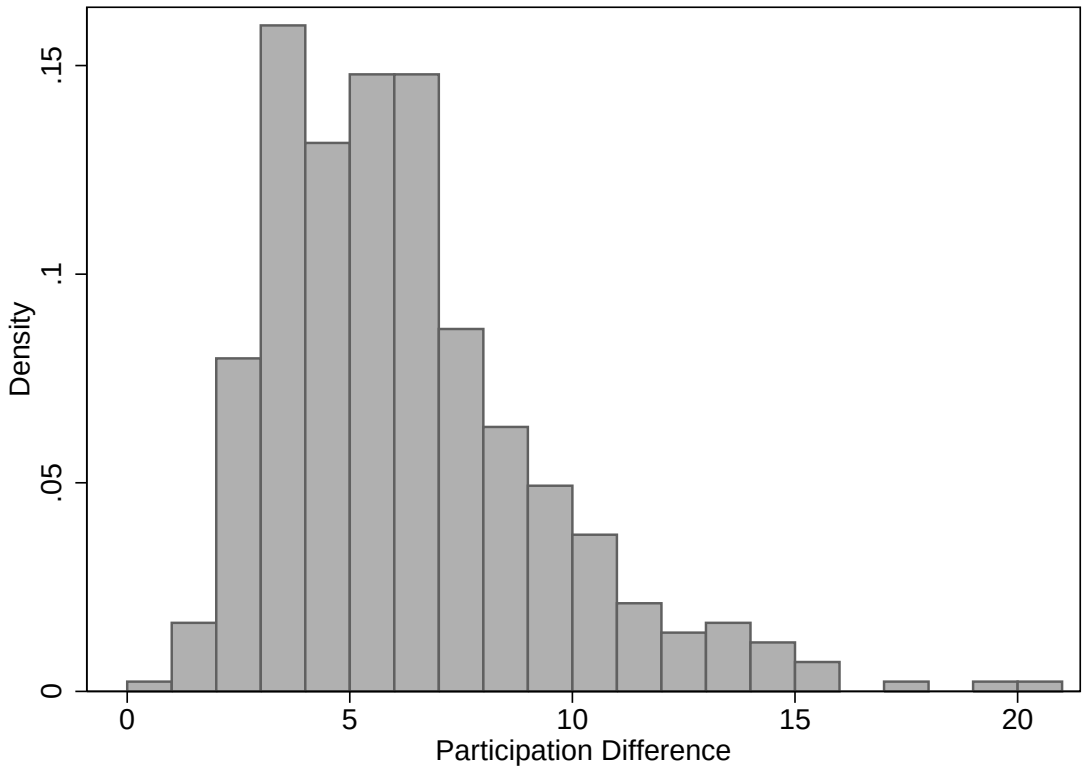
Figure 1: Perceived Election Stakes



*Notes: The figure presents perceived (local and regional) election stakes across five hydropower income categories. Hydropower income (HPI) is measured at the local government level in NOK 1000 per capita. Reported are the fraction of survey respondents answering that they believe the upcoming election will be of 'high importance' for the development of the municipality/county over the next four years. Alternative responses are 'don't know', 'little or no importance' and 'some importance'. Data from the Local Election Survey (*Lokalvalgsundersøkelsen*) 2003 and 2007 (n= 4701).*

Figure 2: Density of Observations as a Function of the Participation Difference



Note: The histogram shows the density of observations as a function of the difference in electoral participation at the local relative to the regional election. The width of each bar is one percentage point. The data are from elections held September 9–10, 2007. Electoral participation is the percentage of eligible voters who cast a vote in the election.

Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	C. V.	Min.	Max.
Per Capita Public Spending					
Schooling	14.961	4.077	0.273	9.347	42.926
Elderly Care	17.212	5.260	0.306	8.061	50.306
Child Care	5.523	2.662	0.482	2.743	44.848
Social Assistance	4.665	2.328	0.499	1.393	29.439
Health Care	2.809	1.442	0.513	1.156	11.801
Infrastructure	3.569	1.984	0.556	0.000	13.459
Administration	5.963	3.443	0.577	1.703	30.776
Fire Protection	0.894	0.654	0.732	0.073	7.538
Planning	1.141	1.004	0.880	0.046	10.976
Roads	1.984	1.866	0.941	0.329	17.928
Culture	3.482	4.222	1.213	0.925	49.666
Industry Support	1.885	2.568	1.362	0.015	30.098
Shares of Public Spending					
Schooling	23.979	4.757	0.198	11.581	48.01
Elderly Care	27.181	5.077	0.187	10.019	48.54
Child Care	8.971	2.989	0.333	3.975	20.557
Social Assistance	7.403	2.659	0.359	1.548	26.638
Health Care	4.288	1.460	0.340	1.972	14.159
Infrastructure	5.610	2.459	0.438	0.000	17.754
Administration	8.925	2.915	0.327	3.388	23.547
Fire Protection	1.388	0.801	0.577	0.100	11.018
Planning	1.733	0.989	0.571	0.093	7.874
Roads	2.930	1.837	0.627	0.432	18.943
Culture	5.024	3.440	0.685	1.738	32.771
Industry Support	2.568	2.269	0.884	0.030	16.125

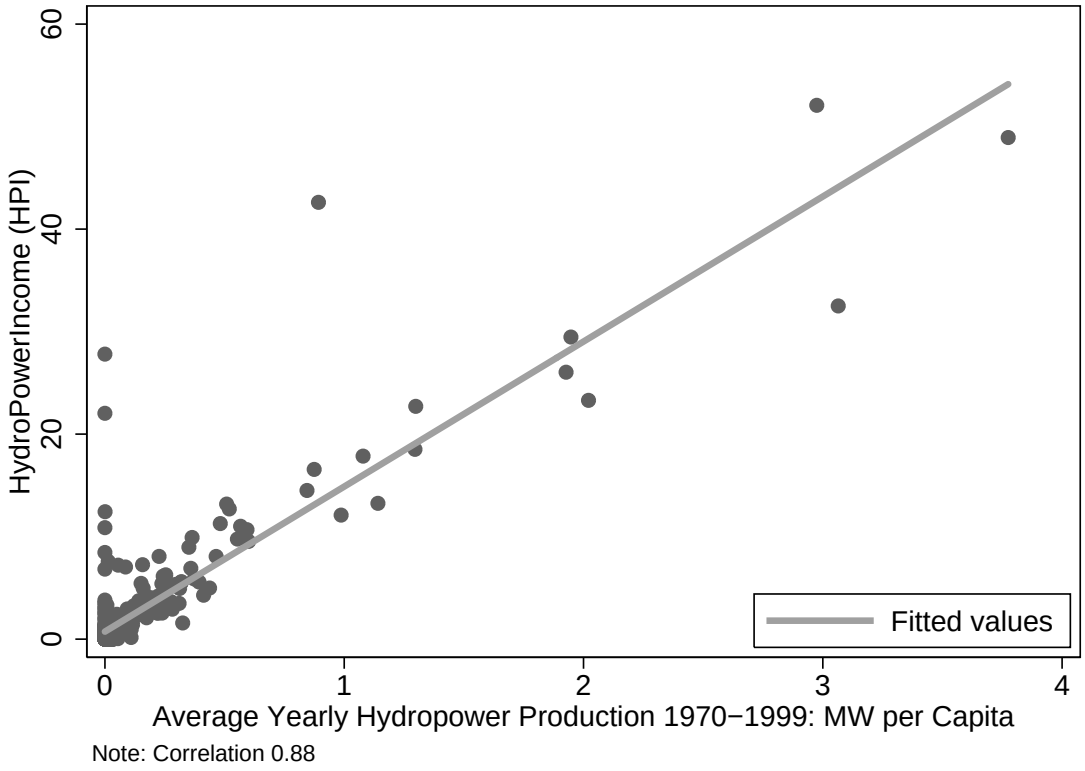
Note: Descriptive statistics based on account data from 2007. Per capita public spending is measured in NOK 1,000. Shares of public spending measured in percent.

Table 2: Descriptive Statistics on Hydropower Income (HPI)

	Mean	Std. Dev.	Min.	Median	Max.
Hydropower Income (HPI)	2.197	5.760	0.000	0.297	52.078
	HPI=0	**0<HPI<2**	**2<HPI<10**	**10<HPI**	**Total**
No. of local governments	151	182	70	23	426

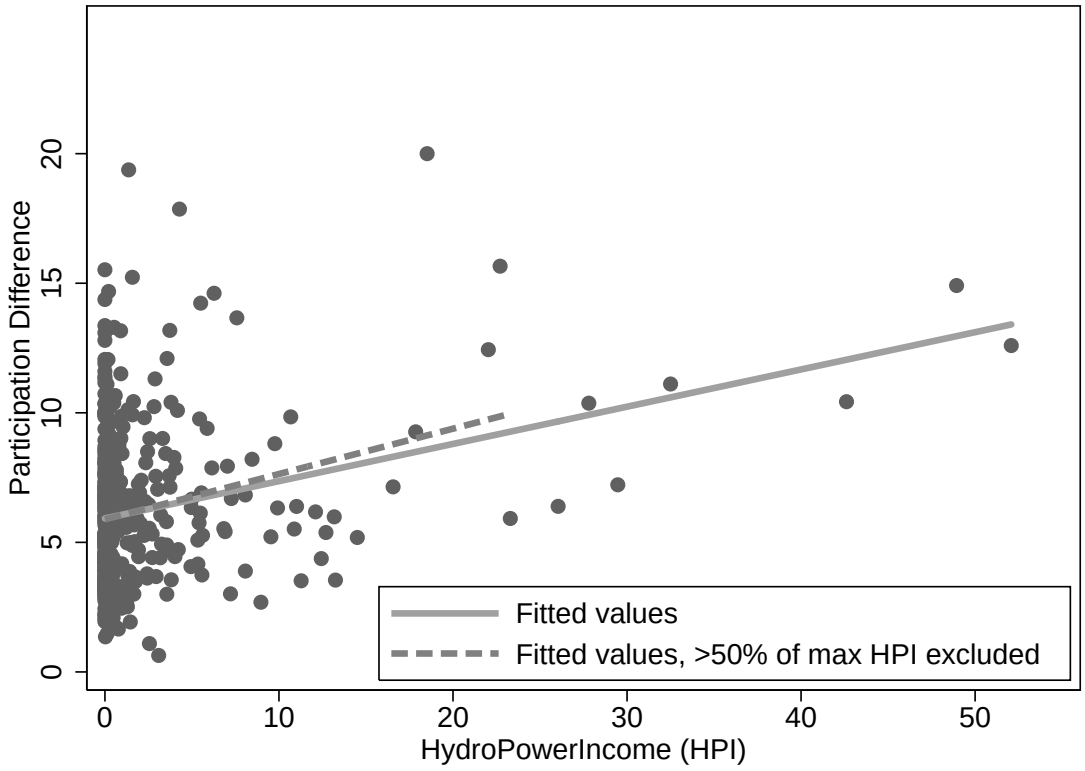
Note: Hydropower income is measured in NOK 1000 per capita in 2007.

Figure 3: Historical Hydropower Production and Commercial Property Taxation in 2007



Notes: Hydropower income (HPI) is measured at the local government level in NOK 1000 per capita in 2007. Data on average yearly hydro power production, 1970-1999, are from the Norwegian Water Resources and Energy Directorate.

Figure 4: Participation Difference and Hydropower Income



Note: The scatterplot shows the relation between the difference in participation rates at the local relative to the regional elections and hydropower income. The data are from elections held September 9–10, 2007.

Table 3: The Relationship Between Hydropower Income and the Participation Difference

	(1)	(2)	(3)	(4)	(5)
HydroPowerIncome	0.14***	0.16***	0.11***	0.13***	0.12***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
LogVotingPopulation			-1.26***	-1.35***	-1.53***
			(0.19)	(0.35)	(0.38)
ShareInRuralAreas				0.09	-0.31
				(0.97)	(1.02)
RecentImmigrants				-19.50	-19.17
				(16.86)	(16.75)
ShareVotersAged18to37				1.70	4.41
				(20.32)	(21.58)
ShareVotersAged38to57				-15.11	-16.05
				(16.26)	(15.99)
ShareVotersAged58to77				2.39	3.99
				(15.87)	(17.15)
ShareWomen				-0.80	-2.28
				(23.97)	(23.70)
ShareUnMarried				-1.09	-0.00
				(9.58)	(9.34)
ShareWidow				-1.88	-2.07
				(25.38)	(26.20)
ShareDivorced				2.48	1.38
				(14.15)	(14.73)
ShareLowerSecondary				4.40	6.28
				(5.29)	(5.10)
ShareUpperSecondary				-3.76	0.16
				(5.45)	(5.59)
CharityDonations				-0.02	-0.02
				(0.02)	(0.02)
ChurchServiceAttendance				-0.53	-0.53
				(0.32)	(0.34)
GrossWageMen				-0.28	-0.30
				(0.52)	(0.56)
GrossWageWomen				0.11	0.46
				(1.84)	(1.93)
DirectElectionMayor					0.04
					(0.37)
TwoVotingDays					-0.09
					(0.38)
PartyFragmentation					2.19
					(1.93)
PartyIndepLists					0.77**
					(0.33)
N	426	426	426	422	420
adj. R^2	0.071	0.363	0.511	0.530	0.541
Labor Market Fixed Effects	No	Yes	Yes	Yes	Yes

Note: The dependent variable is the difference between participation rates at the local and the regional elections. The data are from elections held in 2007. Standard errors clustered at the labor market region level in parentheses. * $p < 0.10$,** $p < 0.05$, *** $p < 0.01$.

Table 4: First-Stage Estimates: Altitude as Instrument for Hydropower Income

	(1)	(2)	(3)	(4)	(5)
Altitude600to899	6.43*	8.27*	6.70	8.22**	7.45**
	(3.40)	(4.48)	(4.18)	(3.44)	(3.58)
Altitude900to1199	5.46	15.67**	15.57**	14.54**	15.25**
	(6.62)	(7.75)	(7.63)	(5.89)	(6.07)
Altitude1200	10.31	14.31***	13.67***	12.48***	11.78***
	(6.63)	(4.91)	(4.89)	(3.86)	(3.76)
LogVotingPopulation			-1.03**	-0.71	-0.62
			(0.46)	(1.29)	(0.81)
ShareInRuralAreas				3.91	3.83
				(2.85)	(3.22)
N	424	424	424	420	420
Labor Market Fixed Effects	No	Yes	Yes	Yes	Yes
Population Characteristics	No	No	No	Yes	Yes
Institutional Characteristics	No	No	No	No	Yes

Note: The dependent variable is hydropower income. The excluded instruments capture the fractions of the local government area that are, respectively, 600 to 899 meters, 900 to 1199 meters, and above 1200 meters, above sea level. Standard errors clustered at the labor market region level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Second-Stage Estimates: Hydropower Income and the Participation Difference

	(1)	(2)	(3)	(4)	(5)
HydroPowerIncome	0.31**	0.23***	0.15***	0.18***	0.17***
	(0.13)	(0.06)	(0.05)	(0.06)	(0.06)
LogVotingPopulation			-1.20***	-1.31***	-1.49***
			(0.17)	(0.32)	(0.32)
ShareInRuralAreas				-0.08	-0.41
				(0.78)	(0.81)
N	424	424	424	420	420
Labor Market Fixed Effects	No	Yes	Yes	Yes	Yes
Population Characteristics	No	No	No	Yes	Yes
Institutional Characteristics	No	No	No	No	Yes
F-statistic from 1st.	8.416	7.274	7.565	11.36	10.43

Note: The dependent variable is the difference between participation rates at the local and the regional elections. The data are from elections held in 2007. The excluded instruments capture the fractions of the local government area that are, respectively, 600 to 899 meters, 900 to 1199 meters, and above 1200 meters, above sea level. Standard errors clustered at the labor market region level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: The Relationship Between Hydropower Income and Preferential Voting

	(1)	(2)	(3)	(4)	(5)
HydroPowerIncome	0.55***	0.52***	0.27***	0.23**	0.20*
	(0.11)	(0.12)	(0.10)	(0.10)	(0.11)
LogVotingPopulation			-6.02***	-4.59***	-4.77***
			(0.51)	(0.94)	(0.99)
ShareInRuralAreas				6.89***	6.54**
				(2.60)	(2.51)
RecentImmigrants				-47.46	-40.41
				(44.78)	(44.51)
ShareVotersAged18to37				63.04	52.19
				(62.98)	(60.11)
ShareVotersAged38to57				-25.07	-33.55
				(62.59)	(61.24)
ShareVotersAged58to77				30.67	18.67
				(56.22)	(51.64)
ShareWomen				-3.75	-10.06
				(64.83)	(66.59)
ShareUnMarried				-0.07	-5.86
				(33.59)	(32.04)
ShareWidow				56.32	19.18
				(79.50)	(77.05)
ShareDivorced				25.32	27.34
				(40.71)	(42.58)
ShareLowerSecondary				-5.67	-5.53
				(15.23)	(15.74)
ShareUpperSecondary				-13.05	-11.30
				(18.51)	(18.91)
CharityDonations				0.04	0.04
				(0.04)	(0.04)
ChurchServiceAttendance				0.30	0.15
				(0.97)	(0.97)
GrossWageMen				-1.19	-0.85
				(2.38)	(2.45)
GrossWageWomen				-1.53	-3.45
				(5.81)	(5.76)
DirectElectionMayor					-3.89***
					(1.25)
TwoVotingDays					0.26
					(1.31)
PartyFragmentation					0.95
					(8.04)
PartyIndepLists					1.46*
					(0.87)
N	426	426	426	422	420
adj. R^2	0.096	0.296	0.610	0.630	0.651
Labor Market Fixed Effects	No	Yes	Yes	Yes	Yes

Note: The dependent variable is the difference in the extent of preferential voting at the local relative to the regional elections. The data are from elections held in 2007. Standard errors clustered at the labor market region level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Electoral Participation and Hydropower Income: Sensitivity Analysis

	(1)	(2)	(3)	(4)
HydroPowerIncome	0.12***	0.13***	0.07***	0.12***
	(0.03)	(0.04)	(0.02)	(0.03)
ShareInRuralAreas	-0.31	-0.63	-0.84	-1.54*
	(1.02)	(1.22)	(0.69)	(0.88)
LogVotingPopulation	-1.53***	-1.68**	-1.03***	-1.46***
	(0.38)	(0.66)	(0.25)	(0.43)
N	420	320	419	318
adj. R^2	0.541	0.438	0.619	0.499
Labor Market Fixed Effects	Yes	Yes	Yes	Yes
Population Characteristics	Yes	Yes	Yes	Yes
Institutional Characteristics	Yes	Yes	Yes	Yes
ExcludedObservations	None	Pop$> 10,000$	None	Pop$> 10,000$
EstimationMethod	OLS	OLS	robust reg.	robust reg.

Note: The dependent variable is the difference between electoral participation at the local and the regional elections. The data are from elections held in 2007. The robust regression, implemented with STATA's rreg command, iteratively re-weights observations to reduce the importance of outliers. Standard errors clustered at the labor market region level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: The Relationship Between Shares of Total Public Spending (percent) and Hydropower Income

C. V.	0.27	0.31	0.48	0.50	0.51	0.56	0.58	0.73	0.88	0.94	1.21	1.36
	(1) School	(2) Elderly	(3) Child	(4) Social	(5) Health	(6) Infra	(7) Admin	(8) Fire	(9) Planning	(10) Roads	(11) Culture	(12) Industry
HydroPowerIncome	-0.25***	-0.25***	0.02	0.00	-0.01	0.02	0.03*	0.00	0.04***	0.07***	0.16***	0.16***
	(0.03)	(0.03)	(0.05)	(0.04)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.05)	(0.05)
Population	0.00	-0.02	0.05***	0.04***	-0.02***	-0.00	-0.04***	-0.00	0.01**	-0.01*	-0.00	-0.01**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
ShareInRuralAreas	-2.38**	2.96***	-3.15***	-1.28**	1.30***	-1.86***	3.51***	-0.02	0.58**	-0.24	-1.19*	1.77***
	(0.97)	(1.00)	(0.57)	(0.50)	(0.33)	(0.43)	(0.68)	(0.14)	(0.23)	(0.43)	(0.65)	(0.41)
Constant	25.66***	26.45***	10.03***	7.66***	3.80***	6.51***	7.49***	1.41***	1.27***	2.99***	5.26***	1.47***
	(0.63)	(0.64)	(0.39)	(0.29)	(0.19)	(0.29)	(0.43)	(0.08)	(0.13)	(0.29)	(0.45)	(0.26)
N	426	426	426	426	426	426	426	426	426	426	426	426
adj. R^2	0.121	0.091	0.208	0.092	0.118	0.032	0.230	-0.005	0.082	0.051	0.065	0.267

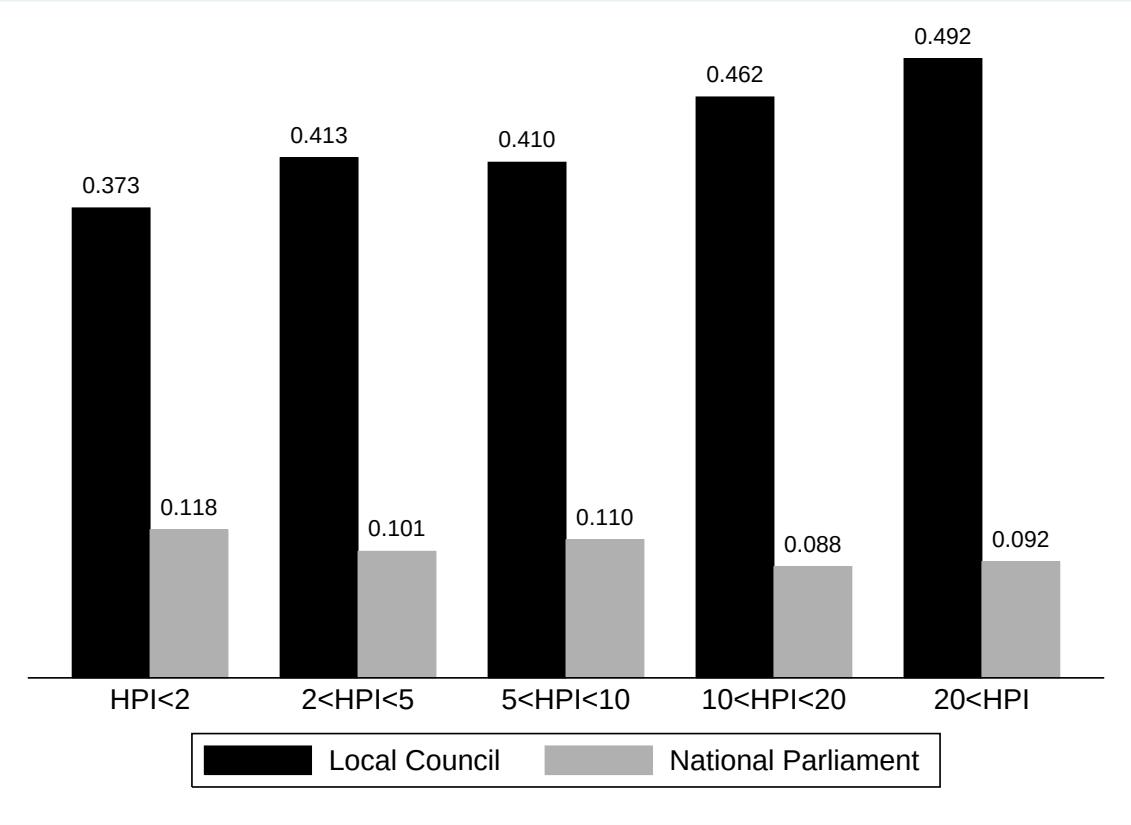
Note: The dependent variables are the shares of public spending, measured in percent. Each spending category is placed according to its coefficient of variation, which is reported in the top line of the table. HydroPowerIncome is measured in NOK 1000 per capita. Population is measured in 1000s. Robust standard errors in parentheses. $^{*}\, p < 0.10, ^{**}\, p < 0.05, \ ^{***}\, p < 0.01$.

Table 9: Electoral Participation and Hydropower Income: Interaction Effects

	(1)	(2)	(3)	(4)
HydroPowerIncome	0.02	0.06	0.06	0.05
	(0.04)	(0.04)	(0.05)	(0.05)
HydroXPartyIndepLists	0.08*	0.06	0.10*	0.12**
	(0.05)	(0.05)	(0.05)	(0.05)
PartyIndepLists	1.01***	0.70**	0.55	0.55
	(0.29)	(0.33)	(0.33)	(0.34)
LogVotingPopulation	-1.41***	-1.31***	-1.35***	-1.48***
	(0.16)	(0.20)	(0.37)	(0.40)
ShareInRuralAreas			-0.03	-0.22
			(0.90)	(0.95)
N	426	426	422	420
adj. R^2	0.323	0.528	0.549	0.550
Labor Market Fixed Effects	No	Yes	Yes	Yes
Population Characteristics	No	No	Yes	Yes
Institutional Characteristics	No	No	No	Yes

Note: The dependent variable is the difference between electoral participation at the local and the regional elections. The data are from elections held in 2007. Hydropower income effect allowed to be conditional on the existence of party independent lists. Standard errors clustered at the labor market region level in parentheses. $^{*}\ p < 0.10, ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$.

Figure 5: Citizen Information Gathering



Notes: Each bar indicates the fraction of survey respondents answering that they have gathered information about local government (dark) or national (grey) issues during the last 12 months across five hydropower income categories. Hydropower income (HPI) is measured at the local government level in NOK 1000 per capita. The data are from a national survey conducted in 2009 by the Agency for Public Management and eGovernment (Innbyggerundersøkelsen), n=10469).

Table A.1: Descriptive Statistics

Variable name	**Mean**	**Std. Dev.**	**Description**
ParticipationLocal	64.051	5.49	Eligible voters who vote in local election, percent
ParticipationRegional	57.81	5.02	Eligible voters who vote in regional election, percent
DParticipation	6.241	3.06	ParticipationLocal - ParticipationRegional
PreferentialVotesLocal	51.405	13.08	Share of corrected votes at the local election
PreferentialVotesRegional	28.925	8.83	Share of corrected votes at the regional election
DPreferentialVotes	22.48	10.09	PreferentialVotesLocal - PreferentialVotesRegional
HydroPowerIncome	2.197	5.76	Commercial property tax income, NOK 1000 pr capita
VotingPopulation	7025	11642	Number of local government eligible voters
LogVotingPopulation	8.199	1.09	Log of VotingPopulation
Population	9071	15003	Number of local government inhabitants
ShareInRuralAreas	0.493	0.27	Share of population living in rural areas
RecentImmigrants	0.045	0.02	Population share that migrated to the municipality in 2006
ShareVotersAged18to37	0.297	0.04	Share of eligible voters aged 18 to 37
ShareVotersAged38to57	0.354	0.02	Share of eligible voters aged 38 to 57
ShareVotersAged58to77	0.252	0.03	Share of eligible voters aged 58 to 77
ShareVotersAged77plus	0.097	0.02	Share of eligible voters aged 77 and older
ShareWomen	0.497	0.01	Share of women
ShareUnMarried	0.488	0.03	Share of unmarried
ShareWidow	0.067	0.02	Share of widowed
ShareDivorced	0.075	0.02	Share of divorced
ShareLowerSecondary	0.348	0.07	Share aged 16 and above with lower secondary education as highest education (October 1, 2007)
ShareUpperSecondary	0.445	0.05	Share aged 16 above with upper secondary education as highest education (October 1, 2007)
CharityDonations	47.338	15.24	Donations per capita (NOK) at annual TV charity show, Oct. 22, 2006, (to *Doctors Without Borders*)
ChurchServiceAttendance	1.838	0.68	Per capita church services attended 2007
GrossWageMen	3.216	0.44	Average gross wage, men 17 years and older, 2006
GrossWageWomen	2.056	0.18	Average gross wage, women 17 years and older, 2006
DirectElectionMayor	0.117	0.32	Dummy=1 if direct elections for local mayor
TwoVotingDays	0.481	0.50	Dummy=1 if municipality has two voting days
PartyFragmentation	0.747	0.10	1 - (Herfindahl index of party fragmentation in the local council at the 2003 election).
PartyIndepLists	0.406	0.49	Dummy=1 if at least one party independent list obtained at least one seat in the local council
Altitude0to299	0.531	0.35	Share of local government area 0 to 299 meters above sea level (hereafter MAMSL)
Altitude300to599	0.227	0.19	Share of loc. gov. area 300 to 599 MAMSL
Altitude600to899	0.127	0.16	Share of loc. gov. area 600 to 899 MAMSL
Altitude900to1199	0.075	0.13	Share of loc. gov. area 900 to 1199 MAMSL
Altitude1200	0.04	0.12	Share of loc. gov. area more than 1200 MAMSL

Note: All election variables are from September 2007, unless otherwise noted. Demographic variables are from January 1st, 2007 unless otherwise noted. The data are provided by Norwegian Social Science Data Services and Statistics Norway.

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Centre for Applied Macro - Petroleum economics (CAMP)
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