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Jon H. Fiva, Gisle James Natvik

ABSTRACT: We identify exogenous variation in incumbent policymakers' re-election probabilities and explore empirically how this variation affects their investments in physical capital. Our results indicate that a higher re-election probability leads to higher investments, particularly in the purposes preferred more strongly by the incumbents. This aligns with a theoretical framework where political parties disagree about which public goods to produce using labor and predetermined public capital.

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1 Introduction

This paper explores whether and how strategic considerations influence the accumulation of physical capital in the public sector. The analysis is motivated by the fact that the stock and composition of physical capital at any point in time is determined by decisions made in the past. Hence, when deciding how much and in which projects to invest in the current period, an incumbent policymaker should consider how these decisions will influence policy in the future. In particular, incumbents may consider their perceived re-election probability when they make investment decisions. We therefore test if variation in incumbents' re-election probability affects the overall amount and composition of their investments in physical capital.

Investigating public capital accumulation is interesting because it can provide insight into what motivates policymakers' decisions. In cornerstone studies Persson and Svensson (1989) and Tabellini and Alesina (1990) show that how much a government chooses to save in financial capital will be affected by its probability of remaining in office in the future.[1] This effect, known as strategic debt accumulation, is theoretically well understood as potential determinants of actual policies.[2] However, financial capital is not the only instrument for storing public wealth. An alternative is physical capital, as emphasized by for instance Glazer (1989) and Natvik (2009). We therefore empirically assess these theoretical studies' key prediction that incumbents' re-election probabilities influence how much

[1] Persson and Svensson (1989) show that the risk of being replaced motivates politicians who favor a relatively small public sector to run excessively high deficits, while it motivates politicians who favor a relatively large public sector to run excessively high surpluses. Tabellini and Alesina (1990) argue that when voters disagree over the composition of government spending, any policymaker who expects to be replaced by someone with different preferences has an incentive for excess debt accumulation.

[2] These theories are often given considerable attention both in general macroeconomic textbooks, such as Romer (2001), and in specialized textbooks on political economics, such as Persson and Tabellini (2000). The empirical support for these theories is however mixed. Cross country studies (e.g. Grilli, Masciandaro, and Tabellini (1991)) tend not to find any support for these theories, while some studies of lower levels of government do (e.g. Crain and Tollison (1993), Petterson-Lidbom (2001)).

they choose to invest. In addition, we provide theoretical predictions on how the *composition* of public investment will respond to variation in re-election probabilities, and explore these empirically. We contrast the responses of investment to those of current expenditure.

In our analysis we use panel data for Norwegian local governments covering a period of 28 years, where elections are held simultaneously every fourth year. Norwegian local governments are well-suited for our purpose since they operate within the same institutional environment, facilitating comparison in the cross-section and over time, and because they have large discretion in investment policy compared to other OECD countries (Rattsø, 2003).

We exploit a unique feature of the Norwegian institutional setting to obtain exogenous variation in re-election probabilities: National elections are held exactly in the middle of the local election term.[3] These national elections provide information on the incumbents' popularity in each municipality separately, and we are free to choose the level of aggregation at which we use this information. This allows us to address the reverse causality problem inherent in any approach to analyze how popularity influences policy: We instrument the result of the national election held in each municipality i by the result from the same election held in all other municipalities of the county to which i belongs. In this manner we capture swings in voters' ideological sentiment unrelated to local politics. The identifying assumption is that the county-wide result from the national election does not influence local policy except through its impact on perceived re-election probabilities.

Empirical studies on strategic debt accumulation have primarily relied on his-

[3]The ability of the incumbent government to call an early election is a common feature of most political systems. Among the OECD countries, only Norway, Sweden, Switzerland and the United States have exogenous election terms at the national level. In other OECD countries early elections can be held if the incumbent government wishes to do so and the occurrence of an early election is prevalent (Heckelman and Berument, 1998). Norway is, as far as we know, the only OECD country that also has regularly scheduled elections at the local level that differs from the national election cycle.

torical measures of political stability to proxy for re-election probabilities (e.g. Grilli, Masciandaro, and Tabellini (1991), Crain and Tollison (1993), Petterson-Lidbom (2001)).[4] Similarly, Darby, Li, and Muscatelli (2004), rely on electoral volatility at the previous election in their study of political uncertainty and public investments in a panel of European countries. The validity of these identification strategies hinges on the assumption that (historically) instable units are similar to stable units in all other respects relevant for politics (given control variables). Our approach, based on changes in re-election within election periods, does not rely upon this strong assumption.

Our main finding is that public investments do respond to changes in re-election probabilities. We find that incumbents raise total investment when their re-election probability increases. We also find qualitative differences between incumbents of different party affiliation, as left-bloc incumbents increase investments in child-care only, while right-bloc incumbents tend to raise investment in education and elderly care when their re-election probability goes up. In light of the existing evidence on party preferences in Scandinavia (Sørensen (1995), Borge and Sørensen (2002), Svaleryd (2009))), our analysis indicates that when re-election becomes more likely, incumbents increase investment in the purposes they prefer more strongly than their competitors for office. In contrast, we find no such responses for current expenditure.

Importantly, these findings allow us to distinguish between existing theories on public sector capital accumulation. Frameworks where public capital is equivalent to a durable version of a public good, as in Glazer (1989) and Beetsma and van der Ploeg (2007), predict that incumbents will increase total investment and tilt the composition of investment toward their most preferred purposes if re-election becomes less likely. Our findings are the opposite. A framework where capital is an input that must be combined with flow variables (i.e. labor) in order to produce

[4] An exception is Lambertini (2004) that relies on opinion polls.

public goods, as in Natvik (2009), yields predictions that are consistent with both the level and composition effects we find in the data. When capital is complementary to flow variables in government production, the expectation of losing influence in the future makes an incumbent hold back on investment since the capital he purchases will be inefficiently combined with complementary inputs in the future.[5]

The rest of this paper is organized as follows. Section 2 lays out a theoretical framework based on Natvik (2009) which motivates the empirical analysis. Section 3 presents the data and the institutional setting. In section 4 we present our empirical strategy. Section 5 presents the main results. Section 6 explores the robustness of our results along various dimensions and examines the validity of our identifying assumption. Section 7 discusses our findings in relation to the theory presented in Section 2. Section 8 concludes.

2 Theory

Using the framework proposed in Natvik (2009), we here provide a theoretical argument why re-election probabilities may influence public investment.[6] We reproduce the prediction of Natvik (2009) regarding how anticipated turnover influences the aggregate level of public investment, and in addition we assess how re-election probabilities are likely to affect the composition of investment.

[5]While we focus on theories where public capital is heterogenous, and where the political agents do not agree about the relative value of different capital types, several recent studies have analyzed public investment in capital that is homogenous. Besley and Coate (1998) and Azzimonti (2009) both consider public capital as an input in private production, which makes current investments influence future tax revenues. Bassetto and Sargent (2006) study the incentives for public investments in goods that benefit not only today's voters, but also individuals who are not old enough to vote. Battaglini and Coate (2007, 2008) consider investment as providing a public good that benefits all citizens, and contrast it to pork-barrel projects targeted at specific groups. Our analysis is not constructed to test these studies directly, but our results do support the general idea that public investments are influenced by strategic considerations.

[6]This model is an extension of that in Tabellini and Alesina (1990) and Alesina and Tabellini (1990), where political agents disagree over which goods and services government should provide. The extension is that these goods cannot simply be purchased at fixed prices, but must be produced using labor and publicly owned capital.

2.1 The Model

There are two periods, $t = \{1, 2\}$, and two parties, $J = \{R, L\}$. Each period a party J is in office and decides how to spend one unit of income in order to produce two goods f and g with the production functions

$$h_t = h(n_t^h, k_t^h) = \left(\gamma n_t^{h\frac{\varepsilon-1}{\varepsilon}} + (1-\gamma)\, k_t^{h\frac{\varepsilon-1}{\varepsilon}}\right)^{\frac{\varepsilon}{\varepsilon-1}}, \tag{1}$$

where n_t^h and k_t^h are labor and capital used in period t to produce good h, $h = g, f$. ε is the elasticity of substitution between the two input factors in production. The supplies of capital and labor to the public sector are infinitely elastic at the unit cost 1. While the amount of labor employed is freely chosen each period, capital is chosen one period in advance and specific to the production of each public good. Hence k_2^h is set in period 1.

In the first period the public sector's budget constraint is

$$n_1^g + n_1^f + k_2^g + k_2^f = (1-\delta)\left(k_1^g + k_1^f\right) + 1 + b, \tag{2}$$

where δ is the depreciation rate of public capital and b is debt accumulated in that period. In period 2, no investments are undertaken and the budget constraint is

$$n_2^g + n_2^f = 1 - b. \tag{3}$$

The gross interest rate on bonds is exogenous and equal to 1, which also is the inverse of politicians' discount factor.[7] Obviously, (3) builds on the assumption that debt is always honored, and implies that $b \in [-1, 1]$. This budget constraint also implies that public capital is irreversible for the period 2 decision-maker as he cannot liquidate it.

In period 1 the empowered party chooses $\left\{n_1^g, n_1^f, k_2^g, k_2^f, b\right\}$. The party in office

[7] We can think of the interest rate on b as determined on the world market.

in period 2 sets $\left\{n_2^g, n_2^f\right\}$. Party J's preferences are given by $W^J = E\sum_{t=1}^{2} u\left(g_t, f_t|\alpha^J\right)$, where

$$u\left(g_t, f_t|\alpha^J\right) = \frac{\left[\left(\alpha^J g_t^{\frac{\phi-1}{\phi}} + \left(1-\alpha^J\right) f_t^{\frac{\phi-1}{\phi}}\right)^{\frac{\phi}{\phi-1}}\right]^{1-1/\sigma}}{1-1/\sigma}. \tag{4}$$

Here σ is the intertemporal elasticity of substitution for efficiency units of public goods, while ϕ is the intratemporal elasticity of substitution between goods g and f.[8] Hence, ϕ indicates the willingness of politicians to alter the composition of public goods in response to changes in their relative production costs. $E(\cdot)$ is the expectations operator, reflecting that there is uncertainty about who is in charge next period. Before period 2 an election is held over which party is to be in office in that period. With probability p_R party R wins, with probability $1-p_R$ party L wins.

2.2 Political Equilibrium

The equilibrium objects of this economy are $\left\{n_1^g, n_1^f, k_2^g, k_2^f, b\right\}$ and $\left\{n_2^g, n_2^f\right\}$. Since first period choices are contingent on second period reactions, the model is solved by backward induction.

2.2.1 The Second Period

In period 2 the office holder, identified by α_2^J, allocates labor to production of each good. This party's problem is

$$\max_{n_2^g, n_2^f} u\left(g_t, f_t|\alpha_2^J\right)$$

[8] An efficiency unit of public goods is $\left(\alpha^J g_t^{\frac{\phi-1}{\phi}} + \left(1-\alpha^J\right) f_t^{\frac{\phi-1}{\phi}}\right)^{\frac{\phi}{\phi-1}}$.

subject to (1), and (3). Ignoring the specific functional forms in (1) and (4) to preserve space, we may write the first-order condition as

$$u_g\left(g_2, f_2|\alpha_2^J\right) g_n\left(n_2^g, k_2^g\right) = u_f\left(g_2, f_2|\alpha_2^J\right) f_n(n_2^f, k_2^f) \tag{5}$$

Together with the budget constraint (3), this equation implicitly defines the equilibrium choices n_2^{g*} and n_2^{f*} as functions of α_2^J, b, k_2^g and k_2^f. Define these functions as

$$n_2^{g*} = G\left(\alpha_2^J, b, k_2^g, k_2^f\right) \tag{6}$$

$$n_2^{f*} = F\left(\alpha_2^J, b, k_2^g, k_2^f\right). \tag{7}$$

Under mild restrictions, discussed in Natvik (2009), these reaction functions have the intuitive properties $G_{\alpha_2^J} = -F_{\alpha_2^J} > 0$ and $G_b = -1 - F_b \; \epsilon \; \langle 0, 1\rangle$. On the other hand, how labor responds to capital is ambiguous:

$$G_{k_2^g} = -F_{k_2^g} \gtreqless 0 \Leftrightarrow \varepsilon \gtreqless \phi \tag{8}$$

An equivalent condition holds for $F_{k_2^f} = -G_{k_2^f}$. The intuition here is that an extra unit of capital has two opposing effects on second period labor demand. On the one hand, an extra unit of k_2^g increases the marginal productivity of labor in producing g_2, and more strongly so the higher is the complementarity (the lower is ε) between the two input factors in production. All else equal, this motivates the second period policymaker to increase employment in the g-sector. On the other hand, an extra unit of k_2^g will raise the provision of g-goods relative to f-goods, all else equal. When the policymaker views the two goods as imperfect substitutes ($\phi < \infty$) this motivates a shift of labor from g-production to f-production. Hence, the use of labor in g-production increases with the amount of capital installed for that purpose if and only if the degree to which k_2^g substitutes for n_2^g in production (ε) is lower than the degree to which g_2 substitutes for f_2 in consumption (ϕ).

2.2.2 The First Period

The first-period policymaker, identified by α_1^J, solves the following problem:

$$\max_{n_1^g, n_1^f, k_2^g, k_2^f, b} E \sum_{t=1}^{2} u\left(g_t, f_t | \alpha_1^J\right)$$

subject to the production technology summarized by (1), the budget constraint (2) and the reaction functions (6) and (7). Thus, the office holder in period 1 internalizes how its investment choices will influence outcomes in period 2. The first-order conditions for the solution to this problem are given in the appendix.

2.2.3 Model Solution and Parametrization

Because the model does not have a general closed-form solution, we solve it numerically. Our procedure is to find the values of $\left\{n_1^g, n_1^f, n_2^g, n_2^f, k_2^g, k_2^f, b\right\}$ that satisfy the first-order conditions (5) and (13)-(16) (in the appendix) and the budget constraints.[9] As a benchmark, we set the parameter values as displayed in Table 1.

The choice of $\varepsilon = 0.7$ is motivated by evidence from estimated macro production functions, such as Klump, McAdam, and Willman (2007) and Antràs (2004). We set σ equal to 1, which is a standard value for households' intertemporal elasticity of substitution for private consumption in the macroeconomic literature (King and Rebelo (1999)) and in line with recent estimates in finance (Vissing-Jørgensen and Attanasio (2003)). For the intratemporal elasticity of substitution we have no evidence to guide us, and we set ϕ to 0.5. Imposing such a low value of ϕ amounts to assuming that politicians are relatively "stubborn", in the sense that they have low willingness to let the composition of public goods respond to production costs rather than what their utility weights α^J dictate.

[9] In order to solve the model, initial capital stocks $\left\{k_1^g, k_1^f\right\}$ must be specified. We set $\left\{k_1^g, k_1^f\right\}$ so that if $p_R = 1$ it is optimal to choose $k_2^h = k_1^h$ for $h = g, f$. As shown in Natvik (2009), these initial conditions for capital do not influence how anticipated turnover affects policy.

Importantly, σ, ϕ and ε are the parameters that determine the model's qualitative predictions which we will explore empirically. We therefore explain the role of these parameters below. The remaining parameters matter only quantitatively. [10]

2.3 Key Implications

The key questions that we wish to explore empirically regard the following: How does the probability that an incumbent party is re-elected affect its spending on current expenditure and investment?

We display the model's answers to these questions in Figure 1. The figures are plotted for an incumbent of type R. Since we study the case where party R is in office in period 1, the probability of re-election is p_R. In this numerical example the incumbent party prefers goods of type g more strongly than its competitor ($\alpha^R = 0.6$ while $\alpha^L = 0.4$). The plots display the respective variables' percentage point deviation from the value they take when $p_R = 0$.

The figure gives us the following main predictions for how the re-election probability affects first period policies.

2.3.1 Investment

1. When the probability of re-election increases, an incumbent increases total investments.

   Intuition: The incumbent party (R in the example) understands that if it is ousted from office, less labor will be employed to produce the good it prefers relatively strongly (good g in the example). Thus, when capital and labor complement each other, the return to investment in the incumbent's most

[10] γ is set to 0.7, implying a labor share of about 65 percent if the government were cost minimizing. This has approximately been the labor share of government production in the US since World War II (Cavallo (2005)). The depreciation rate per election term, δ, is set to 0.2, implying a yearly depreciation rate slightly below 5 percent, which is consistent with what Kamps (2004) argues is empirically reasonable for public capital.

preferred purpose is reduced by political turnover. The effect on capital returns in the other purpose (f in the example) will of course go in the opposite direction, but since the incumbent derives relatively low utility from this good, that effect will not outweigh the first. Hence, the more likely an incumbent is to remain in office, the higher will it value future public capital, and the more will it invest. We will later refer to this effect as the "aversion to inefficient capital utilization". The lower left plot of Figure 1 illustrates that the essential assumption behind this prediction is sufficient complementarity between capital and labor, i.e. that ε is small.

2. When the probability of re-election increases, an incumbent party raises investment in its most preferred purpose relative to its less preferred purpose. (I^g/I^f increases with p_R, where $I^h \equiv k_2^h - (1-\delta)\, k_1^h$)

   Intuition: When ε is low, capital returns are highly sensitive to how labor is allocated in the future, and it will therefore be important for the incumbent how the capital it builds is combined with labor after the election. Hence, the prospect of losing influence motivates the incumbent to invest more in the project preferred strongly by its successor, as this is where capital will be complemented by most labor. On the other hand, the impact of turnover on the future labor allocation also implies that relatively less will be produced of the incumbent's preferred good. To compensate for this effect, the incumbent may tilt the investment composition toward its own favorite projects as re-election becomes less likely. Finally there is a third mechanism: The incumbent's composition of investment affects the successors' allocation of labor. From expression (8) we know that when $\phi < \varepsilon$, it follows that $dn_2^f/dk_2^f = -dn_2^g/dk_2^f < 0$ and $dn_2^f/dk_2^g = -dn_2^g/dk_2^g > 0$. Hence, when $\phi < \varepsilon$ the incumbent has an additional incentive to tilt the investment composition *away from* its own most-preferred purpose as re-election becomes *less* likely. This is what occurs in the upper left plot of Figure 1. On the

other hand, if $\phi > \varepsilon$ the investment composition is tilted toward good f when p_R increases, as we see in the upper right plot of Figure 1.[11]

We have here deliberately focused on the model's predictions when capital and labor are complements. The reason is that this both seems empirically relevant, for instance due to the macro evidence mentioned above, and because allowing for this aspect is what makes our model substantially different from alternative existing theories, primarily Glazer (1989) and Beetsma and van der Ploeg (2007). These two studies analyze investment when public capital is equivalent to a durable version of a public consumption good. This is analogous to assuming full substitutability between capital and labor, which illuminates why these studies conclude that anticipated turnover motivates *higher* total investment. They also imply a composition effect where investment is tilted toward the incumbent's most preferred purpose if turnover becomes more likely. Thus, the two predictions above allow us to evaluate the empirical relevance of our framework relative to these closely related alternatives.

2.3.2 Wage Expenditure ("Current Expenditure")

1. The composition of wage expenditure across the two purposes is unaffected by the probability of re-election.

   Intuition: The employment composition (n_1^g/n_1^f) is determined by the initial capital stocks, as is evident from the first-order condition (13) in the appendix. Because these are beyond an incumbent's control, and because wages are exogenous, it follows that the composition of wage spending is not influenced by re-election probabilities.

As shown in the lower right panel of Figure 1, an incumbent may also adjust

[11] It is only when there is substantial complementarity between capital and labor that the composition effect is qualitatively pinned down by whether ϕ is greater or smaller than ε. When capital and labor are relatively easily substitutable (i.e. when ε is relatively high), the composition effect is no longer determined only by whether $\phi < \varepsilon$ or $\phi > \varepsilon$.

the total level of wage spending to variation in the re-election probability. Wage expenditure increases with the re-election probability when $\sigma > 1$, decreases when $\sigma < 1$, and is unaffected when $\sigma = 1$.[12] However, because the Norwegian municipalities we explore must balance current expenditure against income, as explained below, we do not believe that this dimension of the model can be explored with our data.

In this theoretical model the key difference between capital and labor is that the latter is freely determined each period, while the former is not. Empirically we distinguish between capital and current expenditures. Current expenditures are dominated by wage expenditures. We believe that although these inputs may not be completely flexible each period, they are considerably more flexible than physical capital.

3 The Institutional Setting and Data

To investigate the empirical relevance of the theoretical framework laid out in the previous section we utilize data from Norwegian local governments.

Norwegian local governments constitute a substantial part of the Norwegian economy. Together with the regional level of government in Norway, the counties, they account for about 15 to 20 percent of mainland GDP. Their main responsibilities include child care, primary education and care for the elderly. In addition they have the responsibility for some other services, such as culture and infrastructure. The local governments face some regulations concerning coverage and standards of welfare services, but have considerable discretion concerning the composition of

[12] On the one hand, turnover implies a "substitution effect": The incumbent will wish to shift labor expenditure from the second period to the first period, as this allows it to spend more on the purpose it prefers more strongly. On the other hand turnover implies an "income effect": Politicians want to smooth the instantaneous utility flow from publicly provided goods over time. Because turnover implies that in period 2 relatively little labor is allocated to the purpose that the incumbent derives most utility from, the way to smooth the utility flow is to cut labor expenditure in period 1 in favor of period 2. This income effect dominates the substitution effect if $\sigma < 1$, while the substitution effect dominates if $\sigma > 1$. If $\sigma = 1$, the two effects cancel out.

expenditures. On the revenue side they are more restricted. The local public sector is largely financed by block grants and regulated income taxation. 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 income tax revenue sharing system. Grants are also largely determined by rules and regulations. $98 - 99\%$ of grants are non-discretionary, and the remaining grants are primarily used to compensate for extraordinary events (like floods). The revenue sources where local governments have some discretion, are user fees and property taxation. For more details, see Rattsø (2003).

An important feature of the Norwegian system is that local governments are free to deficit finance investment, but not current expenditures. The sum of current expenditure and interest payments cannot exceed revenues.[13]

3.1 Data from Local Government Accounts

We will utilize data from the local governments' accounts that allow us to distinguish between current expenditures and investment for different purposes. Our data set covers 7 election terms, from 1972 to 1999. We do not use data after 1999 because of a reform in the organization of the account data in the following election term. In the period we study, the number of local governments fell from 454 to 434.

We focus on the main welfare services that local governments are responsible for: education, elderly care and child care.[14] On average, spending on these three

[13]The punishment for violating this requirement is to be set under administration by the central government, but this happens extremely rarely. Budgets and borrowing must, however, be approved by the regional commissioner (*fylkesmannen*), the central government's representative in the county. If the balanced budget requirement is broken, the regional commissioner will act to restore economic balance (Borge (2005)).

[14]In preliminary investigations we also analyzed the impact of changes in re-election probabilities on other sectors, namely central administration, culture and infrastructure. We did not find any impact of re-election probabilities on these expenditure types. This fits well with the theory in section 2, since only spending on the purposes that parties disagree about should be influenced by re-election probabilities.

purposes together constitutes about 45 percent of total municipal spending. Local governments are the main providers of these services. The public sector faces little competition from the private sector, in particular for educational services. Almost all pupils are enrolled in public primary schools.

Investment is defined as maintenance and spending on new buildings and structures (including wage expenditure etc. in relation to these) minus sales of buildings and structures. On average, maintenance accounts for about 50 percent of investment, while sales amount to about 2.5 percent of investment. Current expenditure is the sum of wages, equipment, external transfers and "other current expenditures". Table 2 displays spending per capita for the different purposes based on two-year averages. The descriptive statistics are based on the final data set that we use in our empirical analysis.

In our sample, the average local government spends about NOK 11500 (approx. USD 2000) per capita on the production of education services, elderly care and child care each year. Current expenditures account for about 90 percent. The coefficients of variation for investments on education, elderly care and child care are 1.25, 2.29 and 2.28, which reflect that investments in welfare services are lumpy. The corresponding coefficients of variation for current expenditures are 0.25, 0.80 and 0.99.

3.2 Political System

Each local government is ruled by a locally elected council, based on proportional representation. Council members represent either political parties or local lists formed outside the party structure. Most council members represent one of the 7 major parties that are dominant at both the local and the national arena.

The mayor is the key player in the local council, and elected by the local council at the beginning of each election term. Under the New Local Government Act, implemented in 1992, the mayor cannot be removed within an election term.

Before 1992 some local governments had a practice where the mayor and the deputy mayor swapped positions after two years (Gravdahl (1998)).

The Norwegian policy space is well represented by a single left-right dimension (Strøm and Leipart (1993)). The main political divide goes between the left-leaning socialist and the right-leaning conservative camp, and the political system is dominated by these two blocs. The left bloc is strongly dominated by the Labor Party, while the right bloc is more fragmented.[15] The same parties are dominant at both the national and the local level. At the local level parties sometimes form joint lists, which are always from the same bloc in our data. In the average local council, 41 percent represent one of the parties in the left bloc, or joint lists of left-bloc parties, 52 percent represent right-bloc parties, or joint lists of right-bloc parties, and 7 percent represent local lists which cannot immediately be categorized as belonging to the left or right bloc.

We exclude local governments with one or more representatives from local lists. We also exclude local governments before 1992 where the mayor and deputy mayor were from different blocs.[16]

County and local government elections are held in September every fourth year. National elections are also held every fourth year in September, but the electoral cycle differs from the local elections with two years, i.e. national elections are held exactly in the middle of two local elections. We will use this institutional feature in our empirical strategy.

The system of representation into the national parliament largely mirrors the system at the local level. Although local lists are sometimes formed at the national election, their electoral support is in most cases negligible. Between 1973 and 1997 only two representatives got elected from local lists. We exclude local governments

[15] We classify representatives that belong to the Socialist Left Party, the Labor Party, Red Electoral Alliance and the Communist Party as belonging to the left bloc.

[16] The total number of available observations is 2933. 1093 observations are excluded because the local council has at least one representative from local lists. In sensitivity analysis we include these observations in our sample.

from these counties in the relevant election periods.[17]

Table 3 provides descriptive statistics on political variables in our final sample. These are dummies for the mayors' bloc (Mayor Left and Mayor Right), share of votes to each bloc (Voteshare Left and Voteshare Right), support for the incumbent mayor at the local (SupportLocalElection) and national elections (SupportNationalElection), a dummy capturing whether the bloc of the incumbent is in power also the next election period (ReElection), and finally the change in support for the bloc of the incumbent from the local election to the national election, measured both at the local ($\Delta Support$) and county-wide levels ($\Delta Support^{County}$). $\Delta Support^{County}$ is key in our empirical strategy, and we elaborate on this in Section 4.

Given the theory presented in Section 2, it is instructive to know which welfare services each bloc prefers more strongly, before we study how spending decisions react to re-election probabilities. Sørensen (1995) and Borge and Sørensen (2002) provide direct evidence on such partisan preferences, based on a survey where municipality council members elected for the period from 1987 to 1991 were asked which of the existing local government responsibilities deserved more or less resources. The answers revealed that left-bloc representatives wanted to increase spending on child care services and cut back on education relative to what right-bloc representatives wanted. Right-bloc representatives wished to expand both education and elderly care at the expense of child care.[18] This pattern is consistent with an ideological divide by which the left bloc is more concerned with stimulating female labor force participation than the right bloc, which values traditional family life more strongly. Furthermore, Svaleryd (2009) documents a similar pat-

[17] We exclude local governments involved in mergers, secessions or border changes during an electoral period, local governments that do not have proportional election systems and the capital, Oslo, which has a different institutional structure than other local governments. We also exclude local governments with less than 1000 inhabitants. Finally, we lose a limited amount of observations due to missing data from the local government accounts.

[18] In the survey the separate category stated was health care, not elderly care. However, elderly care largely dominates this category in the accounts.

tern in survey data of elected representatives in Swedish local councils from 1980 and 1993. In contrast to right-bloc politicians, left-bloc politicians ranked child care as the most important spending category.[19]

In light of this evidence, disagreement between the two blocs seems most pronounced for spending on child care relative to education and elderly care. Hence, for composition-effects we would expect the strongest impact of re-election probabilities to occur along this dimension in the data.

4 Empirical Strategy

To pin down how re-election probabilities affect policy-making we face three econometric challenges. First, we are interested in estimating the impact of a variable, the (perceived) re-election probability, which is inherently unobservable. Second, this variable may be correlated with other local government characteristics that influence political outcomes (omitted variable problem). And third, the (perceived) re-election probability may be a result, and not a cause, of political decisions (reverse causality problem).

Our empirical strategy is based on the following conjecture: The share of votes an incumbent bloc received when it was elected into office through the local election in year t contains information about how likely that bloc is to be re-elected through the local election in $t+4$. Similarly, the share of votes an incumbent bloc receives in the national election in year $t+2$ also contains information about how likely re-election is. Denote these two vote shares as $S_{i,t}$ and $S_{i,t+2}$, respectively. If our conjecture is correct, then a change in support within election period T, $\Delta S_{i,T} \equiv S_{i,t+2} - S_{i,t}$, indicates that an incumbent's probability of being re-elected has changed. Hence, we consider the results from the national election as a "grand

[19] An alternative approach to identify party preferences is to apply a study actual expenditure decisions with a regression discontinuity design, as in Lee, Moretti, and Butler (2004), Ferreira and Gyourko (2009) and Petterson-Lidbom (2008). As our objective is not to reveal politicians' preferences, such an analysis as beyond the scope of this paper.

opinion poll" that captures ideological preferences of the electorate, while leaving the composition of the local council unaffected. The national election is a particularly useful tool as it contains information from each municipality separately and we can choose the level of aggregation at which we use this information. The empirical relevance of this idea is evaluated in the next section.

With the above logic in mind, we aim to estimate the following relationship:

$$\Delta Y_{i,T}^{h} = \psi \Delta S_{i,T} + \tau_T + \varepsilon_{i,T}, \tag{9}$$

where Δ is the first-difference operator, and $\Delta Y_{i,T}^{h}$ is the change in spending on purpose h from the two first years in election period T to the two last years in that election period. We include election period fixed effects, τ_T, in order to allow for election cycles unrelated to changes in re-election probabilities. These take out national swings in partisan sentiment and other time effects.[20] The key parameter of our interest is ψ.

Note that with the specification in (9) our inference is based on changes in policymaking within election periods, and hence for given policymakers. A strength of this approach is that all time-invariant factors are netted out. Unobserved characteristics of the incumbents will not influence our results. However, an OLS regression run directly on (9) is likely to suffer from an endogeneity problem: Parliamentary election results may be correlated with preceding local political decisions, i.e. $Cov\left(\Delta S_{i,T}, \varepsilon_{i,T}\right) \neq 0$. For instance, if a mayor is perceived as having done a good job during his first two years in office, voters may be more inclined to support his bloc at the national election. This generates an endogeneity problem if spending is correlated with voters' perception of incumbents' performance. More generally, omitted variables that influence both local priorities and voting will bias OLS estimation of (9).

[20] Several studies have documented an election cycle in public policy, e.g. Drazen and Eslava (2005), Veiga and Veiga (2007) and Dahlberg and Mörk (2008), using data from Columbian, Portuguese and Swedish local governments respectively.

To address the endogeneity problem we use an instrumental variable approach. Our instrument is the population-weighted average of the support for the incumbent's bloc in all other municipalities in the county to which municipality i belongs. This county-level information, denoted $S_{i,T}^{county}$, is calculated as follows:

$$\Delta S_{i,T}^{county} = \frac{\sum_{j \neq i}^{C_i} pop_{j,t} \Delta S_{j,T}}{\sum_{j \neq i}^{C_i} pop_{j,t}},$$

where C_i denotes the number of other municipalities in the county to which municipality i belongs and $pop_{j,t}$ is the population size of municipality j in year t.

Our first stage equation is given by

$$\Delta S_{i,T} = \zeta \Delta S_{i,T}^{county} + \tau_T + \epsilon_{i,T}, \tag{10}$$

The idea behind this equation is that the change in support from the local election result at the county level ($S_{i,t}^{county}$) to the national election result at the county level ($S_{i,t+2}^{county}$) two years later captures regional swings in partisan sentiment, which can be treated as independent of local decisions. Our identifying assumption is that a change in support for the incumbent's bloc at the county level does not influence the change in local decision making, except through its impact on perceived local re-election probabilities. In sensitivity analyses this assumption will be closely investigated. The idea that voter movements between parties to some extent is due to general trends, independent of local politics, has also been utilized by Svaleryd and Vlachos (2009) in a study of political rent seeking in Sweden.

We will estimate all equations separately for mayors from each of the two blocs. Hence, changes in the composition of the national parliament cannot be driving any results, as long as all incumbents from the same bloc are similarly affected.

5 Results

5.1 The National Election and Re-election Probabilities

The central element in our empirical strategy is to consider the results of the national election for parliament as signals to local incumbents about their likelihood of being re-elected. A key question is then: Does the national election provide relevant information about the local incumbents' re-election probability? To answer this question, we run the following probit regressions that relate actual local election outcomes in $t+4$, denoted by $R_{i,t+4}$, to the incumbent blocs' support at the elections in t and $t+2$:

$$R_{i,t+4} = \nu_1 + \omega_1 S_{i,t} + \eta_{1,i} \tag{11}$$

and

$$R_{i,t+4} = \nu_2 + \omega_2 S_{i,t} + \theta S_{i,t+2} + \eta_{2,i}. \tag{12}$$

Here $R_{i,t+4} = 1$ if the incumbent bloc is re-elected, while $R_{i,t+4} = 0$ if the incumbent bloc is not re-elected. If θ in (12) is different from zero, then the parliamentary election brings new information to the incumbents about their support among voters.

The results from regressions on (11) and (12) are provided in Table 4. The table shows that the estimates of ω_1 and θ are large and highly statistically significant, while ω_2 is not. Hence, while $S_{i,t}$ is a significant predictor of future re-election before $S_{i,t+2}$ is known, this is no longer the case once $S_{i,t+2}$ is included in the information set; the impact of $S_{i,t}$ is close to zero and statistically insignificant when we control for $S_{i,t+2}$. These results imply that a change in support from the local to the national election, $\Delta S_{i,t}$, indicates a change in incumbents' re-election probability.

5.2 The Effects of Changes in Re-election Probabilities

The results from the first stage regression, specified in (10), are reported in Table (5). The excluded instrument, $\Delta S_{i,t}^{county}$, is a strong predictor of $\Delta S_{i,t}$. The F-statistics are 52 and 69 for the right and left blocs, respectively, indicating that the instruments are relevant. A one percentage point increase in the support for the bloc of the incumbent at the county level, translates into roughly 0.5 and 0.6 percentage points higher support for the right and left-bloc incumbents at the local level, respectively.

Our results for investment are presented in Table 6 and for current expenditure in Table 7. The results are obtained from separate regressions for each category of public expenditure (education, elderly care and child care), as well as the aggregates (i.e. the sum over the three categories). Each table presents results for right-bloc incumbents in the upper panel and results for the left-bloc incumbents in the lower panel. In order to facilitate interpretation, the dependent variable in each regression is standardized by its standard deviation.

Table 6 shows that public investment varies with changes in incumbents' support. For the right bloc, there is a positive aggregate effect that is statistically significant at the five percent level. This seems to be driven by investment responses in education and elderly care, although neither of these components' responses are significant at the five percent level when considered separately. Incumbents from the left bloc, on the other hand, tend to raise investment in child care when their re-election probability increases. This effect is statistically significant at the one percent level. Because these incumbents do not adjust spending on elderly care or education, which together dominate total spending, the aggregate investment effect is not significantly different from zero.

Quantitatively, the results show that a 5 percentage point increase in the support of a right-bloc incumbent raises aggregate investment by 0.7 standard deviations. Similarly, a 5 percentage points increase in the support of an incumbent

from the left bloc increases investment in child care by 0.8 standard deviations.

A related study to ours is Darby, Li, and Muscatelli (2004). They document a negative association between political instability and public investment in a panel of European countries. While interesting, their approach cannot say much about causality. Our analysis however, corroborates the general hypothesis that the direction of causality runs from political instability to public investment.

From the theoretical studies of Glazer (1989) and Beetsma and van der Ploeg (2007), a central prediction is that the less likely incumbents are to be re-elected, the more will they invest. Our finding that investments tend to increase with incumbents' support contradicts this prediction. On the other hand, this finding is more consistent with the theoretical predictions emphasized in Natvik (2009), and displayed in the lower left plot of Figure 1. The essential mechanism in this framework is that incumbents are averse to the inefficient capital utilization that will follow if they lose influence to someone with different preferences for public goods.

In light of the evidence in Sørensen (1995) and Borge and Sørensen (2002) on party preferences, our results suggest that both left- and right-bloc incumbents tend to tilt the composition of investment toward their most preferred welfare service when their re-election probabilities increase. This tendency is strong for left-bloc incumbents, who raise child care investments, while it is somewhat weaker for incumbents from the right bloc who more strongly prefer education and elderly care. Cast against theory, these findings are the opposite of what Glazer (1989) and Beetsma and van der Ploeg (2007) predict. They are more consistent with the theoretical prediction displayed in the upper left panel of Figure 1, which is obtained under the restriction that the elasticity of substitution between public goods in utility (ϕ) is lower than the elasticity of substitution between capital and labor in production (ε).

In contrast to the investment effects, Table 7 shows that current expenditures

do not respond to variation in incumbents' support. For all spending categories considered the estimated effects are far from significant. While the absence of an aggregate effect most likely is due to the balanced budget requirement, and thus not informative on how re-election prospects shape policymakers' choices, the lack of a composition effect is more interesting. The balanced budget rule does not prevent politicians from re-allocating current expenditure across purposes. That politicians do not vary the composition here, while they do vary their investment composition, is consistent with the specific theory presented above.

To clarify the role of our instrumental variable strategy, consider Table 8 and 9 that report OLS estimates from our second stage regression (specification (9)) without instrumenting $\Delta Support$. The OLS specification indicate that public investments do not vary with changes in re-election probabilities. For current expenditures there are mostly negative associations between spending and support for the incumbent.

A priori, it is not clear whether the OLS estimates are upward or downward biased. The bias depends on the effect that spending has on the support for the incumbent and the relationship between omitted variables and spending. However, in comparison to the IV estimates, that correct for both sources of bias, OLS estimates seem to be biased downwards. One plausible mechanism behind this bias is that high spending early in the election period (all else equal) increases incumbent mid-term popularity.

6 Sensitivity Checks

The results reported in the previous section capture the average causal effect of changes in re-election probabilities on local decision making as long as the instrument we apply is valid. To investigate our benchmark results we conduct a number of sensitivity checks. First, we include potentially relevant control vari-

ables. Second, we investigate whether yardstick competition threatens the validity of our exclusion restriction. Third, rather than excluding observations with council members from local lists, we consider a different approach to handle these observations.[21]

6.1 Control Variables

Our inference is based on changes in policymaking within election periods, and all time-invariant factors are thus netted out. However, there may potentially be time-varying factors that affect policymaking which could give rise to omitted variable bias. For this to be the case, the omitted variables must affect not only local politics, but also be correlated with county-wide swings in ideological sentiment, which is our instrument.

Factors that reflect the need for welfare services is one class of variables that may be correlated across local governments within counties and possibly also correlated with our instrument. To address this issue we control for variation in demographics over time, namely the number of inhabitants (ΔPop), the share of children (0-6 years) ($\Delta Children$), the share of young (7-15)($\Delta Young$), the share of elderly (67 years and older)($\Delta Elderly$), the share of women ($\Delta Women$) and the share of the female population (15 years and above) that are married ($\Delta MarriedWomen$).[22]

On the revenue side, it is unlikely that changes in local economic conditions can be driving any of the results presented above. The reason is that local revenues are largely determined by non-discretionary grants and regulated income tax sharing. However, as a robustness check we also include changes in the local unemployment rate ($\Delta Unemp$) in our second stage.

[21] In a previous version of this study, we also varied the threshold population size below which we exclude municipalities from our sample. This did not alter our main results in a substantial way. See www.cesifo.de/DocCIDL/cesifo1_wp2709.pdf.

[22] Note that these variables may be endogenous due to Tiebout sorting and it is not obvious that they belong in our second stage.

Table (10) and (11) report results from specifications where control variables are included. The demographic variables mainly have the expected signs. We find that an increased number of inhabitants in a particular age group is associated with an increase in current expenditures in the relevant sector. E.g. when the share of the population in school age increases, spending on schooling increases. Changes in demographics are less important for investment. There is some evidence that higher unemployment is associated with lower current expenditures. This might work through the revenue side of the budget, but is more likely caused by increased local demand for welfare benefits, which crowds out spending on other purposes. Investment spending is largely unrelated to the local unemployment rate.

Importantly, our main results on the impact of re-election probabilities are essentially unaltered when we include control variables.

6.2 Yardstick Competition

Voters may use information about political decisions in neighboring local governments to evaluate the performance of their own government (Salmon (1987), Besley and Case (1995)). Such yardstick competition is a potential problem in our setting. If voters in local government i condition their voting at the national election on the performance of their own local incumbent relative to the incumbent in local government j, then the county-wide ideological sentiment (where votes in i are excluded) may be endogenous to local decision making in i. This implies that the exclusion restriction we impose, namely that the county-level change in support for an incumbent does not affect his spending decisions except through the local re-election probability, may not hold.

To investigate whether yardstick competition biases our IV estimates, we need to exclude local governments that voters in local government i use as yardsticks. Empirically, it is not obvious how this should be operationalized. We use two alternative approaches to investigate the importance of yardstick competition. First,

we exclude local governments where the county administration is located. These "county capitals" are considerably larger than the average local government and consequently get substantial weight when we generate our population-weighted instrument.[23] In addition, these local governments may be problematic because the county population pays attention to the politics of the "county capital" (due to e.g. more media coverage). In Tables (12) and (13) we report results where "county capitals" are excluded. The results are basically the same as before.

Our second approach is to rely on information on local labor market regions. The labor market regions, 90 in total, are defined by Statistics Norway on the basis of commuting flows across local government borders. In Tables (14) and (15), we present results where the instrument is based on changes in the regional partisan sentiment, excluding election results from local governments belonging to the same labor market region.

As expected, the instruments become slightly weaker with the alternative instrument. The aggregate investment effect for right-bloc incumbents and the child care effect for left-bloc incumbents is still statistically significant at the five percent level.

Because results change little when we exclude local governments based on two plausible definitions of "neighborhood", it seems unlikely that our main findings are severely biased by yardstick competition.

6.3 Local Lists

7 percent of all representatives in the local councils of our sample belong to local lists that do not participate in the national elections. For our key explanatory variable, $\Delta Support$, to correctly capture the change in bloc support from the local to the national election, we need to know whether these local lists belong to either the left or the right bloc. However, information that allows such a categorization

[23] The average population size of the "county capitals" is 56.000.

is not readily available. We therefore excluded municipalities with such council members from the sample in our analysis above. The cost of this conservative approach was that we excluded a substantial number of observations from our analysis. In order to assess the importance of these exclusions for our results, we here deal with the local lists in an alternative way.

The aim of the procedure we pursue is to avoid excluding observations with mayors who represent parties that we know which bloc belongs to.[24] In order to measure change in support at the local level for the incumbent in municipality i, $\Delta S_{i,T}$, we characterize all local lists as part of the right bloc. However, the instrument, county-wide change in support $\Delta S_{i,T}^{county}$, is constructed without municipalities with council members from local lists, just as before. The idea is that while the ad hoc categorization of local lists introduces noise in our measurement of change in support at the local level, $\Delta S_{i,T}$, our instrument $\Delta S_{i,T}^{county}$ remains unaffected by this source of measurement error. We thereafter conduct a similar analysis with all local lists categorized as members of the left bloc.

Tables 16 and 17 display the results when local lists are included in the right bloc. Tables 18 and 19 display the results when local lists are included in the left bloc. As expected, the instrument becomes weaker when support for local lists are included in either of the two blocs. However, the main results from the previous analysis remain unchanged. For the right bloc the aggregate effect remains significant, and still seems to be driven by elderly care and schooling, while for the left bloc the effect on child care remains.

7 Discussion: Theory and the Results

The predictions from our theoretical model, taken from Natvik (2009), were determined by the specific parameter values for the production functions of the public sector and utility function of the political parties competing for office. A way to

[24] We still exclude all observations with mayor from a local list, 4 percent of our observations.

evaluate our theory is therefore to ask if there exist reasonable parameter values under which its predictions are consistent with our empirical findings. At this point, the most important finding is that incumbents tend to invest more when re-election becomes more likely, which is consistent with the model under the assumption that capital and labor are complements, i.e. when ε in the model is low. Based on the existing evidence on macro production functions (e.g. Klump, McAdam, and Willman (2007) and Antràs (2004)) such a degree of complementarity is reasonable.

In terms of investment composition, our theory is consistent with the empirical findings only if the political parties have a low intratemporal elasticity of substitution (ϕ). For this parameter, we have no empirical evidence to lean on, and hence our finding that higher re-election probabilities make incumbents tilt the composition toward the purposes they prefer more strongly poses no strict test of our model. However, cast against the predictions from Glazer (1989) and Beetsma and van der Ploeg (2007), the composition effect in the data does point toward our framework where capital and labor are complementary inputs to government production.

While our empirical analysis was designed to explore the predictions of one specific theory, the findings may also be used to evaluate alternative models. For instance, one possible force behind strategic investments could be that incumbents attempt to influence their own re-election probability. Two recent studies that emphasize this mechanism are Aidt, Veiga, and Veiga (2007) and Drazen and Eslava (2005). Both assume that public investments are particularly visible types of public expenditure. Office-seeking incumbents will therefore invest more when they need to boost their re-election probability, i.e. when electoral competition is perceived as high. Our evidence does not support this prediction because a higher support in the national election indicates a higher re-election probability, and thus

less competition in the upcoming election.[25] Of course, this does not rule out that incumbents attempt to influence their re-election probabilities when choosing how to invest. But, to the best of our knowledge, existing frameworks cannot explain our findings as driven by endogenous voting.[26]

Finally, it is striking that re-election probabilities seem to affect the composition of investment, but not the composition of current expenditures. This finding supports the general idea that the returns to investment are more sensitive to future policy choices than is the case for current expenditure, as in a theory where capital is a relatively inflexible input in producing public goods.

8 Conclusion

By studying highly comparable entities, municipalities in Norway, and utilizing the overlapping regularity of local and national election terms that characterizes this institutional setting, we have found that incumbent policymakers adjust their investment policies in response to exogenous shifts in their support among voters. Incumbents who experience increased popularity raise investment in the purposes they prefer more strongly than their competitors for office.

This result is interesting for two broad reasons. First, it provides a finding against which we can evaluate politico-economic hypotheses of public investment. We have focused on theoretical frameworks where re-election probabilities are exogenous, and argued that our evidence rejects theories where the returns to public capital are independent of other policy choices, as in Glazer (1989) and Beetsma

[25] The positive relationship we find between investment and support is therefore the opposite of what both Aidt, Veiga, and Veiga (2007) and Drazen and Eslava (2005) predict.

[26] An alternative model of endogenous voting and public investment is that of Robinson and Torvik (2005), where incumbents may choose to invest in socially inefficient projects ("white elephants") targeted to their core voters so as to raise their own re-election probability. While this theory may well be relevant for developing countries (as the authors allude to), we do not view our findings from Norway as consistent with it. The reason is that this theory would predict incumbents to invest more in their most-preferred projects when electoral competition is expected to be tough, which under the premise that a low re-election probability signals tougher competition is the opposite of what we find.

and van der Ploeg (2007). On the other hand, our evidence is consistent with a framework where the returns to investment in public capital depend on the other inputs that such capital must be combined with in order to produce public goods, as in Natvik (2009). Hence, our results indicate that it is important to account for complementarity between public capital and other inputs to public good provision when analyzing public investment in a political equilibrium. Furthermore, while we have not placed much emphasis on theories where incumbents choose the composition of investment so as to influence future voting, it may well be that such considerations are important. We believe that our study motivates theoretical investigation into how politicians may choose investment strategies to boost their likelihood of being re-elected.

Second, our results are important for normative considerations as well. A feature of democracies is that whoever is in government at a point in time faces the risk of losing influence in the future. It is important to know whether and how this feature affects which policies are actually implemented, since such knowledge provides guidance as to whether democratically elected governments should face restrictions on the set of policies they may implement. On this issue the literature has traditionally emphasized deficit restrictions, as in Persson and Svensson (1989) and Tabellini and Alesina (1990). For investment, emphasis has been on the aggregate level of capital accumulation, with a central prescription being the "golden rule", which states that investment in physical capital should be exempted from deficit restrictions (e.g. Bassetto and Sargent (2006)). The institutional setting in which Norwegian municipalities operate is very similar to such a "golden rule". Hence, our results show that such a rule is not sufficient to prevent politicians from varying the capital stock in response to altered prospects of re-election. Understanding the welfare consequences of such investment behavior seems an important subject for future research.

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A Appendix

A.1 First Period Choices

For notational convenience, and without loss of generality, assume that the incumbent is of type R. Let h_2^J and $n_2^{h,J}$ denote the quantities of good h and labor use for producing good h when party J is in office in period 2, and G^J denote the reaction function of party J. The incumbent's choices of $\left\{n_1^g, n_1^f, k_2^g, k_2^f, b\right\}$ must satisfy the first-order conditions

$$u_g\left(g_1, f_1|\alpha^R\right) g_n\left(n_1^g, k_1^g\right) = u_f\left(g_1, f_1|\alpha^R\right) f_n(n_1^f, k_1^f) \tag{13}$$

$$\left\{\begin{array}{c} u_g\left(g_1, f_1|\alpha^R\right) g_n\left(n_1^g, k_1^g\right) \\ -p_R\left[u_g\left(g_2^R, f_2^R|\alpha^R\right) g_n\left(n_2^{g,R}, k_2^g\right)\right] \\ +(1-p_R)\left[\begin{array}{c} u_g\left(g_2^L, f_2^L|\alpha^R\right) g_n(n_2^{g,L}, k_2^{g,L}) G_b^L \\ +u_f\left(g_2^L, f_2^L|\alpha^R\right) f_n(n_2^{f,L}, k_2^{f,L}) F_b^L \end{array}\right] \end{array}\right\} = 0 \tag{14}$$

$$\left\{\begin{array}{c} -u_g\left(g_1, f_1|\alpha^R\right) g_n\left(n_1^g, k_1^g\right) \\ +p_R\left[\begin{array}{c} u_g\left(g_2^R, f_2^R|\alpha^R\right) g_k(n_2^{g,R}, k_2^g) \end{array}\right] \\ +(1-p_R)\left[\begin{array}{c} u_g\left(g_2^L, f_2^L|\alpha^R\right) g_n(n_2^{g,L}, k_2^g) G_{k_2^g}^L \\ +u_f\left(g_2^L, f_2^L|\alpha^R\right) f_n(n_2^{f,L}, k_2^f) F_{k_2^g}^L \\ +u_g\left(g_2^L, f_2^L|\alpha^R\right) g_k(n_2^{g,L}, k_2^g) \end{array}\right] \end{array}\right\} = 0 \tag{15}$$

$$\left\{\begin{array}{c} -u_g\left(g_1, f_1|\alpha^R\right) g_n\left(n_1^g, k_1^g\right) \\ +p_R\left[\begin{array}{c} u_f\left(g_2^R, f_2^R|\alpha^R\right) f_k(n_2^{f,R}, k_2^f) \end{array}\right] \\ (1-p_R)\left[\begin{array}{c} u_g\left(g_2^L, f_2^L|\alpha^R\right) g_n(n_2^{g,L}, k_2^g) G_{k_2^f}^L \\ +u_f\left(g_2^L, f_2^L|\alpha^R\right) f_n(n_2^{f,L}, k_2^f) F_{k_2^f}^L \\ +u_f\left(g_2^L, f_2^L|\alpha^R\right) f_k(n_2^{f,L}, k_2^f) \end{array}\right] \end{array}\right\} = 0 \tag{16}$$

in addition to the budget constraint (2). These are the first-order conditions for labor hiring, debt accumulation, and investment in purpose g and f.

Table 1: Parametrization

Parameter	Value	Parameter	Value	Parameter	Value
δ	0.2	ϕ	0.5	α^R	0.6
ε	0.7	σ	1	α^L	0.4
γ	0.7				

Notes: δ is the depreciation rate of public capital during an election term. ε is the elasticity of substitution between capital and labor in the production of public goods. γ is the share parameter of labor in the production function. ϕ is the intratemporal elasticity of substitution between goods g and f, and σ is the intertemporal elasticity of substitution in the utility function. α^R and α^L are party R and party L's utility weights on good g.

Table 2: Descriptive Statistics: Investment and Current Expenditures

Variable	Mean	Std. Dev.	Min.	Max.
Investment Aggregate	1.138	1.242	-15.632	12.247
Investment Education	0.663	0.820	-5.198	9.017
Investment Elderly Care	0.396	0.901	-16.11	10.986
Investment Child Care	0.08	0.183	-1.409	3.2
Current Expenditures Aggregate	10.635	4.925	3.498	48.125
Current Expenditures Education	5.822	1.462	2.551	16.267
Current Expenditures Elderly Care	3.95	3.181	0.106	34.124
Current Expenditures Child Care	0.864	0.844	0	4.922
N		3446		

Notes: Investment is defined as maintenance and spending on new buildings and structures minus sales of buildings and structures. Current expenditure is the sum of wages, equipment, external transfers and 'other current expenditures'. All figures are measured per capita in NOK 1000 and deflated to 1998 levels. Descriptive statistics are based on two-year averages. The sample is restricted as in baseline estimations below.

Table 3: Descriptive Statistics: Political Variables.

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
Mayor Left	0.456	0.498	0	1	1723
Mayor Right	0.544	0.498	0	1	1723
Voteshare Left	0.449	0.146	0.062	0.832	1723
Voteshare Right	0.55	0.146	0.167	0.938	1723
SupportLocalElection	0.615	0.103	0.235	0.938	1723
SupportNationalElection	0.593	0.096	0.222	0.908	1723
ReElection	0.825	0.38	0	1	1706
$\Delta Support$	-0.018	0.041	-0.243	0.192	1723
$\Delta Support^{County}$	-0.005	0.025	-0.066	0.072	1723

Notes: SupportLocalElection is the incumbent bloc's share of votes in the local election held at the beginning of each local election period. SupportNationalElection is the incumbent bloc's share of votes in the parliamentary election held in the middle of the local election period. ReElection is an indicator variable which equals one if the bloc of the incumbent remains in power the next election period, zero otherwise. $\Delta Support$ is the change in support for the bloc of the incumbent from the local election held in year t (SupportLocalElection) to the national election held in year $t+2$ (SupportNationalElection). $\Delta Support^{County}$ is the population-weighted average of $\Delta Support$ at the county level, excluding the local government under study. The sample is restricted as in baseline estimations below.

Table 4: Information from Parliamentary Election

	Right-wing	Left-wing	Right-wing	Left-wing
SupportLocalElection	4.61***	6.71***	0.14	-0.23
	(0.99)	(1.63)	(0.03)	(-0.05)
SupportNationalElection			5.31***	7.84***
			(1.11)	(1.81)
Constant	-1.89***	-2.83***	-2.24***	-3.23***
N	929	777	929	777
pseudo R^2	0.077	0.156	0.093	0.199
Estimation Method	Probit	Probit	Probit	Probit

Notes: SupportLocalElection is the incumbent bloc's share of votes in the local election held at the beginning of each local election period. SupportNationalElection is the incumbent bloc's share of votes in the parliamentary election held in the middle of the local election period. The dependent variable is an indicator variable which equals one if the bloc of the incumbent remains in power the next election period, zero otherwise. Regressions are run separately for mayors from each bloc. The sample is restricted as in baseline estimations below. Marginal effects in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: First Stage Regressions

	Right-wing Mayors	Left-wing Mayors
$\Delta Support^{County}$	0.48***	0.60***
	(0.07)	(0.07)
N	937	786
R^2	0.179	0.292
Estimation Method	OLS	OLS

Notes: The dependent variable, $\Delta Support$, is the change in support for the bloc of the incumbent from the local election held in year t to the national election held in year $t+2$. $\Delta Support^{County}$ is the population-weighted average of $\Delta Support$ at the county level, excluding the local government under study. Regressions are run separately for mayors from each bloc. Election period fixed effects included in all specifications. Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Effects of Increased Support for the Incumbents' Bloc on Investment

Right-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	13.90***	9.59*	9.16*	2.85
	(5.33)	(5.31)	(5.31)	(5.31)
N	937	937	937	937
F-statistic from 1st.	52.45	52.45	52.45	52.45

Left-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	5.86	1.22	3.45	16.58***
	(4.28)	(3.81)	(4.52)	(4.70)
N	786	786	786	786
F-statistic from 1st.	68.75	68.75	68.75	68.75

Notes: Each cell represents coefficients from IV regressions for each category of public expenditure on changes in support for the bloc of the incumbent. The dependent variable is the change in yearly spending from the two first years in each election period to the two last years in each election period, scaled by the relevant standard deviation (from Table 2). The parameter estimates measure spending responses if support were to increase from zero to 100 percent. The instrument for $\Delta Support$ is the population-weighted average of the change in support for the incumbent's bloc at the county level, excluding the local government under study ($\Delta Support^{County}$). Regressions are run separately for mayors from each bloc. Election period fixed effects included in all specifications. Standard errors in parentheses, * $p < 0.10$,** $p < 0.05$, *** $p < 0.01$.

Table 7: Effects of Increased Support for the Bloc of the Incumbent on Current Expenditures

Right-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	0.44	0.56	0.25	0.57
	(0.66)	(0.99)	(0.82)	(0.85)
N	937	937	937	937
F-statistic from 1st.	52.45	52.45	52.45	52.45

Left-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	0.07	-0.03	0.40	-1.06
	(0.60)	(0.77)	(0.84)	(0.65)
N	786	786	786	786
F-statistic from 1st.	68.75	68.75	68.75	68.75

Notes: For explanatory details, see Table 6

Table 8: Investment. Simple OLS.

Right-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	1.81	1.89	0.55	0.17
	(1.17)	(1.21)	(1.20)	(1.23)
N	937	937	937	937

Left-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	-1.46	-0.95	-1.28	0.01
	(1.20)	(1.09)	(1.28)	(1.21)
N	786	786	786	786

Notes: Each cell represents coefficients from OLS regressions for each category of public expenditure on changes in support for the bloc of the incumbent. The dependent variable is the change in yearly spending from the two first years in each election period to the two last years in each election period, scaled by the relevant standard deviation (from Table 2). The parameter estimates measure spending responses if support were to increase from zero to 100 percent. Regressions are run separately for mayors from each bloc. Election period fixed effects included in all specifications. Standard errors in parentheses, * $p < 0.10$,** $p < 0.05$, *** $p < 0.01$.

Table 9: Current Expenditures. Simple OLS.

Right-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	-0.09	0.20	-0.08	-0.56***
	(0.15)	(0.23)	(0.19)	(0.19)
N	937	937	937	937

Left-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	-0.67***	-0.36	-0.78***	-0.40**
	(0.17)	(0.22)	(0.24)	(0.18)
N	786	786	786	786

Notes: For explanatory details, see Table 8

Table 10: Investment. Control Variables Included

Right-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	14.07***	9.37*	9.41*	4.02
	(5.37)	(5.32)	(5.35)	(5.33)
ΔPop	−0.14	−0.03	−0.13	−0.08
	(0.15)	(0.14)	(0.15)	(0.15)
$\Delta Children$	11.42	12.56	−0.50	22.75*
	(11.87)	(11.76)	(11.82)	(11.79)
$\Delta Young$	15.52	30.71***	−7.30	1.78
	(10.82)	(10.72)	(10.77)	(10.74)
$\Delta Elderly$	−8.36	6.84	−14.16	−12.90
	(11.15)	(11.05)	(11.10)	(11.07)
$\Delta Women$	−29.96*	−8.52	−34.33**	−25.89
	(16.38)	(16.23)	(16.31)	(16.27)
$\Delta MarriedWomen$	−5.78	−1.99	−2.24	−20.94***
	(6.58)	(6.52)	(6.55)	(6.54)
$\Delta Unemp$	−4.73	−10.53	3.03	−1.54
	(8.82)	(8.73)	(8.78)	(8.75)
N	937	937	937	937
F-statistic from 1st.	51.47	51.47	51.47	51.47

Left-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	5.34	1.18	2.74	16.73***
	(4.22)	(3.79)	(4.46)	(4.66)
ΔPop	0.03	0.00	0.01	−0.05
	(0.19)	(0.17)	(0.21)	(0.22)
$\Delta Children$	1.91	11.15	−9.28	14.74
	(13.58)	(12.19)	(14.35)	(15.02)
$\Delta Young$	−11.36	−5.06	−9.63	−4.72
	(11.89)	(10.68)	(12.57)	(13.16)
$\Delta Elderly$	23.11*	11.56	18.62	8.92
	(12.49)	(11.21)	(13.20)	(13.81)
$\Delta Women$	−48.70**	−21.94	−48.69**	−6.99
	(20.35)	(18.28)	(21.51)	(22.51)
$\Delta MarriedWomen$	4.56	3.15	6.37	−19.66**
	(7.05)	(6.33)	(7.45)	(7.79)
$\Delta Unemp$	9.34	−1.25	13.93*	1.57
	(7.67)	(6.89)	(8.11)	(8.49)
N	786	786	786	786
F-statistic from 1st.	69.73	69.73	69.73	69.73

Notes: For explanatory details, see Table 6

Table 11: Current Expenditures. Control Variables Included

Right-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	0.30	0.17	0.19	0.70
	(0.66)	(0.97)	(0.82)	(0.86)
ΔPop	-0.04^{**}	-0.03	-0.05^{**}	-0.01
	(0.02)	(0.03)	(0.02)	(0.02)
$\Delta Children$	-0.52	-6.49^{***}	1.27	3.35^{*}
	(1.45)	(2.15)	(1.81)	(1.90)
$\Delta Young$	4.24^{***}	6.69^{***}	3.56^{**}	-0.20
	(1.33)	(1.96)	(1.65)	(1.74)
$\Delta Elderly$	2.04	-2.16	4.80^{***}	-2.22
	(1.37)	(2.02)	(1.70)	(1.79)
$\Delta Women$	1.96	2.17	2.73	-2.53
	(2.01)	(2.97)	(2.49)	(2.63)
$\Delta MarriedWomen$	0.17	0.65	0.34	-1.48
	(0.81)	(1.19)	(1.00)	(1.06)
$\Delta Unemp$	-1.16	-3.72^{**}	0.31	-1.57
	(1.08)	(1.60)	(1.34)	(1.41)
N	937	937	937	937
F-statistic from 1st.	51.47	51.47	51.47	51.47

Left-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	0.14	-0.00	0.52	-1.13^{*}
	(0.59)	(0.75)	(0.82)	(0.64)
ΔPop	-0.05^{*}	-0.04	-0.05	-0.00
	(0.03)	(0.03)	(0.04)	(0.03)
$\Delta Children$	-2.10	-4.22^{*}	-0.78	-2.05
	(1.91)	(2.42)	(2.65)	(2.06)
$\Delta Young$	1.86	7.59^{***}	0.17	-3.20^{*}
	(1.67)	(2.12)	(2.33)	(1.81)
$\Delta Elderly$	3.60^{**}	-2.88	6.42^{***}	1.48
	(1.76)	(2.23)	(2.44)	(1.90)
$\Delta Women$	1.54	-3.85	4.99	-3.27
	(2.86)	(3.63)	(3.98)	(3.09)
$\Delta MarriedWomen$	0.58	-0.17	0.67	1.13
	(0.99)	(1.26)	(1.38)	(1.07)
$\Delta Unemp$	-3.90^{***}	-2.66^{*}	-3.72^{**}	-3.90^{***}
	(1.08)	(1.37)	(1.50)	(1.17)
N	786	786	786	786
F-statistic from 1st.	69.73	69.73	69.73	69.73

Notes: For explanatory details, see Table 6

Table 12: Investment. County Administration Local Governments Excluded

Right-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	12.29**	9.03*	8.22	-1.62
	(5.28)	(5.31)	(5.28)	(5.34)
N	891	891	891	891
F-statistic from 1st.	53.02	53.02	53.02	53.02

Left-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	4.49	-0.78	3.51	16.15***
	(4.00)	(3.56)	(4.31)	(4.42)
N	749	749	749	749
F-statistic from 1st.	76.76	76.76	76.76	76.76

Notes: For explanatory details, see Table 6

Table 13: Current Expenditures. County Administration Local Governments Excluded

Right-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	0.68	0.48	0.51	1.10
	(0.67)	(0.99)	(0.82)	(0.87)
N	891	891	891	891
F-statistic from 1st.	53.02	53.02	53.02	53.02

Left-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	-0.29	-0.12	-0.01	-1.42**
	(0.57)	(0.73)	(0.79)	(0.62)
N	749	749	749	749
F-statistic from 1st.	76.76	76.76	76.76	76.76

Notes: For explanatory details, see Table 6

Table 14: Investment. Local Governments Belonging to the Same Labor Market Region Excluded from Instrument

Right-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	12.08**	11.30*	5.51	0.39
	(6.05)	(6.17)	(6.00)	(6.10)
N	937	937	937	937
F-statistic from 1st.	39.05	39.05	39.05	39.05

Left-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	8.25*	3.04	4.89	16.95***
	(4.88)	(4.30)	(5.10)	(5.28)
N	786	786	786	786
F-statistic from 1st.	53.87	53.87	53.87	53.87

Notes: For explanatory details, see Table 6

Table 15: Current Expenditures. Local Governments Belonging to the Same Labor Market Region Excluded from Instrument

Right-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	0.53	0.50	0.45	0.48
	(0.77)	(1.14)	(0.95)	(0.98)
N	937	937	937	937
F-statistic from 1st.	39.05	39.05	39.05	39.05

Left-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	0.21	0.38	0.47	-1.16
	(0.68)	(0.87)	(0.94)	(0.73)
N	786	786	786	786
F-statistic from 1st.	53.87	53.87	53.87	53.87

Notes: For explanatory details, see Table 6

Table 16: Investment. Representatives from Local Lists Included in Right Bloc

Right-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	12.76**	8.28	8.44*	6.03
	(5.18)	(5.09)	(4.65)	(4.66)
N	1422	1422	1422	1422
F-statistic from 1st.	45.20	45.20	45.20	45.20

Left-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	-0.40	1.28	-4.75	13.90***
	(4.45)	(4.33)	(4.78)	(4.87)
N	1079	1079	1079	1079
F-statistic from 1st.	33.99	33.99	33.99	33.99

Notes: For explanatory details, see Table 6

Table 17: Current Expenditures. Representatives from Local Lists Included in Right-Bloc

Right-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	-0.05	0.24	-0.32	0.46
	(0.55)	(0.80)	(0.70)	(0.67)
N	1422	1422	1422	1422
F-statistic from 1st.	45.20	45.20	45.20	45.20

Left-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	-0.23	-0.50	0.08	-0.72
	(0.59)	(0.83)	(0.79)	(0.78)
N	1079	1079	1079	1079
F-statistic from 1st.	33.99	33.99	33.99	33.99

Notes: For explanatory details, see Table 6

Table 18: Investment. Representatives from Local Lists Included in Left Bloc

Right-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	19.01*	12.33	12.58	8.98
	(10.06)	(8.66)	(8.13)	(7.62)
N	1422	1422	1422	1422
F-statistic from 1st.	6.56	6.56	6.56	6.56

Left-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	-0.26	0.83	-3.10	9.06***
	(2.89)	(2.83)	(3.10)	(3.11)
N	1079	1079	1079	1079
F-statistic from 1st.	42.29	42.29	42.29	42.29

Notes: For explanatory details, see Table 6

Table 19: Current Expenditures. Representatives from Local Lists Included in Left Bloc

Right-Bloc Mayors

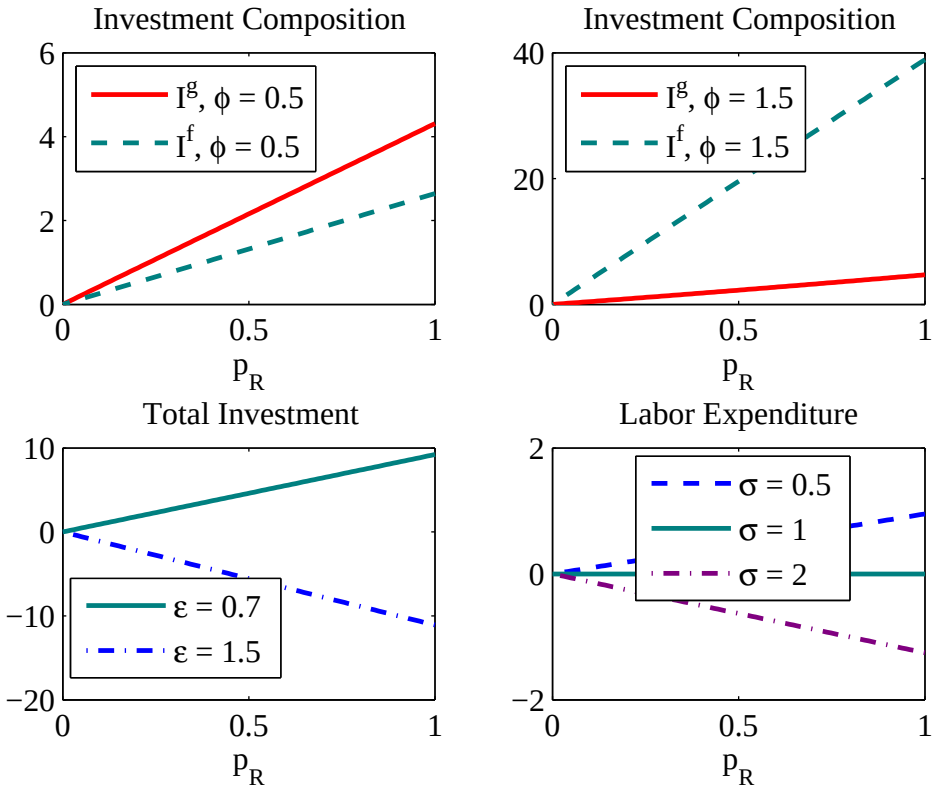
	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	-0.07	0.35	-0.47	0.69
	(0.82)	(1.19)	(1.06)	(1.04)
N	1422	1422	1422	1422
F-statistic from 1st.	6.56	6.56	6.56	6.56

Left-Bloc Mayors

	Aggregate	Education	Elderly Care	Child Care
$\Delta Support$	-0.15	-0.33	0.05	-0.47
	(0.38)	(0.54)	(0.52)	(0.49)
N	1079	1079	1079	1079
F-statistic from 1st.	42.29	42.29	42.29	42.29

Notes: For explanatory details, see Table 6

Figure 1: The Effect of Re-election Probability on Policy



Notes: All plots show the percentage point difference from the corresponding outcomes when turnover is certain ($p_R = 0$). I^g and I^f denote investment in production of good g and f. Total investment means investment in both goods summed. Labor expenditure means spending on labor in the production of both goods summed. Unless otherwise noted, parameter values take the values in Table 1.

2007

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