Investments and maintenance: Easy targets when governments cut budgets?

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Abstract

The paper adds to the scarce empirical literature on the determinants of public investments and related expenditures. A main contribution is that we investigate how both maintenance and investments are affect by fiscal and political variables using data for Norwegian local governments. There is strong evidence that investments and maintenance are more sensitive to fiscal variables than other expenditures, i.e. they are easy targets when budgets are to be cut. It is a plausible hypothesis that maintenance, because of lower visibility, is even more sensitive to fiscal variables than investement, but the evidence for this hypothesis is mixed. Finally, political fragmentation is associated with low levels of maintenance, but does not seem to affect investments.

Keywords: Fiscal distress, political fragmentation, maintenance, public investment
JEL codes: H72, H82

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1 Introduction

It has a become a popular claim that public investments are insufficient because of myopic politicians and that investments take more than its fair share when budgets are cut. Roubini and Sachs (1989, p. 108-109) formulated it as follows: "in periods of restrictive fiscal policies and fiscal consolidation capital expenditures are the first to be reduced (often drastically) given that they are the least rigid component of expenditures". A first basis of the claim is the experiences for the OECD countries during the 1980s as discussed by Oxley and Martin (1991), De Haan et al. (1996) and Sturm (1998, ch. 3) among others. During the 1980s public investment as share of GDP declined in a majority of the OECD countries, while at the same time total public spending stopped growing as share of GDP. Based on panel data for a sample of 22 OECD countries, De Haan et al. (1996) and Sturm (1998, ch. 3) find evidence in favor of the hypothesis that public investment is reduced as share of public spending during periods of fiscal stringency. They also find that frequent government changes lead to cuts in investment spending.

In the US the same concerns were raised regarding a possible "infrastructure crisis" in state and local governments. Hulten and Peterson (1984) document the decline in capital spending in the 1970s and early 1980s and offer possible explanations. A key issue in the debate was whether the decline was a sensible response to changing economic and demographic conditions or whether it reflected myopic behavior by state and local politicians. Proponents of the latter explanation (e.g., Inman, 1983) emphasize that capital spending is an easy target when there is a need to balance public budgets because it takes time for the adverse consequences to occur. In a series of papers, Holtz-Eakin and Rosen (1989, 1993) provide more formal tests, and in general they find that the hypothesis of rational forward-looking behavior is an adequate description of municipal capital spending.[1] Poterba (1995) analyzes how capital spending in the US states are affected by budgetary procedures. He finds that states with separate capital budgets spend more on public capital projects than comparable states with unified budgets.

In this paper we add to the scarce literature on the determinants of public investment and related expenditures. The main contribution is that we analyze both investments and maintenance. Although maintenance spending usually is defined as current expenditures, it is similar to investments in the sense that it adds to the real capital stock. Maintenance does so indirectly by reducing depreciation and extending the lifetime of the existing capital stock. There is much of anecdotal and case-based evidence on (insufficient) maintenance, but we

[1] A similar examination is carried out by Rattsø (1999) on Norwegian data. As Holtz-Eakin and Rosen (1989, 1993) he cannot reject that local public investments are determined by rational forward looking behavior.

are not aware of any large scale analysis of the determinants of maintenance spending. The main reason for this is lack of good data.[2] In this study we take advantage of a new and novel data set on maintenance spending in Norwegian local governments that has been available since 2008. We utilize this data set in two different ways. First, we investigate whether maintenance and investments are more sensitive to fiscal distress and revenue changes than other expenditures. In addition we analyze how political fragmentation affects maintenance and investments. The claim that investments take more than its fair share when budgets are cut is based on the assumptions that it takes time before the consequences of reductions in public investments become easily observable. The same will be the case for reductions in maintenance spending, and because of the precautionary nature of maintenance reductions in maintenance is likely to be less visible than reductions in investments. We thus expect that maintenance will be even more sensitive to fiscal variables than investments. This hypothesis is in line with Drazen and Eslava (2010) who argue that new investments have high visibility. Maintenance on the other hand, have low visibility both when it is decreased and when it is increased. Second, the new database on maintenance also provides information on the total space of purpose buildings that facilitates calculation of maintenance spending per m^2. Maintenance spending per m^2 is the preferred indicator when it comes to evaluating whether maintenance is sufficient. We investigate whether economic and political determinants can explain the variation in maintenance spending per m^2.

The results show that fiscal variables are important determinants for both expenditures, and that maintenance seems to be somewhat more sensitive, at least to short-run fluctuations than investment. Further, whereas political fragmentation is associated with low levels of maintenance, it does not seem to affect investments.

The remainder of the paper is organized as follows: Section 2 presents the institutional background and dependent variables. Section 3 discusses the econometric specification and explanatory variables, while the results are discussed in Section 4. Finally, Section 5 offers some concluding remarks.

2 Institutional background and the data on investments and maintenance

As in other Scandinavian countries, Norwegian local governments are important providers of welfare services like child care, primary and lower secondary education, primary health care, and care for the elderly. Other important tasks are culture and infrastructure. The local

[2]See McGratten and Schmitz (1999) for a discussion of the difficulties of constructing measures of maintenance.

public sector accounts for around 50 percent of government consumption and their revenues make up 18 percent of GDP. After labor, buildings are probably the most important input in production of local public services. Local government buildings amount to 50 m^2 per employee and make up as much as 1/4 of all non-residential buildings in Norway. Schools make up nearly half of the total building mass and constitute the most important building type, followed by nursing homes (22 percent), office buildings (11 percent), and child care centers (7 percent).[3] The main revenue sources for the local governments are taxes, grants from the central government and user charges. Whereas the local governments have a large degree of discretion on the expenditure side, the revenues are heavily regulated under central standards. The opportunity to influence current revenues is in practice limited to property tax and user charges.[4]

The political system at the local government level is a representative democracy where the members of the local council are elected every fourth year. The elections are held on the same day in all local governments, in September. The national parties are important players, and the national struggle between the socialist and non-socialist camps is mirrored at the local level. Compared to national politics, a main difference is that the majority coalition does not form a cabinet. The typical organization is an alderman model with an executive board with proportional representation from all major parties. The executive board is led by the mayor, and the members of the executive board, including the mayor and the deputy mayor, are elected among the members of the local council.

Prior to each fiscal year, the local council makes decisions regarding current spending, revenue, investment activity and borrowing. The executive board and the chief administrative officer (*rådmannen*) are central players in the early stages of the budgetary process, and the executive board presents a budget proposal to the local council. The groupings in the local council are free to put forward own suggestions, either small or large changes to the proposal from the executive board, or totally different budget proposals. Finally the local council determines the budget either by voting on alternative budget proposals or issue by issue. The final vote takes place shortly before new year, around medio December.

In the empirical analysis we take advantage of maintenance and investment data from the local government accounts in the period 2008-2013. Before 2008 the local government accounts did not provide an accurate measure of maintenance spending. The problem was that maintenance spending only included materials and labor purchased from external firms, and not the maintenance work conducted by local government employees. Since maintenance spending only was captured to the extent it was outsourced, maintenance was underestimated

[3] Around half of all child care centers are privately owned and are not included in the figures.

[4] The user charges are limited to cover costs.

Table 1: Descriptive statistics: Maintenance and investment

Variable	Mean (St.dev.)
Maintenance spending per m^2 (in NOK)	78.79
$(N = 2,307)$	(54.72)
Maintenance spending per capita (in NOK)	380.53
$(N = 2,307)$	(266.25)
Maintenance as share of total gross expenditures (%)	0.63
$(N = 2,307)$	(0.43)
Investment per capita (in 1,000 NOK)	3.24
$(N = 2,307)$	(3.09)

Maintenance spending per m^2 and per capita and investment per capita are in fixed 2008 prices.
The averages are weighted.

and the data were not commensurable across local governments. Since 2008 maintenance work conducted by the local government is included in maintenance spending, and in this study we take advantage of the new and improved spending measure. The spending measure captures maintenance activity for buildings owned by local governments. Maintenance does not include upgrades and major renovations as they are considered as investments.

Table 1 reports summary statistics for maintenance and investment in the period 2008-2013.[5] We use three indicators of maintenance spending; per m^2, per capita, and as share of total current expenditures. Maintenance spending per m^2 is the best indicator with respect to evaluating whether maintenance is sufficient. However, it is not an easy task to develop guidelines for proper maintenance. The traditional engineering approach is to calculate the level of maintenance that is necessary in order to keep buildings in their original technical condition. Norms for proper maintenance will obviously vary by type of building and utilization. Available Norwegian guidelines (FOBE, 2006) for the local government building mass indicate that maintenance per m^2 should be NOK 110-145.[6] From an economic perspective it is not obvious that it is optimal to keep buildings in their original technical condition. It may be optimal to let buildings (e.g., schools or nursery homes) decay if they are not suitable for future service organization or if service demand is expected to be reduced in the future (Hopland and Kvamsdal, 2014). Although the norm should be interpreted as an upper limit, the figures in Table 1 indicate that maintenance was insufficient on average.

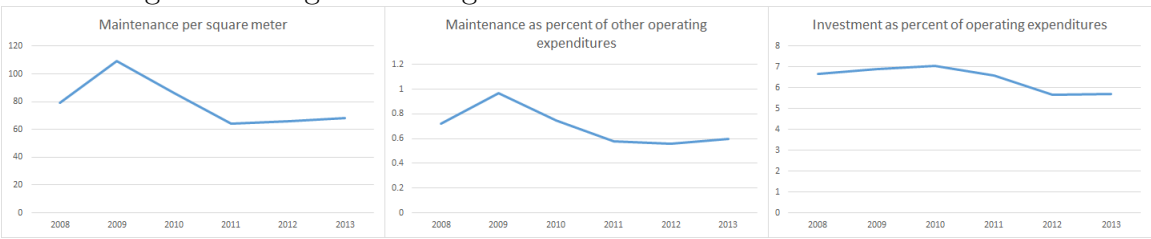
In the regression analysis, the main emphasis will be on maintenance as share of total expenditures, since this is the variables that most clearly show how much priority local politicians give to maintenance relative to other expenditures. Investments are measured per capita.

Figure 1 gives further insight, as it plots the averages year-by-year. In 2008 maintenance spending amounted to NOK 79 per m^2 and 0.7 percent of current expenditures. In January

[5]Observations where maintenance is reported to be 10 NOK or less (in 2008 prices) are excluded.

[6]The original figures from 2004 are adjusted for inflation and are in 2008 prices as all other figures in the paper.

Figure 1: Weighted average maintenance and investment over time.



2009 a maintenance grant to local governments was implemented as part of the fiscal stimulus package to counteract the impacts of the global financial crisis. The grant was earmarked for new maintenance projects that were not included in the adopted budget for 2009, and was paid out as a flat amount per capita.[7] The grant contributed to an increase in maintenance spending to NOK 109 per m^2. After the grant was abolished in 2010, maintenance spending per m^2 dropped back to NOK 86 and further to NOK 64 in 2011. A small increase followed in the two latest years, about NOK 66 and 68 in 2012 and 2013, respectively. The same development over time is observed for maintenance spending as share of total expenditures and to a large extent also for maintenance per capita. The investments made was stable between about 6.6 to 7 percent of operating expenditures (when omitting maintenance) except for a dip in the two last years when it dropped to about 5.7 percent.

The descriptive statistics indicate that, on average, the local government building mass is insufficiently maintained, even during the fiscal stimulus in 2009. However, the average figures mask large differences across local governments. While a majority is characterized by low maintenance spending and poor building conditions, there is also a sizable minority with a well-functioning facility management. It is of great interest to seek explanations for these differences.

3 Econometric specification and hypotheses

In order to investigate determinants of maintenance and investment, we estimate various versions of the regression equation

$$m_{ijt} = \boldsymbol{Fiscal}'_{ijt}\boldsymbol{\beta_{FM}} + \boldsymbol{Political}'_{ijt}\boldsymbol{\beta_{PM}} + \boldsymbol{Controls}'_{ijt}\boldsymbol{\beta_{CM}} + \alpha_{Mj} + \delta_{Mt} + u_{Mijt} \quad (1)$$

[7]The scope of the maintenance grant was broader than the spending concept used in this study. The grant could be used for local government infrastructure (not buildings only), for private organizations receiving financial support from the local government, and also for renovation and upgrading.

$$Inv_{ijt} = \boldsymbol{Fiscal}'_{\boldsymbol{ijt}}\boldsymbol{\beta_{FI}} + \boldsymbol{Political}'_{\boldsymbol{ijt}}\boldsymbol{\beta_{PI}} + \boldsymbol{Controls}'_{\boldsymbol{ijt}}\boldsymbol{\beta_{CI}} + \alpha_{Ij} + \delta_{It} + u_{Iijt} \qquad (2)$$

m_{ijt} and inv_{ijt} are, respectively, maintenance and investments relative to other expenditures in local government i in year t, depending on the specification. $\boldsymbol{Fiscal_{ijt}}$ is a vector containing indicators of fiscal capacity and stress, $\boldsymbol{Political_{ijt}}$ a vector of political variables, and $\boldsymbol{Controls_{ijt}}$ a vector of control variables. Owing to limited time variation, we are not able to control for local government fixed effects. We do however control for fixed effects at the county level (captured by α_{Mj} andα_{Ij}) by including county dummies in all regressions.[8] Similarly, the time fixed effects δ_{Mt} and δ_{It} are included in all regressions. u_{Mijt} and u_{Mijt} are error terms.

The fiscal variables capture the level of revenues and fiscal distress. Our general hypothesis is that maintenance and investments are more sensitive to fiscal variables than other expenditures. Consequently, we expect β_{FM} and β_{FI} to be positive for revenues, i.e., maintenance and investments increases (decreases) relatively more than other expenditures when local government revenue increases (decreases). Likewise, we expect negative coefficients for for indicators of fiscal distress and positive coefficients for indicators that are inversely related to fiscal distress.

The main fiscal variable is local government revenues in terms of local taxes and general purpose grants (lump sum grants). Because the grant system to some extent compensates for unfavorable cost conditions, nominal per capita revenues may be a poor indicator of "real" revenues (or the service standard that the revenues can generate). The point can be illustrated by an example. Consider a small and sparsely populated local government that is unable to exploit economies of scale. It will tend to have high nominal revenues per capita because the unfavorable cost conditions are compensated through the grant system, but not necessarily high real revenues. As in other recent Norwegian studies (Borge et al., 2008; Borge and Haraldsvik, 2009), we take advantage of an indicator of real per capita revenues published annually by the Ministry of Local Government. The indicator is calculated by "deflating" tax revenues and general purpose grants by an index of spending needs from the spending needs equalization system. The index for spending needs captures unfavorable cost conditions related to population size, settlement pattern, the age composition of the population, and social factors. The indicator of real revenue is an index where the weighted average for all local governments is set equal to 100 each year. Since most taxes are of the revenue sharing type and the general purpose grants are distributed by objective criteria, the

[8]There are 19 counties in Norway.

revenue measure can be considered exogenous (not affected by local government spending priorities) and can be interpreted as an indicator of fiscal capacity. There is substantial variation in fiscal capacity across local government, reflecting differences in tax bases and the design of the grant system.

In addition to per capita revenues as indicator of fiscal capacity, we include indicators of fiscal distress. Fiscal distress is broadly defined as actual fiscal performance in relation to the balanced-budget-rule (BBR). The main requirement in the Norwegian BBR is operational budget balance. In the budget (or ex ante), current revenues must be sufficient to cover current expenditures (wages and materials) and debt servicing costs (net interest payment and net installment on debt). Actual deficits can be carried over, but have to be covered within two years.[9] On average (over time and across local governments) the net operating surplus amounts to 2-3 percent of revenues and contributes to 1/3 of investment financing.

The net operating surplus[10] in the previous year is our first indicator of fiscal distress. Local governments with low or negative net operating surplus may need to tighten their budgetary policy. But since the budget can be balanced by use of rainy-day-funds, the need to tighten the budgetary policy will be less for local governments with large funds. Available rainy-day-funds by the end of the previous year constitute our second indicator. It is inversely related to fiscal stress.

The final indicator of fiscal distress is a dummy variable capturing whether the local government is included in the Register for State Review and Approval of Financial Obligations (Robek). The register lists local governments that have violated the BBR by passing a budget with a net operating deficit or have been unable to cover an actual deficit within two years. The far most common reason for being in the register is that a deficit is not covered on time. The consequence of being in the register is that the budget and resolutions to raise new loans must be approved by the county governor, the central government's representative in the county. Local governments in the register are subject to stronger central government control, and must tighten their budgetary policy in order to be removed from the register.[11]

The fact that politicians face upcoming elections may be a source of myopic policy making, and the degree of myopic behavior is likey to increase with electoral uncertainty. Alesina and Tabellini (1990) is an early theoretical contribution emphasizing that electoral uncertainty leads to mypoic behavior in terms of deficit bias. More recent papers (Darby, Li and Muscatelli 2004, Bohn 2007 and Natvik 2013) develop models that predict underinvestment in public capital for the same reason. Based on these theoretical studies we expect that mypoic policy making leads to lower investments, and also to lower maintenance spending.

[9] An actual deficit is covered when future surpluses are at least as large as the deficit.

[10] The net operating surplus is current revenue less current expenditures and debt servicing costs.

[11] See Hopland (2013; 2014) for further details.

Borge and Tovmo (2009) analyze the intertemporal spending behavior of Norwegian local governments. They find that political fragmentation is associated with myopic spending behavior. In addition Borge (2005) documents a deficit bias in local governments with a high degree of political fragmentation. As indicator of political fragmentation and mypoic behavior we use the effective number of parties ($ENOP$), which is the inverse of the traditional Herfindahl-Hirschman index

$$ENOP = \left(\sum_{p=1}^{P} SH_p^2 \right)^{-1} \tag{3}$$

where SH_p is the share of representatives from party p. The effective number of parties varies from close to 1.1 to nearly 7.4, with an average of 4 (both across local governments and over time). We expect a negative sign of ENOP, i.e. an increase in the effective number of parties leads to a reduction in maintenanace and investments relative to other expenditures.

that the effective number of parties reduces maintenance and investment spending relative to other ex

In Norway, the socialist camp is dominated by the Labor party, while the non-socialist camp is more fragmented. As a consequence, there is a negative correlation between party fragmentation and the share of socialists in the local council.[12] Hence, we also control for the share of socialists (Soc) to avoid the coefficient for political fragmentation capturing ideological preferences. Socialist parties are defined as the social democrats (The Labour Party) and parties to its left.

The vector of control variables contain population size and variables capturing age composition. We include the share of the population below school age (0-5 years), the share of the population in primary and lower secondary schools (6-15 years) and the share of elderly citizens (80 years and above). Since these socioeconomic variables also are included in the spending needs index used to "deflate" local government revenues, they may be of less importance in our case. In the maintenance regressions we also control for the share of rented building mass. The reason is that maintenance of rented buildings is not included in the measure of maintenance spending. Finally, since climatic conditions can affect need for maintenance and building conditions, we include winter temperature.

The dependent variables in the models described above are maintenance and investment relative to other expenditures. We will in addition estimate models with maintenance spending per m^{2}as dependent variable. The specification is as equation (1) except for the definition of the dependent variable. We expect the same qualitative effect of the fiscal and political variables on maintenance spending per m^{2}as for maintenance relative to other expenditures, i.e. a low level of revenue, fiscal distress and political fragmentation will all lead to a low

[12]The correlation between the effective number of parties and the share of socialists is -0.33.

Table 2: Maintenance as percent of operating expenditures.

	(A)	(B)	(C)	(D)	(E)
Local government revenue	0.00548***	0.00510***	0.00420***	0.00544***	0.00542***
	(0.00130)	(0.00137)	(0.00148)	(0.00130)	(0.00133)
Surplus in year $t-1$ (% of revenues)		0.00518			
		(0.00329)			
Rainy-day-funds (% of revenues)			0.0101***		
			(0.00374)		
Robek				-0.0469	-0.0425
				(0.0363)	(0.0370)
Effective number of parties	-0.0452**	-0.0453**	-0.0401*	-0.0437**	-0.0373*
	(0.0217)	(0.0216)	(0.0219)	(0.0217)	(0.0226)
Share of socialists in the local council (%)	0.000623	0.000651	0.00111	0.000597	0.000908
	(0.00143)	(0.00142)	(0.00138)	(0.00143)	(0.00150)
Population size (in 10,000)	0.0149**	0.0150**	0.0163**	0.0146**	0.0160**
	(0.00677)	(0.00676)	(0.00658)	(0.00678)	(0.00729)
Rented buildings (%)	-0.00635***	-0.00625***	-0.00556***	-0.00619***	-0.00592***
	(0.00210)	(0.00211)	(0.00206)	(0.00209)	(0.00204)
Share of population 0-5 years (%)					0.0454*
					(0.0271)
Share of population 6-15 years (%)					-0.00744
					(0.0238)
Share of population 80 years and above (%)					0.0519**
					(0.0221)
Normal winter temperature					0.00805
					(0.00919)
Observations	2,283	2,282	2,273	2,282	2,268
R-squared	0.118	0.120	0.133	0.118	0.128

A constant term, county dummies, and year dummies (not reported) included.
Robust standard errors (clustered on the local government level) in parentheses.
Operating expenditures do not include maintenance and amortization.
***p<0.01, **p<0.05, *p<0.1

level of maintenance spending per m^2.

4 Results

The estimation results with maintenance expenditures relative to other expenditures are reported in Table 2. In colum (A) we include local government revenue and the effective number of parties, and with population size and county dummies as the only controls. Local government revenue comes out as highly significant with the expected positive sign, i.e. maintenance expenditures are more sensitive to revenue changes than other expenditures. The effective number of parties is also statistically significant. The negative sign is consistent with the hypothesis that myopic politicians tend to reduce maintenance relative to other expenditures.

In column (B)-(D) we include the three indicators of fiscal distress one by one. Rainy-day-funds comes out as highly significant and with the expected positive sign, i.e., local governments with small funds cut down on maintenance relative to other expenditures. The two other indicators of fiscal distress, lagged surplus and the ROBEK dummy, has the expected

Table 3: Investment as share of operating expenditures.

	(A)	(B)	(C)	(D)	(E)
Local government	0.00316	-0.0109	-0.00504	0.00107	0.00955
revenue	(0.0130)	(0.0122)	(0.0124)	(0.0127)	(0.0152)
Surplus in year $t-1$		0.189**			
(% of revenues)		(0.0959)			
Rainy-day-funds			0.0681**		
(% of revenues)			(0.0315)		
Robek				-2.386***	-2.297***
				(0.531)	(0.520)
Effective number of	0.133	0.132	0.174	0.204	0.0634
parties	(0.234)	(0.224)	(0.242)	(0.232)	(0.245)
Share of socialists in	0.0210	0.0213	0.0251	0.0203	0.0222
the local council (%)	(0.0156)	(0.0150)	(0.0158)	(0.0154)	(0.0174)
Population size	0.0110	0.0135	0.0180	-0.00639	-0.0464
(in 10,000)	(0.0407)	(0.0409)	(0.0409)	(0.0403)	(0.0549)
Rented buildings (%)	0.0359	0.0401	0.0420	0.0434	0.0394
	(0.0366)	(0.0356)	(0.0372)	(0.0369)	(0.0360)
Share of population					0.706**
0-5 years (%)					(0.344)
Share of population					0.0363
6-15 years (%)					(0.261)
Share of population					0.0342
80 years and above (%)					(0.218)
Normal winter					0.0279
temperature					(0.0943)
Observations	2,283	2,282	2,273	2,282	2,268
R-squared	0.032	0.047	0.036	0.041	0.049

A constant term, county dummies, and year dummies (not reported) included.
Robust standard errors (clustered on the local government level) in parentheses.
Operating expenditures do not include maintenance and amortization.
***p<0.01, **p<0.05, *p<0.1

signs, but they are not significant at conventional levels. The effects of local government revenue and the the effective number of parties are largely unaffected to the inclusion of indicators of fiscal distress, and also to the inclusion of additional controls in column (E).

We now turn to the corresponding estimation results for investment expenditures reported in Table 3. In column (A) neither local government revenue nor the effective number of parties come out as significant. The interpretation is that investment expenditures are equally responsive to changes in revenue and political fragmentation as other expenditures. However, the indicators of fiscal distress included in columns (B)-(D) come out as significant and with the expected signs. Investment expenditures tend to be relatively low (compared to other expenditures) in local governments with past deficits and with small funds. Local governments in the Robek register seems to cut investment expenditures relatively more than other expenditures. The estimates are robust to the inclusion of additional controls in column (E).

Taken together the interpretation of the results in Tables 2 and 3 is that both maintenance and investment expenditures are more sensitive to fiscal variables than other expenditures. This finding is as expected and confirms that maintenance and investment expenditures are

Table 4: Asymmetric response.

	(A)	(B)
	Maintenance as percent of other expenditures	Investment as percent of other expenditures
Local government revenue	0.00512***	0.00288
	(0.00134)	(0.0125)
(Local government revenue)*(reduction in revenue)	0.000461*	-0.00262
	(0.000250)	(0.00312)
Robek	-0.0461	-2.390***
	(0.0363)	(0.531)
Effective number of parties	-0.0419*	0.194
	(0.0220)	(0.234)
Share of socialists in the local council (%)	0.000630	0.0201
	(0.00142)	(0.0155)
Population size (in 10,000)	0.0149**	-0.00836
	(0.00681)	(0.0406)
Rented buildings (%)	-0.00597***	0.0421
	(0.00208)	(0.0372)
Observations	2,282	2,282
R-squared	0.120	0.042

A constant term, county dummies, and year dummies (not reported) included.
Robust standard errors (clustered on the local government level) in parentheses.
Operating expenditures do not include maintenance and amortization.
***p<0.01, **p<0.05, *p<0.1

easy targets when governments need to cut budgets. Maintenance expenditures is also more sensitive than other expenditures to changes in political fragmentation, while no such effect is found for investment expenditures.

It is less straightforward to compare the sensitivity of respectively maintenance and investment expenditures. However, since local government revenue and the effective number of parties come out as significant in the maintenance regressions but not in the investment equations, it can be argued that maintenance is more sensitive to those variables than investments. For the indicators of fiscal distress the evidence is more mixed. Past surpluses and the Robek dummy come out as significant in the investment regressions but not in the maintenance regressions, indicating that investment expenditures are most sensitive to changes in these variables. The stronger effect of the ROBEK dummy on investments may reflect that investments are restricted by the imposed borrowing control. Rainy-day-funds has a positive and significant effect in both the maintenance and the investment regressions. However, the estimated coefficients cannot be directly compared. Since investments are roughly ten times as large as maintenance, the maintenance coefficient should be multiplied by ten in order to be comparable to the investment coefficient. When this adjustment is made, maintenance is slightly more responsive to rainy day funds than investments. Taken the together there is mixed support for the hypothesis that maintenance expenditures are more sensitive to fiscal variables than investment expenditures.

In Table 4 we have investigated whether the response to revenue changes is asymmetric in the sense maintenance and investments are more sensitive to revenue reductions than to

Table 5: Maintenance per m^2.

	(A)	(B)	(C)
Local government revenue	0.338***	0.281**	0.374***
	(0.124)	(0.117)	(0.120)
Surplus in year $t-1$ (% of revenues)	0.570*		
	(0.342)		
Rainy-day-funds (% of revenues)		0.761**	
		(0.353)	
Robek			-6.583
			(4.176)
Effective number of parties	-4.366*	-4.010	-4.155*
	(2.526)	(2.581)	(2.502)
Share of socialists in the local council (%)	-0.0939	-0.0595	-0.0989
	(0.180)	(0.183)	(0.180)
Population size (in 10,000)	3.538***	3.658***	3.487***
	(0.922)	(0.925)	(0.923)
Observations	2,282	2,273	2,282
R-squared	0.057	0.060	0.057

A constant term, county dummies, and year dummies (not reported) included. Robust standard errors (clustered on the local government level) in parentheses.
***p<0.01, **p<0.05, *p<0.1

revenue increases. The models in column (E) in Tables 2 and 3 are extended by a dummy for revenue reduction interacted with local government revenue. There is some evidence of an asymmetric response for maintenance. The interaction is significantly positive, indicating that maintenance (relative to other expenditures) are more sensitive to revenue reductions than to revenue increases. For investments there is no evidence of an asymmetric response.

Table 5 reports results with maintenance per m^2 owned by the local government. The picture is mostly similar as when studying maintenance as percent of operating expenditures. Local government revenue comes out with a coefficient varying from 0.28-0.38. The largest coefficient suggests that a one standard deviation reduction of revenues leads to a decline in maintenance expenditures by a bit more than NOK 8, or 10% of the average maintenance spending. Both surplus in year $t-1$ and rainy-day-funds come out as significant. A one standard deviation reduction in lagged surplus and rainy-day-funds predicts a reduction by about 4% and 7% of the average maintenance expenditures, respectively. Based on Column (A), a one standard deviation increase in the effective number of parties is associated with a decline in maintenance per m^2 by about 6% of average maintenance spending. Again, political color is of no importance.

5 Concluding remarks

In this paper we add to the scarce literature on the determinants of public investment and related expenditures. The main contribution is that we analyze both investments and main-

tenance. Although maintenance spending usually is defined as current expenditures, it is similar to investments in the sense that it adds to the real capital stock.

The results show that fiscal variables are important determinants for both expenditures, and that maintenance seems to be somewhat more sensitive, at least to short-run fluctuations than investment. Further, whereas political fragmentation is associated with low levels of maintenance, it does not seem to affect investments.

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Appendix A: Descriptive statistics, explanatory variables

Variable	Description	Mean (St.dev.)
Local government revenue	The sum of local taxes and lump-sum grants from the central government. Measured per capita and adjusted for spending needs. Normalized such that the weighted average (for all local governments) equals 100 each year.	107.42 (21.65)
Surplus in year $t-1$ (% of revenues)	The net operating surplus the previous year. Measured in percent of revenues in the same year.	2.12 (5.13)
Rainy-day-funds (% of revenues)	Available funds by the end of the previous fiscal year. Measured in percent of current revenues.	6.02 (7.34)
Robek	A dummy variable set equal to one if the local government is listed in the Register of State Review and Approval of Financial Obligations.	0.10 (0.31)
Effective number of parties	An indicator of party fragmentation in the local council. Based on elections in 2007 and 2011.	4.04 (1.07)
Share of socialists in the local council (%)	The share of socialists in the local council, in percent. Based on elections in 2007 and 2011.	35.29 (14.27)
Population size (in 10,000)	The number of inhabitants January 1, in ten thousands.	1.06 (2.11)
Rented buildings (%)	The fraction of the building mass that is rented, in percent.	2.75 (4.96)
Share of population 0-5 years (%)	The share of the population 0-5 years January 1, percent.	6.72 (1.21)
Share of population 6-15 years (%)	The share of the population 6-15 years January 1, percent.	12.84 (1.35)
Share of population 80 years and above (%)	The share of the population 80 years and above January 1, percent.	5.42 (1.50)
Normal winter temperature	Normal winter temperature.	-2.95 (4.03)

The means and standard deviations are based on the regression samples.