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MYOPIC OR CONSTRAINED BY BALANCED-BUDGET-RULES? THE INTERTEMPORAL SPENDING BEHAVIOR OF NORWEGIAN LOCAL GOVERNMENTS

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Myopic or constrained by balanced-budget-rules? The intertemporal spending behavior of Norwegian local governments*

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Abstract
The paper analyzes the intertemporal spending behavior of Norwegian local governments with particular attention to liquidity constraints imposed by balanced-budget-rules (BBRs). The main findings are: (i) On average, local government spending behavior is neither perfectly forward looking nor fully myopic. (ii) Local governments with good fiscal conditions behave more forward looking than other local governments. (iii) A high degree of party fragmentations is associated with less forward looking behavior. The overall assessment is that the departure from rational forward looking behavior reflects both liquidity constraints imposed by BBRs and myopic behavior.

Keywords: Balanced-budget-rules; Intertemporal spending behavior; Consumption smoothing; Local government
JEL classification: D91, H72

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1. Introduction

Several contributions have investigated whether governments' tax and spending patterns are consistent with rational forward looking behavior. Such behavior basically means that tax and spending decisions are determined by permanent resources, and that the deficit should be the main absorber of short term shocks. Empirical analyses of national governments have concentrated on 'tax smoothing' and have investigated whether tax rates can be described as random walks. The results of Barro (1979, 1981) support the tax smoothing hypothesis for the U.S. and the U.K., but according to Roubini and Sachs (1989) who analyze 15 OECD countries, the U.S. and the U.K. appear to be special cases.

The related literature on subnational governments has concentrated on the intertemporal pattern of public spending and resource use. Holtz-Eakin and Rosen (1989, 1991, 1993) analyze respectively capital spending, labor demand, and construction spending using data for U.S. municipalities. They apply the approach developed by Hall (1978), i.e. they estimate Euler equations and test whether the lag structure is consistent with a model based on rational forward looking behavior. The results are generally supportive of forward looking behavior, but the behavior seems to differ between different groups of municipalities. The spending behavior of small (in terms of population size) and suburban municipalities is consistent with rational forward looking behavior, while the behavior of large municipalities and non-suburbs is not.[1]

The Euler equation approach facilitates a test of whether spending behavior is consistent with rational forward looking behavior, but, in the case of rejection, the approach provides no information on the quantitative departure from such behavior. Holtz-Eakin et al. (1994) apply the so-called 'λ-model' developed by Campbell and Mankiw (1990), and are then able to determine the fraction of local public spending that is governed by permanent resources and the fraction that is governed by current resources. Using aggregate time series data for state and local government spending in the U.S., rational forward looking behavior is clearly rejected. Moreover, the quantitative departure from such behavior is substantial since they

[1] In the analysis of construction spending (Holtz-Eakin and Rosen, 1993) they also perform a more explicit test of the impact of anticipated and unanticipated changes in the community's resources. The same approach is used by Rattsø (1999) in a study of investment spending in Norwegian local governments. Both studies find that only anticipated spending is important in the long term.

find (p. 173) “that essentially 100% of the growth rate of state and local spending on nondurable items is determined by the decision maker’s contemporaneous level of resources.” Dahlberg and Lindström (1998) estimate the λ-model using data for Swedish municipalities, and with very different results compared to Holtz-Eakin et al. (1994). Using panel data, their estimates indicate that (p. 269) “spending decisions on nondurable goods and services are to a very high degree (90% or more) associated with permanent resources.”[2] Moreover, municipalities in the southern part of Sweden are more forward looking than those in the northern part, but there is no significant difference between socialist and conservative municipalities.

In this paper we estimate the λ- model on a large panel data set for Norwegian local governments. The analysis should be of interest for several reasons. First, given the sharp difference between the American and Swedish studies, more evidence is needed to improve our understanding of the dynamic spending behavior of local governments. Second, within the λ- model it is not clear how departure from rational forward looking behavior should be interpreted. Does it reflect that local governments are myopic, or does it reflect liquidity constraints? Our aim is to discriminate between these two interpretations by splitting the sample according to fiscal conditions. A positive correlation between fiscal conditions and the degree of forward looking behavior will be interpreted as support for liquidity constraints. On the other hand, myopic behavior is supported if the degree of departure from forward looking behavior is unrelated to fiscal conditions. This way of splitting the sample is similar to the approach taken in the empirical literature investigating whether households are liquidity constrained, and may provide more interesting interpretations than the sample splits used in the earlier analyses of local governments (population size, suburban vs. non-suburban, geography, and political ideology). Moreover, we split the sample according to political characteristics based on previous evidence that fragmented leaderships behave more short sighted. Correlation between fragmentation and the degree of forward looking behavior could be interpreted as evidence of myopic behavior.

[2] The difference between the American and Swedish estimates is partly due to the nature of the data in the two studies. When Dahlberg and Lindström reestimate their model on aggregate time series data, the proportion of spending decisions associated with permanent resources is reduced to 60-70%. Empirical analyses of household behavior show the same pattern. Whereas rational forward looking behavior is strongly rejected in aggregate time series studies, the results are less clear when microeconomic data is applied (Jappelli et al., 1998, p. 251).

The analysis is also of practical relevance for the way the local public sector is currently used in the macroeconomic stabilization policy. In Norway the local public sector is responsible for the provision of important welfare services like education and health care, and it makes up a large part of the total economy. During the period under study the revenues of the local public sector (local governments and counties) amounted to around 20% of GDP, and through the grant system and income tax revenue sharing the revenue growth is largely in the hands of the central government. As documented by Borge and Rattsø (2002a), the regulation of local revenues is part of the general fiscal policy. In recessions, the central government increases grants and the share of taxes received by local governments in order to stimulate aggregate demand. In booms, the opposite policy is implemented to reduce aggregate demand. This policy will only be effective if local government spending behavior to some extent is determined by current resources, i.e. not fully forward looking. Moreover, if the degree of departure from forwarding looking behavior is related to fiscal conditions, the effectiveness may vary over time depending on the degree of fiscal stress in the local public sector.

The rest of the paper is organized as follows: Section 2 presents an intertemporal model of local government spending behavior, while Section 3 provides details about the Norwegian balanced-budget-rule and derives hypotheses regarding intertemporal spending behavior. Data and estimation methods are discussed in Section 4, and the estimation results are presented in Section 5. Finally, Section 6 summarizes the main findings of the paper.

2. Local government spending behavior in an intertemporal context

The point of departure is a community preference model (Wildasin, 1986, ch. 3) where the representative voter receives utility from current production of local public services and the current level of private consumption. Following Holtz-Eakin and Rosen (1994), the model is extended to a dynamic setting where the representative voter receives utility from current and future flow of local public services (*G*). At the beginning of period *t*, expected utility (V_t) is given by

$$V_t = E_t \sum_{j=0}^{\infty} \frac{1}{(1+\rho)^j} \frac{G_{t+j}^{1-\sigma}}{1-\sigma} \qquad (1)$$

where ρ denotes the rate of time preferences, $1/\sigma$ the intertemporal elasticity of substitution, and E_t expectations conditional on information available at the beginning of period *t*.

The utility function focuses on the consumption of local public services and leaves out private consumption. The justification for this formulation is that the Norwegian system of financing is highly centralized. Grants and taxes shared with the central government account for more than 80% of total revenue, and these revenue sources are under central government control. The opportunity to influence current revenues is limited to property tax and user charges. But since the property tax is of little importance (around 5% of tax revenues) and user charges are limited to cover costs, we make the simplifying assumption that the local governments face a fixed level of revenue in each period. This is in line with earlier Norwegian studies of local government expenditures, e.g. Borge and Rattsø (1995).[3] The intertemporal decision problem is then to find an optimal path for provision of local public services given expectations about future revenues.

As a point of departure, we assume that local governments have access to a perfect credit market where they can save and borrow at the same interest rate. Then the decision-making process may be described as maximization of V_t subject to the following constraints

$$W_{t+1} = (1 + r_t)W_t + R_t - G_t \tag{2}$$

$$\lim_{j \to \infty} E_t \left[\frac{W_{t+j}}{\prod_{i=t+1}^{t+j} (1 + r_i)} \right] = 0 \tag{3}$$

where W_t denotes net wealth at the beginning of period *t*, r_t the real interest rate on wealth carried from period *t*-1 to period *t*, and R_t local government revenue in period *t*. The unit cost of local public services is normalized to unity. Equation (2) describes how net wealth evolves over time, whereas equation (3) rules out perpetual debt financing. The information set at the beginning of period *t* includes current revenue (R_t) and the current real interest rate (r_t). The

[3] Dahlberg and Lindström (1998) formulate an intertemporal model with local tax discretion, but in the end they estimate the same equation as us.

dynamic budget constraint assumes that local governments can use financial markets to choose a time path for spending that deviates from the time path for revenues.

The optimal spending path can be described by a system of Euler equations:

$$E_{t+j}\left[\left(\frac{1+r_{t+j}}{1+\rho}\right)\left(\frac{G_{t+j+1}}{G_{t+j}}\right)^{-\sigma}\right]=1 \quad j=0,1,\ldots,\infty \tag{4}$$

By assuming joint lognormality in the real interest rate and spending (Hansen and Singleton, 1983), the Euler equation can be simplified to

$$E_{t-1}(\Delta \ln G_t)=\mu+\frac{1}{\sigma}E_{t-1}(r_t) \tag{5}$$

where μ is a constant. If the real interest rate is constant, equation (5) implies that (the logarithm of) local government spending follows a random walk with drift. No variables known at the beginning of period *t*-1 should have any predictive power for consecutive spending growth. A key aspect of the solution is that local government spending is determined by permanent resources (the present value of current and future revenue), the real interest rate, and time preferences. Expected fluctuations in current revenues will not show up in the spending path since local governments can use financial markets to smooth spending over time. On the other hand, an unexpected revenue change will lead to a revision of permanent resources and thereby affect the immediate spending growth.

Campbell and Mankiw (1990) extend the above model by assuming that a proportion (1-λ) of spending is determined by permanent resources, whereas a proportion λ is linked to current revenue (in the sense that $\Delta \ln G_t = \Delta \ln R_t$). The parameter λ may be interpreted as the proportion of local governments that behave myopically or the proportion of spending that is determined by current resources.[4] The so-called λ- model can be expressed as follows:

[4] Given the logarithmic formulation of the model, this interpretation only holds as an approximation.

$$E_{t-1}(\Delta \ln G_t) = (1-\lambda)\mu + \lambda E_{t-1}(\Delta R_t) + (1-\lambda)\frac{1}{\sigma} E_{t-1}(r_t) \qquad (6)$$

The λ- model has the advantage that it makes it possible not only to test whether spending behavior is consistent with rational forward looking behavior, but also to quantify the degree of departure from such behavior. The quantitative departure from rational forward looking behavior is larger in the case where λ is 0.8 compared to the case where it is 0.2. On the other hand, the λ-model does not specify why agents depart from rational forward looking behavior. A positive and significant λ is evidence of 'excess sensitivity', but we do not know whether agents are liquidity constrained (unable to smooth spending over time) or just myopic (behavior is not guided by an intertemporal utility function).

In most countries local governments face balanced budget rules (BBRs) that may affect their intertemporal spending behavior. BBRs may affect the ability to take advantage of financial markets to smooth spending over time, and as such they are important for the extent to which spending is determined by permanent resources. Moreover, since BBRs may have heterogeneous effects for different groups of local governments, they may help to identify whether departure from rational forward looking behavior is due to myopia or liquidity constraints. In the next section we discuss the Norwegian BBR and how it can be utilized in the empirical analysis.

3. The BBR and the ability to smooth spending over time

In general, local governments may face liquidity constraints of two reasons. First, they may meet credit market constraints in the same way as firms and households. Second, they may be liquidity constrained because of BBRs imposed by higher-level government. In Norway, credit market constraints are of little importance. The effective constraint is that the county governor must approve borrowing as part of the control of the budgets.[5] If borrowing is approved, local governments can easily find credit institutions willing to lend them money. Since local governments can not go bankrupt and are expected to be bailed out by the national

[5] The county governor is the central government's representative in the county. The description of the regulation of borrowing and control of budgets refers to the rules that applied during the period under study. From 2001 this control system has become more selective and only applies to local governments that have violated the BBR in recent years.

government in case of a severe financial crisis, loans to local governments are considered to have extremely low risk. We therefore concentrate on the BBR as the primary source of liquidity constraints.

The main requirement in the Norwegian BBR is operational budget balance.[6] In the budget, the net operating surplus must be non-negative, i.e. current revenues must be sufficient to cover current expenditures, interest payments and regular installment of debt. This means that loan financing of current expenditures is not allowed. Since the present analysis focuses on current expenditures, it is important to notice that it is possible to smooth current expenditures within the requirement of operational budget balance. First, the typical case is that local governments have net operating surpluses and that a substantial part of investments is financed by surpluses.[7] A local government that expects a temporary reduction in current revenues can therefore avoid a corresponding reduction in current expenditures by reducing the fraction of investments financed by a positive net operating surplus, and finance a larger fraction of investments by borrowing. This strategy obeys the BBR as long as the local government still runs a surplus. Second, it is possible to have a net operating deficit if it can be financed by specific rainy-day funds that are built up by past surpluses.

Finally, since the requirement of operational budgetary balance is imposed ex ante, current expenditures can be smoothed by having deficits ex post.[8] A net operating deficit is not a rare event, and in a typical year 15-20% of the local governments run deficits. Although deficits are quite common, we can not immediately conclude that they are used to smooth expenditures in response to expected revenue decreases. In order to run a deficit as a response to an expected revenue decrease, the submitted budget must be balanced by gimmicking, i.e. by deliberate overestimation of revenues and/ or underestimation of expenditures. On the other hand, the observed deficits could be caused by revenue- or expenditure shocks during the fiscal year. Rattsø (2004) provide evidence on the importance of fiscal shocks, but it can not be ruled out that the observed deficits to some extent reflect gimmicking to smooth consumption.

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[6] We refer to Borge and Rattsø (2002b) for a more detailed discussion of the regulations of budgets and borrowing in the Norwegian institutional context.

[7] As an average (over time and across local governments) nearly 50% of investments are financed by positive net operating surpluses.

[8] Ex post deficits must be "repaid" within 2 years, i.e. the surpluses in the following two years must in aggregate be at least as large as the deficit.

The above discussion shows that it is possible for Norwegian local governments to take advantage of financial markets to smooth current expenditures, and it is therefore highly relevant to investigate whether their intertemporal spending behavior is consistent with rational forward looking behavior. Moreover, the ability to smooth current expenditures may vary between local governments depending on their fiscal conditions. The first strategy to smooth current expenditures, increasing the fraction of investments financed by borrowing, is only available for local governments that have a surplus at the outset. And the second strategy, use of rainy-day funds, assumes that funds are built up in the first place. It is therefore reasonable to expect that local governments with good fiscal conditions are less constrained by the BBR than local governments with weaker fiscal conditions.

A main contribution by our empirical analysis is that we investigate whether local governments with different fiscal conditions have different intertemporal spending behavior. We follow the empirical literature that has investigated whether private households are liquidity constrained (e.g. Zeldes, 1989; Runkle, 1991; Shea, 1995), and split the sample according to fiscal conditions. [9] As indicators of fiscal conditions we use net operating surplus, available funds, and revenues. The general idea is that the BBR to a larger extent will impose liquidity constraints on local governments with weak fiscal conditions compared to local governments with good fiscal conditions. A negative relationship between the estimate of λ and fiscal conditions can therefore be taken as evidence that departure from rational forward looking behavior to some extent can be explained by the BBR. However, a negative relationship between λ and fiscal conditions can not rule out myopia if λ is significantly positive also for local governments with good fiscal conditions. Myopia may only be ruled out if the spending behavior of local governments with the best fiscal conditions is fully consistent with rational forward looking behavior, i.e. if we can not reject the hypothesis that $\lambda=0$ for this group.

[9] The studies of private households split the sample according to wealth. The idea is that if liquidity constraints are important, the permanent-income hypothesis should be rejected for low wealth households, but not for high-wealth households. The results are mixed. The findings of Zeldes (1989) are consistent with liquidity constraints, whereas Runkle (1991) can not reject the permanent income hypothesis for neither high nor low-wealth households. Shea (1995) rejects the permanent-income hypothesis for both types of households, and the results are inconsistent with liquidity constraints.

However, even if we fail to reject the permanent income hypothesis for local governments with the best fiscal conditions, the above procedure is no more than an indirect test of myopia. A more direct test would be to split the sample according to some variable capturing myopia, and in the empirical analysis we will use the degree of party fragmentation as a possible indicator. Recent studies have shown that fragmentation is associated with weak fiscal performance in terms of large deficits, which may reflect short sighted behavior. We refer to Borge (2005) and Hagen and Vabo (2005) for evidence from Norwegian local governments and to Ashworth et al. (2005) for a recent review of international studies.

4. Data and econometric analysis

The econometric analysis is based on the empirical counterpart of equation (6)

$$\Delta \ln G_{it} = \beta_t + \lambda \Delta \ln R_{it} + \gamma \Delta Z_{it} + \alpha_i + \varepsilon_{it} \qquad (7)$$

where G_{it} and R_{it} are respectively spending and revenue in local government *i* in year *t*. The year fixed effects β_t capture the real interest rate and other macroeconomic variables that vary over time and are common to all local governments. *Z* is a vector of control variables that may affect the marginal utility of local public spending. The age composition of the population and the local unemployment rate are included in *Z*. Finally, α_i is a community specific term.

The model is estimated on a balanced panel data set of Norwegian local governments. The data set includes 411 local governments during the period 1980-1996.[10] Spending and revenue data are obtained from Statistics Norway. Since the discussion in Section 2 assumes that *G* is nondurable spending, the preferred spending measure would be local government spending on nondurable goods and services. Unfortunately, data on nondurable spending is not available in any statistics and we choose to rely on current expenditures, which includes wages and purchases of goods and services for non-investment purposes. A potential problem with this

[10] In 1996 the total number of local government is 435. Local governments affected by consolidations during the period under study are excluded. A few local governments with unreasonable high or low spending or revenue growth (in at least one year) were also excluded from the sample.

approach is that the spending measure may include some spending on durables.[11] The revenue measure includes local taxes, user charges, grants from the central government, and interest. Spending and revenue are measured per capita and deflated by the national account's price index for local government consumption.

Table 1 about here

Table 1 displays the development of local government spending and revenue during the period under study. There are two breaks in the series. First, the sharp increase in spending and revenue from 1987 to 1988 is due to a shift in the functional responsibility, in which local governments became responsible for some health care institutions that were earlier county responsibilities. Second, the figures underestimate the actual spending and revenue growth in 1991 due to new accounting standards. Some preliminary analyses indicated that these breaks were not sufficiently captured by the year fixed effects, and it was necessary to allow separate λ's for both 1988 and 1991. There has been a steady growth in spending and revenues during the period under study. For the period as a whole the growth has been reasonably balanced. The average annual growth rates are respectively 2.9% and 3.0% for spending and revenue.[12]

Two different formulations of the model are estimated. First, since equation (7) is in first difference, it can be argued that the community specific effects already are taken care of and can be set to zero. The simplest way to proceed would then be to estimate equation (7) with OLS on the pooled data set. However, OLS is likely to produce biased estimates even in the absence of community specific terms. The reason is that the error term (ε_{it}) can be interpreted as the revision of future resources between period *t*-1 and period *t*. And if the revision of future resources is linked to the growth of current resources ($\Delta \ln R_{it}$), OLS will be biased. We rely on the generalized method of moments (GMM) as developed by Arellano and Bond (1991). Lagged values of spending and revenue dated *t*-2 and back are valid instruments if the error term ε_{it} is serially uncorrelated.

[11] Dahlberg and Lindström (1998) face the same problem as us, and use spending on personnel as a proxy for nondurable spending. The potential problem with their approach is that the spending measure will be sensitive to how local government production is organized. Spending on personnel can be separated out if local government employees produce a service, but not when the same service is contracted out to a private firm.

[12] The years 1988 and 1991 are not included in these calculations.

Although equation (7) is in first difference, heterogeneity in time preferences (ρ) across local governments is an argument for including community specific effects. In order to allow for different time preferences, we remove the community specific effect by differentiating equation (7):

$$\Delta^2 \ln G_{it} = \Delta\beta_t + \lambda\Delta^2 \ln R_{it} + \gamma\Delta^2 Z_{it} + \Delta\varepsilon_{it} \tag{8}$$

Since correlation between ε_{it} and $\Delta \ln R_{it}$ most likely will carry over to $\Delta\varepsilon_{it}$ and $\Delta^2 \ln R_{it}$, we also estimate the second difference by GMM.

The GMM procedure provides one-step and two-step estimates. The two-step procedure is efficient in the presence of heteroskedasticity, but as shown by Arrelano and Bond (1991), the estimated standard errors tend to be downward biased in finite samples. Instead we report first-step estimates and standard errors that are corrected for heteroskedasticity. When it comes to the Sargan test for the joint hypothesis of valid instruments and correct model specification, we use the two-step version since the one-step version is not robust to heteroskedasticity. Lagged values of spending and revenue dated *t*-2 and back are valid instruments if ε_{it} is serially uncorrelated. However, some preliminary investigation and testing showed that lagged values of spending as well as revenue dated *t*-2 did not perform well as instruments. The GMM estimates presented in the preceding sections are obtained using revenue dated *t*-3 to *t*-7 as instruments.

5. Estimation results

The estimation results for the pooled sample are displayed in Table 2, where the left panel shows the results for first difference and the right panel the results for the second difference. In both cases we report three sets of estimates, i.e. OLS, GMM, and GMM with age composition and unemployment rate as controls. We observe that the estimate of λ varies more between first and second difference than between the three estimation methods. The first difference estimates indicate that up to 40% or less of local public spending is guided by permanent resources, compared to around 65% for the second difference estimates. All equations document the importance of controlling for the shift in functional responsibility in 1988 and the change in the accounting system from 1991. Both shifts induced a higher correlation between spending and revenue growth, and would have led to overestimation of λ if not controlled for. Unemployment and share of elderly have a significant impact in the first difference specification, but the estimate of λ is quite robust to whether the additional controls are included or not.

Table 2 about here

The specification tests indicate that the results from the pooled sample should be interpreted with caution. The hypothesis of valid instruments and correct model specification is clearly rejected by the Sargan test, both for the first and the second difference. However, the tests for auto correlation provide some support for the second difference specification over first difference. The presence of first order autocorrelation, but no second order, in the second difference specification is consistent with a serially uncorrelated error term and community specific effects in equation (7). The first and second order autocorrelation in the first difference specification probably reflect that (the relevant) community specific effects are not taken into account.

Heterogeneous spending behavior is a possible reason for the rejections of valid instruments and correct model specification. As discussed in Section 3, the extent to which local governments are liquidity constrained may depend on their fiscal conditions, and the degree of myopia may be related to the party fragmentation of the local council. In Tables 3-6 we have split the sample according net operating surplus, funds, revenues, and party fragmentation. The split is based on average values during the period under study (see the Appendix for details), and for each group we have a balanced panel of 137 local governments. We use GMM without additional controls and report results for both first and second difference. In general the hypothesis of valid instruments and correct model specification can not be rejected for the second difference specification on the split samples.[13] And again, the autocorrelation tests are favorable to the second difference specification. In the following

[13] Valid instruments and correct model specification is not rejected in 11 of 12 cases at the 5% level of significance, and in 10 of 12 cases at the 10% level. Dahlberg and Lindström (1998) do also reject valid instruments and correct model specification for their pooled sample, but not on split samples.

discussion we will focus on the second difference estimates, although all qualitative conclusions also apply to the first difference estimates.[14]

Table 3 about here

In Table 3 the sample is spilt by net operating surplus per capita. The estimate of λ is 0.04 for the high surplus group and nearly 0.50 for the medium and low surplus groups. Moreover, while perfect forward looking behavior is clearly rejected for the two latter groups, it can not be rejected for the high surplus group.

Table 4 about here

In Table 4 the sample is split by funds per capita. The funds of Norwegian local governments can broadly be separated into two groups; investment funds that are earmarked for investment purposes, and non-earmarked funds that can be used to finance current expenditures as well as investments. Since both types of funds facilitate consumption smoothing (see the discussion in Section 3), the sample split is based on the total amount of funds.[15] The results are similar to those in Table 3 in the sense that perfect forward looking behavior is rejected for local governments with low or medium level of funds, but not for the group with the highest level of funds. For local governments with low and medium level of funds the quantitative departure from perfect forward looking behavior is substantial, only 40-50% of spending is determined by permanent resources.

Table 5 about here

Table 5 displays the results when the sample is split by per capita revenue. It appears that rational forward looking behavior is clearly rejected for all revenue groups. And although the point estimate of λ is lowest for the high revenue group, there is no simple monotonic relationship between the level of revenue and departure from forward looking behavior (in the

[14] The direction of the difference between groups of local governments is robust to whether the model is estimated on first or second difference. As for the pooled sample, the main difference is that spending behavior appears to be less forward looking in the first difference specification.
[15] Unfortunately, reliable data on funds are not available prior to 1991, and therefore the sample periods are shorter in Table 4 than in the other tables.

second difference case). This is a bit surprising since revenues are positively correlated with the two other indicators of fiscal conditions. However, surplus and funds correlates more strongly with each other than with the level of revenue.[16]

We have so far split the sample according to fiscal conditions, and the splits with respect to net operating surplus and funds are consistent with the hypothesis that departure from forward looking behavior is related to liquidity constraints imposed by BBRs. Moreover, since perfect forward looking behavior can not be rejected for the high surplus and high fund groups, it may be argued that all departure is explained by liquidity constraints and that myopia plays no role at all. This indirect way of ruling out myopia is not fully satisfactory, and a more direct test would be to split the sample according to some criteria that captures myopic behavior. Myopia is obviously harder to operationalize than liquidity constraints, but we suggest that the degree of party fragmentation in the local council is a possible indicator. We use the familiar Herfindahl-index as indicator of (the inverse of) party fragmentation. The Herfindahl-index is calculated as:

$$HERF = \sum_{p=1}^{P} SH_p^2 , \tag{9}$$

where SH_p is the share of seats in the local council held by party p and P the total number of parties in the council. The index can be interpreted as the probability that two randomly drawn members of the council belong to the same party. Alternatively, we can say that it captures the number of parties in the local council and the distribution of seats among them. The value of the index is reduced (fragmentation increases) when the number of parties increases and when the seats are more equally divided among a given number of parties.

Table 6 about here

Table 6 shows the results when the sample is split by the Herfindahl-index. Perfect forward looking behavior is clearly rejected for the two groups with medium and low values of the Herfindahl-index, and the estimates indicate that around 50% of their spending behavior is determined by permanent resources. On the other hand, the behavior of the least fragmented

[16] The correlations between the four split criteria are displayed in Table A1 in the appendix.

local governments (high Herfindahl-index) is substantially more forward looking. The point estimate for this group indicates that nearly 90% of spending is determined by permanent resources, and perfect forward looking behavior can not be rejected. The estimated relationship between λ and the Herfindahl-index is favorable to the understanding that the Herfindahl-index captures short sighted behavior, and also that the observed departure from forward looking behavior to some extent reflects myopia.

A possible objection to the above interpretation is that the relationship between λ and party fragmentation may reflect that both are related to fiscal conditions. Table A1 in the appendix provides some support for this, but the correlations between fiscal conditions and fragmentation are weak compared to the correlations between the three indicators of fiscal conditions. We have investigated the issue further by splitting the sample according to both net operating surplus and party fragmentation. In order to avoid a sharp increase in the number of groups, we use a 4-way classification that is obtained by first merging the medium and low groups in Tables 3 and 6.[17] The estimations show that fragmentation is of importance also after net operating surplus is controlled for. Among the local governments with medium or low net operating surplus, the estimated λ is substantially lower for the subgroup with the least fragmented council.

6. Concluding remarks

The purpose of this paper was to analyze the intertemporal spending behavior of Norwegian local governments with particular attention to liquidity constraints imposed by BBRs. The analyses were based on large panel data set of Norwegian local governments over the period 1983-1996, and were carried out within the context of the so-called 'λ- model' developed by Campbell and Mankiw (1990). A first finding is that on average, local government spending behavior is neither perfectly forward looking nor fully myopic. Both the pooled estimates and the average of the estimates on split samples indicate that around 65% of local government spending is determined by permanent resources. The intertemporal spending behavior of Norwegian local governments seems to be somewhere in between their American and Swedish counterparts. Future research should engage in comparative studies of BBRs, liquidity constraints, and local government spending behavior.

[17] In both cases the two groups appear to be quite homogeneous in terms of λ.

The main contribution by the paper is that we investigate whether departure from rational forward looking behavior reflects liquidity constraints or myopia. This is done by splitting the sample according to fiscal conditions and the party fragmentation of the local council. The splits by fiscal conditions demonstrate that rational forward looking behavior can not be rejected for the local governments with the best fiscal conditions, while such behavior is clearly rejected for the groups with weaker fiscal conditions. A high degree of party fragmentation in the local council is associated with less forward looking behavior. Our interpretation of these findings is that the observed departure from forward looking behavior reflects both liquidity constraints imposed by BBRs and myopic behavior.

In Norway, central regulation of local government revenues is part of the general fiscal policy. Our findings question the effectiveness of this policy in terms of affecting aggregate demand. Given that only 35% of spending is determined by current resources, temporary changes in revenues have limited impact on local spending. And revenue reductions may be particularly ineffective in situations where the fiscal conditions are good.

Appendix

The sample is split according to the following index

$$I_i = \sum_{t=1981}^{1996} x_{it} \tag{A1}$$

where x is the splitting variable. When the sample is split by revenues, $x_{it} = \frac{R_{it}}{\bar{R}_t}$ where $\bar{R}_t$ is the (weighted) national average in year *t*. When the sample is split by net operating surplus (*NOS*), $x_{it} = \frac{NOS_{it}}{R_{it}}$. When the sample is split by funds (*F*), $x_{it} = \frac{F_{it}}{R_{it}}$ and *t* starts at 1992. Finally, when the sample is split by fragmentation, $x_{it} = HERF_{it}$. In each case the 411 local governments are divided into 3 equally sized groups with low, medium and high values of the index. The correlations between the four splitting criteria are displayed in Table A1.

Table A1 about here

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Table 1

Real spending and revenue growth, 1981-1996

Year	Spending growth		Revenue growth	
	Average (%)	St.dev.	Average (%)	St.dev.
1981	3.1	5.4	6.0	5.6
1982	4.5	5.2	3.6	6.5
1983	3.9	4.8	2.3	5.5
1984	3.8	4.9	3.7	4.9
1985	4.6	4.8	7.8	5.1
1986	2.1	4.4	1.0	5.3
1987	3.4	4.7	0.9	4.8
1988	10.6	10.3	13.0	10.4
1989	3.4	4.9	4.6	5.6
1990	3.6	4.3	3.0	4.9
1991	1.1	9.2	2.0	9.3
1992	5.1	4.0	3.8	4.0
1993	2.1	3.7	1.8	4.2
1994	2.1	3.9	3.6	4.6
1995	1.1	3.5	-1.3	3.7
1996	1.8	3.3	1.2	4.2

Table 2
Estimation results for the pooled sample

	First difference			Second difference		
	I	II	III	IV	V	VI
λ	0.471	0.556	0.581	0.373	0.371	0.350
	(0.021)	(0.078)	(0.079)	(0.025)	(0.088)	(0.089)
λ_{88}	0.387	0.091	0.089	0.477	0.239	0.264
	(0.034)	(0.118)	(0.115)	(0.042)	(0.125)	(0.120)
λ_{91}	0.253	0.136	0.119	0.328	0.344	0.372
	(0.067)	(0.140)	(0.138)	(0.077)	(0.152)	(0.148)
Share of population			-0.068			-0.072
0-6 years			(0.043)			(0.210)
Share of population			0.044			-0.157
7-15 years			(0.033)			(0.158)
Share of population			0.087			-0.065
80 years and above			(0.027)			(0.191)
Unemployment rate			-0.072			-0.130
			(0.038)			(0.129)
Estimation period	1983-96	1983-96	1983-96	1984-96	1984-96	1984-96
Estimation method	OLS	GMM	GMM	OLS	GMM	GMM
Sargan (two-step)		112/57	117/57		111/57	113/57
P-value (two-step)		0.000	0.000		0.000	0.000
m_1	-7.905	-8.739	-9.103	-12.817	-11.853	-11.767
m_2	-5.820	-6.184	-6.441	-0.448	-0.002	-0.002

Note: Year fixed effects are included in all equations. The Sargan test is a joint test of valid instruments and correct model specification. The figures reported are respectively the test value and the degrees of freedom in the χ^2 distribution. m_1 and m_2 are tests for first and second order autocorrelation, and the test statistics follow a standard normal distribution. When the model is estimated by GMM, lagged values of revenue dated *t*-3 to *t*-7 are used as instruments. Standard errors in parentheses.

Table 3
Sample split by net operating surplus

	First difference			Second difference		
	High	Medium	Low	High	Medium	Low
λ	0.134	0.526	0.579	0.042	0.485	0.487
	(0.093)	(0.105)	(0.071)	(0.082)	(0.119)	(0.077)
Estimation period	1983-96	1983-96	1983-96	1984-96	1984-96	1984-96
Sargan (two-step)	67/57	75/57	69/57	61/56	68/56	64/56
P-value (two-step)	0.170	0.059	0.131	0.316	0.126	0.225
m_1	-2.739	-6.227	-3.584	-6.233	-8.549	-8.116
m_2	-2.257	-4.621	-3.137	0.226	-0.472	0.238

Note: See Table 2. Separate λ 's for 1998 and 1991 are allowed.

Table 4
Sample split by funds

	First difference			Second difference		
	High	Medium	Low	High	Medium	Low
λ	0.172	0.592	0.723	-0.039	0.485	0.595
	(0.135)	(0.094)	(0.111)	(0.135)	(0.142)	(0.167)
Estimation period	1992-96	1992-96	1992-96	1993-96	1993-96	1993-96
Sargan (two-step)	25/14	14/14	10/14	14/13	10/13	11/13
P-value (two-step)	0.031	0.422	0.750	0.403	0.700	0.625
m_1	-3.122	-3.480	-3.917	-5.215	-6.066	-5.561
m_2	-1.735	-2.860	-3.390	-0.032	-1.647	-0.049

Note: See Table 2.

Table 5
Sample split by revenues

	First difference			Second difference		
	High	Medium	Low	High	Medium	Low
λ	0.421	0.572	0.665	0.308	0.492	0.380
	(0.084)	(0.083)	(0.079)	(0.100)	(0.092)	(0.086)
Estimation period	1983-96	1983-96	1983-96	1984-96	1984-96	1984-96
Estimation method	GMM	GMM	GMM	GMM	GMM	GMM
Sargan (two-step)	57/57	61/57	85/57	60/56	53/56	71/56
P-value (two-step)	0.469	0.344	0.010	0.331	0.608	0.083
m_1	-4.913	-6.708	-5.840	-7.213	-8.947	-8.561
m_2	-2.971	-4.240	-5.072	0.433	-0.681	-0.667

Note: See Table 2. Separate λ 's for 1998 and 1991 are allowed.

Table 6
Sample split by (inverse) party fragmentation

	First difference			Second-difference		
	High	Medium	Low	High	Medium	Low
λ	0.222	0.711	0.540	0.116	0.524	0.498
	(0.119)	(0.091)	(0.168)	(0.099)	(0.099)	(0.153)
Estimation period	1983-96	1983-96	1983-96	1984-96	1984-96	1984-96
Estimation method	GMM	GMM	GMM	GMM	GMM	GMM
Sargan (two-step)	71/57	59/57	88/57	62/56	62/56	75/56
P-value (two-step)	0.104	0.388	0.006	0.275	0.266	0.049
m_1	-3.400	-6.749	-5.368	-7.374	-8.092	-7.210
m_2	-2.550	-4.744	-3.801	0.575	-0.261	0.420

Note: See Table 2. Separate λ 's for 1998 and 1991 are allowed. High, medium, and low refer to the value of the Herfindahl-index.

Table A1

Correlations between the split criteria

	Revenues	Net operating surplus	Funds	Herfindahl-index
Revenues	1.00			
Net operating surplus	0.50	1.00		
Funds	0.65	0.80	1.00	
Herfindahl-index	0.30	0.11	0.20	1.00