

Fiscal Adjustment under Centralized Federalism: Empirical Evaluation of the Response to Budgetary Shocks

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Abstract

Fiscal federalism implies a challenge of holding fiscal discipline at the local level. Recent analyses of fiscal adjustment have addressed the design of fiscal and political institutions for the US states, and have shown how tax limits and anti-deficit rules strengthen immediate shock adjustment. Here we extend the evidence to the case of centralized financing in Norway. In this system central government takes larger responsibility in smoothing decentralized government revenue, but at the same time the locals are more vulnerable to shocks due to limited room to maneuver. The empirical analysis of responses to budgetary shocks shows that local public investment is the main shock absorber in this system and that investments are procyclical. Local fiscal crisis is avoided, but decentralized government is destabilizing.

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1. Introduction

Fiscal federalism represents a challenge to fiscal discipline. Most countries choose to decentralize important public sector responsibilities and also struggle to control spending and deficit in decentralized government. While decentralization gains can be made on the spending side, it seems harder to decentralize revenue instruments and secure local accountability. To handle the spending and deficit bias implied, most countries establish restrictions to fiscal balance and/or borrowing. Lessons of fiscal adjustment under different institutional constraints are of interest both for country reform and for the design of new fiscal federal systems as in the European Union.

The theory of fiscal federalism does not indicate problems of fiscal discipline. The workhorse Musgrave-Oates-Tiebout model (Musgrave, 1959, Oates, 1972, Tiebout, 1956) is based on four key assumptions: Local public goods, benefit taxation, mobility, and no spillovers. Benefit taxes assures local accountability, and there is no case for central government financial controls. However, many fiscal analysts are worried about 'the dangers of decentralization' (Prud'homme, 1995). Fiscal indiscipline may result from vertical fiscal imbalance, incentives for bailout, and intertemporal behavior (Inman, 2003).

The concern for excessive public spending and deficits has motivated empirical research on fiscal adjustment. Roubini and Sachs (1989) started a series of studies of how economic and political institutions can account for differences in patterns of public sector spending and deficit across OECD-countries. In Europe, Von Hagen (1991) and Von Hagen and Hagen (1994) innovated empirical studies of the fiscal consequences of budget institutions within the EU. The approach includes an evaluation of alternative institutions such as balanced budget rules, nominal fiscal targets, and centralized budget processes. The particular issues related to fiscal federalism have been addressed in econometric analysis of the fiscal performance of the US states. Key contributions are Alt and Lowry (1994), Bayoumi and Eichengreen (1995), Bohn and Inman (1996), Holtz-Eakin (1988) and Poterba (1994). The studies generally conclude that restrictions may be helpful to secure fiscal discipline, but that the design of the restrictions and the surrounding fiscal institutions are important. Von Hagen and Eichengreen (1996) show that the incidence of balanced budget rules at the subnational

level is largely explained by the extent to which local governments own their own tax base.

Beyond the econometric analyses of the US states, the existing literature offers descriptive case studies of country institutions and experiences. They show that countries with decentralized government have put restrictions on the locals, although in various forms and strength. Recent country studies of constraints and their performance are presented by Ter-Minessian (1997) and Dafflon (2002). Country studies of bailout mechanisms and experiences are collected in Fernandez-Arias et al. (2003) and Rodden et al. (2003). The broad conclusion is that hierarchical controls help explain how fiscal crisis is avoided, but there are also stories of fiscal crisis generated by decentralized government, notably in Argentina and Brazil.

This article offers an econometric investigation of the fiscal adjustments in local governments in Norway and represents a comparison of the shock reactions in the US with the performance of the more centralized model. The central government arranges the financing of the local governments and with limited local discretion. Decentralized spending is financed by grants and regulated income taxes, and the country fits into the pattern described by Von Hagen and Eichengreen (1996) by having fiscal restrictions. Economic shocks are basically handled in the national fiscal policy, and revenues for the locals are smoothed out. The central government is concerned about the distribution between the locals, and the mix between grants and taxes is changed when economic cycles change the distribution via income tax revenues. In addition, the central government corrects for the destabilizing role of the balanced budgets in the local public sector, a mechanism that was emphasized in Johansen's (1965, ch. VIII) influential text 'Public Economics'.

The centralized model is assumed to reduce the shocks experienced at the local level, but at the same time reduces the room to maneuver when shocks are experienced. The local discretion to influence revenues is limited, and the spending side is inflexible downwards in the short run due to mandating and wage contracts. When the central government fails to shelter a local government from negative shock, immediate fiscal imbalance is expected, since local governments lack instruments to correct for the shock. At the same time, a balanced budget rule is imposed, whereby current revenue must match current spending

including interest payments, although an actual deficit can be carried over for two years. The US studies find that both tax limits and anti-deficit rules influence state behavior – tax limits reduce tax response to deficits and strong anti-deficit rules increase spending response. The most regulated US cases have similar constraints as the Norwegian local governments, but more responsive current spending is hardly expected in Norway. This has motivated an expansion of the menu of adjustment to include the investment level as a key response variable in this analysis. Investment as an important part of fiscal adjustment is recognized in the applied macroeconomics literature. Roubini and Sachs (1989, p. 108) find that in periods of fiscal consolidation ‘capital expenditures are the first to be reduced, often drastically’ in OECD countries. Alesina and Perotti (1995) similarly conclude that during tight fiscal policies ‘cuts in expenditure fall primarily on public investment’.

Shock adjustment must be understood in an intertemporal context, but there is no established workhorse model of decentralized government intertemporal decision making. In an early contribution, Gramlich (1978, 1991) applies a simple model based on a community preference function including private consumption, local public consumption and stocks of balances. Given the proper budget constraint, demand functions for current expenditures and revenues and stocks of balances are derived. Our analysis follows this fiscal demand approach, and reduced form revenue, expenditure and investment functions are estimated dependent on variables representing the budget constraint, demography, politics and shock. The alternative is separate and different revenue and spending functions as suggested by the tax smoothing analysis of Alt and Lowry (1994), but we prefer demand functions derived from a common decision model. In a related study of Danish local governments, Rattsø and Tovmo (2002) develop a simple two-period model of shock adjustment. Buettner and Wildasin (2002) outline an alternative vector autoregressive system for the analysis of impulse-response functions using a panel of more than 1000 US municipalities.

The empirical analysis is based on unique budget data for 25 local governments in a county in Norway during 1983-1993 and has required access to 275 budgets. The county Sør-Trøndelag, where budgets have been available, is fairly representative for Norway both in terms of industrial structure (and therefore economic shocks) and types of local governments (population size, political leaderships etc.). The data allow for a measure of budgetary shocks

defined as actual deviations from approved budgets. Local governments must handle deviations from budgets and we analyze systematic patterns in this response. The econometric analysis of this panel allows for a more general dynamic specification than in the US studies, and the error-correction model applied separates between short run and long run effects.

The shocks are defined and described in section 2, and the local effects of the centralized system of fiscal control are discussed. The understanding of the fiscal adjustment and the econometric formulation of the analysis is outlined in section 3. The estimated shock responses are presented in section 4, and shows how budgetary shocks account for adjustments in current spending and revenue and in investment. Asymmetric effects of positive and negative shocks and interaction effects of shocks and political characteristics are investigated. The long run determinants of fiscal balance are derived in section 5. Concluding remarks are summarized in section 6.

2. Budgetary shocks

Under centralized financing, the shocks affecting local governments are to a large extent the result of central government policy. Local governments develop their budget for next year during the fall based on forecasts of the income growth made by the central government and announced plans for grants and income tax regulation (maximum tax rates). The budgets of the locals are approved by the central government dependent on these economic conditions. There are two sources of shock in this budgetary design. First, income and wage growth is experienced during the year and may deviate from the budget associated with cyclical factors. In fact, and as will come clear below, the central government tends to underpredict income and wage growth, and consequently local governments underbudget revenues and expenditures. Although the underprediction looks systematic at the national level, it will vary between the locals dependent of local income and wage growth. Second, the parliament determines grants and taxes at the end of the year, which may differ from the announced plans, and the volume and distribution of grants may be changed during the year. In particular the central government is concerned about the distribution between local governments and may change the division between grants and taxes to compensate

distributional effects of cycles.

Budgetary shocks related to current revenues and expenditures are identified separately, and are defined as the gap between actual current revenue and expenditure per capita (REV and EXP) and budgeted current revenue and expenditure per capita (REVB and EXPB). The budgeted values refer to the official budget decided and approved before the start of the fiscal year. The revenue shock in local government i , year t is defined as:

$$\text{REVSHOCK}_{it} = \text{REV}_{it} - \text{REVB}_{it}$$

A positive revenue shock implies that the actual ex post current revenues are larger than in the official budget of the fiscal year. The data include 25 local governments in a county in Norway during 1983-1993. In the descriptive Table 1, the revenue shocks are measured as shares of current revenue, and the shares have been positive and fairly stable at an average of about 6-7 %. Local governments consistently underpredict current revenue, and only 9 of the 275 revenue shocks are negative. The stability of the average revenue shock over time is remarkable given the economic fluctuations experienced. While the average has been stable, the individual municipalities have experienced different and varying shocks over time.

Similar to the revenue side, expenditure shock is defined as:

$$\text{EXPSHOCK}_{it} = \text{EXP}_{it} - \text{EXPB}_{it}$$

The expenditure shock on average is positive (except 1984) and on a rising trend according to Table 1, reaching 6 % of current revenue and above. The standard deviation is about the size of the average. In 233 cases of the 250 studied, local governments underestimate their expenditures.

The overall positive revenue and expenditure shocks, consistent underprediction of revenues and expenditures, need an explanation. The background is conservative central government forecasting of nominal income and wage growth. Since the predictions of the national budget form the background of the annual wage negotiations, the central government presents

conservative estimates of next years nominal wage growth. The wage estimates feed into the predictions of the nominal income growth. When local governments base their budgets on the central government forecasts, they tend to underestimate both income tax revenue and wage expenditure.

The combined revenue and expenditure shocks add up to a current surplus shock :

$$\begin{aligned} \text{SURSHOCK}_{it} &= \text{REVSHOCK}_{it} - \text{EXPSHOCK}_{it} \\ &= (\text{REV}_{it} - \text{EXP}_{it}) - (\text{REVB}_{it} - \text{EXPB}_{it}) \end{aligned}$$

Since both revenue shocks and expenditure shocks are positive on average, they tend to counterbalance each other, and the average ‘net’ surplus shocks are small. While the average shock is less than 2% of current revenues, standard deviation is large (about 6%), and there is some cyclical pattern in the shocks.

During the period investigated Norway experienced a boom during 1984-86 and then a downswing lasting till 1993. The unemployment rate reached a low 1.7% in 1987 and drifted up to above 4 % in 1993. The numbers are low by any standard, but still represent significant fluctuations of the macro economy. Such fluctuations easily are transmitted into pro-cyclical income and expenditure growth in local governments. The background data of revenue and expenditure growth documented in appendix Table 1 show that the central government has been successful in insulating the local public sector from the fluctuations. The average shocks are positive and in the order of 4-6% of current revenue in the boom years 1984-86, while they turn small and even negative in the recession during 1992-93. The central government is generally able to smooth current revenues, but still the surplus shocks, the deviations from the budgets, reflect the underlying cyclical conditions. Overall the revenue shocks dominate, and the data contain 195 positive surplus shocks and 80 negative.

Table 1 – Local government shocks and deficits

When the budgeted current revenues and expenditures are in balance, the minimum requirement regulated by law, the actual surpluses are equal to the surplus shocks. But they

are not. On average, the budgeted current surplus is always positive and contributes to investment financing. The actual current surplus (SUR) on average is about 1/2 the volume of investment. Only 8 out of 275 observations show current deficits. There is no strong business cycle pattern in the actual deficits. But the current surplus has been gradually declining over time. The gap between the surplus shock and the surplus in Table 1 has been about 5% of current revenues, reflecting the fact that the local governments have budgeted a steady current surplus on average over the period. Accordingly, the actual surplus has moved with the surplus shock and has a declining trend. The declining surplus shocks are associated with the rising expenditure shocks.

The investment (INV) share has been about 15-20 % of current revenues on average. The investment series shows large shifts from year to year, even in the averages. Rattsø (1999) analyzes how local public investment in this period is part of a long time trend of growth slowdown and stagnation. The trends and the fluctuations of investments and surpluses add up to the time pattern of local government contribution to national savings (SAV). The savings contribution has been negative on average, implying loan financing of investment, and the drop in current surpluses explains a rising (negative) savings share of revenue. Only low investment in the last part of the period helps modify the absorption of savings from the rest of the economy.

3. Econometric modeling of fiscal adjustment

Local governments must adjust to the shocks, the deviations from their approved budgets. As shown above, the budgetary shocks vary and can be rather large. They represent unexpected current surplus/ deficit and are clearly temporary. While Poterba (1994) was able to investigate unexpected shocks, he could not separate between temporary and permanent shocks. In our data, permanent changes in central government grants and regulated income taxes and in local economic conditions will be taken into account when budgets are produced and will not show up as deviations from budgets.

When they experience a temporary shock, local governments can adjust current revenue and expenditure, adjust investment expenditure, and change stocks of balances (funds or loans).

We concentrate on the consequences for current revenue and expenditure and investment expenditure below, and the residual non-adjustment will necessarily affect funds and/or loans. We study the fiscal adjustments in the period following the shock. The balanced budget rule encourages local governments to raise revenue and/or cut expenditure immediately in the case of an unexpected deficit. In the case of an unexpected surplus, the balanced budget rule will not be binding. Asymmetries in the adjustment to positive and negative shocks may be the result of budget regulations.

The background theoretical understanding of the fiscal adjustment is the standard demand model of public finance. As mentioned in the introduction, no workhorse intertemporal fiscal decision model exists, and we will only motivate our estimated relations with the setup applied by Gramlich (1978, 1991). We assume that investment and current revenue and expenditure are determined by exogenous revenue (grants and regulated taxes), tax base, demography and politics. A stable community preference function is assumed to guide the allocation between local public services and private consumption. Political characteristics, socialist orientation and party fragmentation of the local councils, influence the preferences together with demographic factors (notably the age composition of the population). A production function for local public services links investment to service production.

The econometric formulation assumes an error correction model that allows for a separation between temporary and permanent effects. The implementation of the desired allocation is influenced by the surplus shock (SURSHOCK). Adjustment inertia is allowed for by including lagged dependent variables. Symmetry in the response to surplus shocks is investigated by separating between positive and negative surplus shocks.

The fiscal adjustments on the revenue side are constrained. About 80% of revenues are arranged by the central government. They come as regulated income tax revenue sharing and lump sum grants from the central government (EXOREV). A separation of tax revenue sharing and grants has little meaning, since the central government balances the two as part of the business cycle and equalization policy. The local discretion and the marginal funds are related to user charges and a property tax. To investigate possible tax base and business cycle factors, we have included the local unemployment rate (UNEMP). Adjustments to the stock

of debt are linked to net interest payments (INT).

Preferences for local public services are assumed to vary with demographic factors. Since most of the services are directed towards specific age groups, in particular the young and the old, the age composition of the population is assumed to be an important demand factor. Given the low mobility between municipalities, we take the age composition of the population and the population size (POP) as exogenous. The age composition is described by the share of the population below 15 years of age (YOUNG) and the share above 67 years old (OLD).

Voter preferences are channeled through the political system, and characteristics of the political structure are expected to affect the local public resource use. The formulation allows a comparison with the US studies of divided government. Kalseth and Rattsø (1997) suggest several measures of political strength in the Norwegian system of multi-party proportional representation, and they are shown to influence administrative spending. Here political strength is measured by a Herfindahl index of party fragmentation in the local council. The variable HERF has 1 as the highest value when only one party is represented in the council. To measure the ideological orientation of the political leadership, the share of socialist representatives in the local council (SOCSHA) is included. Dummy variables for socialist share above 50 % (DSOCSHA) and Herfindahl index above 0.7 (DHERF) are used to investigate interaction effects (due to limited data).

The data base covers 275 observations, 25 municipalities in 11 years (documentation in appendix). All economic variables (except the unemployment rate) are measured in 1990-NOK and per capita terms. The political variables reflect the 4-year term of the local council, and elections have been held in 1983, 1987 and 1991.

Tests of the time series properties of the variables are reported in appendix Table 2. It should be noticed that the dataset is characterized by 'large N and small T' (N=25, T=11) and the dynamics variation is consequently limited. The panel unit root tests follow the procedure suggested by Levin and Lin (1992). We have tested for unit root both using standard OLS estimation and with fixed effects. As shown in the appendix table, the null hypothesis of unit

root cannot be rejected under the fixed effect formulation. The economic variables are non-stationary, but $I(0)$ on first difference form. The surplus shock also is $I(1)$, reflecting the slight downward trend documented in Table 1. With OLS estimation, we reject unit root for both the surplus shock and the unemployment rate, and we expect them to be stationary in the long run. The political and demographic characteristics are assumed to be stationary. In the long run they can only influence the level of the local decision variables.

The error correction form of the basic version of the model is:

$$\begin{aligned} \Delta \text{REV}, \\ &= \alpha_0 + \alpha_1 \text{REV}_{-1} + \alpha_2 \text{SURSHOCK}_{-1} + \alpha_3 \Delta \text{EXOREV} + \alpha_4 \text{EXOREV}_{-1} \\ &+ \alpha_5 \Delta \text{UNEMP} + \alpha_6 \text{UNEMP}_{-1} + \alpha_7 \text{OLD}_{-1} + \alpha_8 \text{YOUNG}_{-1} + \alpha_9 \text{INT}_{-1} + \alpha_{10} \text{POP}_{-1} \\ &+ \alpha_{11} \text{SOCSHA}_{-1} + \alpha_{12} \text{HERF}_{-1} \end{aligned}$$

Similar equations are estimated for ΔEXP and ΔINV . The effect of the shock is described by α_2 and is understood as a short run effect. The timing implies that the response is measured in the year following the observed deviation from the budgeted. For the other variables the short-run effects can be read directly from the variables on first difference form, as α_3 measures the following year effect of a change in exogenous revenue. The permanent effect of higher exogenous revenue is estimated by $-\alpha_4 / \alpha_1$.

The estimation method takes into account community specific effects by including dummy variables for each municipality, the fixed effect model. Time dummies are introduced to control for changes in other factors over time. When a fixed effect model includes lagged values of the dependent variable, OLS-estimates are biased even if the residuals are white noise. To obtain consistent estimators, we use the Generalized Method of Moment (GMM) developed by Arellano and Bond (1991). The model is first-differenced to remove the individual fixed effects. The GMM estimators are calculated using the program package DPD (Gauss), as documented by Arellano and Bond (1988). One-step estimates robust to cross-section and time-series heteroscedasticity are reported. No general test of cointegration for panels with instruments is developed, but tests of serial correlation offer interesting information about the dynamics. If the error terms of the basic model are serially

uncorrelated, then the first-differenced error terms are a MA(1)-process implying negative first order serial correlation and absence of second order correlation. The dynamic properties of the model are consistent with cointegration, and the two serial correlation (SC) tests are documented in Table 2. A WALD χ^2 -test of joint significance of all included variables is also documented.

4. Fiscal adjustment to budgetary shocks

Estimation results of the demand model for current revenues, current expenditures and investment expenditures are reported in Table 2. The consequences for current deficit and overall savings are derived. The econometric formulation assumes that the budgetary surplus shock in period t influences the change of revenue and spending from t to $t+1$. The results imply that surplus shocks should be included to have a full understanding of local fiscal determinants.

A surplus shock has no statistically significant effect on current revenue or expenditure in the following year. Current revenue and spending are held independent of shocks. Our interpretation is that local governments under the model of centralized financing and vertical fiscal imbalance have little room to maneuver in the short run. Regulation and mandating allow little flexibility in short run resource allocation. The result is at odds with US studies that show significant current revenue adjustment to shocks and even spending adjustments under strict balanced budget rules. The controls induce more response. In Norway with similar controls there is no response. The central government smoothing of local government revenue through regulated taxes and grants is all the more important. The Scandinavian neighbors allow for more local government discretion in taxation, and Rattsø and Tovmo (2002) identify both current revenue and expenditure adjustment in Denmark, with the revenue side absorbing most of the shock. Surprisingly Lundberg (1998) concludes that only the expenditure side partly absorbs the shock in Sweden.

Approximately all of a change in exogenous revenue ends up as change in current revenue, and the coefficient 1.07 indicates approximately a 1:1 relationship. Higher tax revenue sharing and grants from the central government are not offset by other revenue instruments.

Current spending seems to be driven by long run demand factors, to be discussed. Since business cycles are taken into account in the central government determination and balancing of tax revenue sharing and grants, local cyclical effects (the unemployment variable) are small and not significant.

Table 2 – Fiscal adjustment to shocks

When short-run response in current revenue and expenditure is absent, shocks are channeled into intertemporal fiscal adjustment. Investment responds to revenue and expenditure surprises compared to the budget. Surplus shocks have a clear and positive effect on investment. A surplus shock increases investment by about 1/3 of the shock in the following year. Since the budgetary shocks have somewhat cyclical pattern (section 2), the local public investments are procyclical.

Short run exogenous revenue growth is channeled to investment. About 25 øre of every krone in higher exogenous revenue end up as investment. Investment is independent of variation in unemployment, and consequently there is no sign of countercyclical local public policy. When the shocks are procyclical, revenues controlled by central government (EXOREV) must be contra-cyclical to stabilize public investment. The underlying data show that procyclical local public investment is not avoided, and the investment growth was high during the 1984-86 boom and low and even negative during the recession 1991-93.

When Roubini and Sachs (1989) and Alesina and Perotti (1995) analyze fiscal adjustment at the OECD country level, they find that public investment is an important part of fiscal contractions, while current expenditure rises when fiscal policy is loose. We have investigated whether the effects of the shocks are asymmetric, that is whether a positive surplus shock has a different effect from a negative shock (higher deficit than budgeted). Econometrically we have added a new regressor, a dummy variable D representing the sign of the surplus shock multiplied by SURSHOCK. When the dummy variable is set equal to 1 for positive shocks, the coefficient α_2 measures the effect of negative shocks, while the sum of α_2 and the coefficient of the new regressor measure the effect of positive shocks. The estimates of asymmetry reported in Table 3 represent two separate regressions where the

dummy variable is set to 1 for positive and negative surplus shocks respectively.

The results confirm the independence of both current revenue and expenditure of both positive and negative shocks. The coefficients indicate asymmetric response of investment, but statistically we cannot reject that they are equal at conventional significance level. The estimate of the difference between the positive and negative shocks is reported in Table 3 (when D is equal to 1 for negative shocks), and the coefficient -0.11 is only significant at 14% level. The estimates imply that a positive surplus shock leads to a larger increase in investment (about 40 øre) than the reduction in investment following a negative shock (about 30 øre). The US studies find stronger responses to deficit shocks compared to surplus shocks, which is opposite to the indication of asymmetry here, but they have not investigated the reaction of investment. Our results are consistent with public investment analyses separating between expected and unexpected revenue. Both Holtz-Eakin and Rosen (1993) and Rattsø (1999) find that unexpected revenue, based on a forecasting model, increases local public investment.

Table 3 – Asymmetric fiscal adjustment and politics

The lack of current revenue and spending responses to shocks limits the investigation of political effects. The US experience indicates that single party states raise taxes and cut spending by greater amounts to deficit shocks. In the multi-party proportional representation system in Norway, the fragmentation of the local council measures the same kind of decision problems as divided government in the US. The fragmentation measured by the Herfindahl-index (dummy variable) has no effect on the investment response to shock. Table 3 reports an important interaction effect between shocks and ideology for investment. While a non-socialist majority council (dummy variable) has an investment response close to 50 % of a shock, socialist majority councils adjust investment spending by only 11 %. Positive surplus shocks dominate, and socialist controlled councils seem to put much less emphasis of channeling these into investment. The limited dataset has not allowed a combined check of asymmetry and political interaction effects.

Current deficits are the result of current revenue and spending decisions. It follows that we

can derive determinants of current deficits from the estimates in Table 2. Since short-run changes in exogenous revenue influence current revenue about 1:1 and current expenditure is not affected, a positive shift in exogenous revenue will reduce the deficit by the same amount. The adjustment rule can be understood as smoothing to a long run spending plan (Barro, 1979). Since the surplus shock in general has no effect on current revenue and spending, the actual surplus is independent of last period surplus shocks. The local government contribution to the national savings pool is the result of both current surplus and investment. Combining the three equations of Table 2, we can calculate the short run determinants of overall savings. A surplus shock reduces the local government savings in the following year. Since surplus shocks increase investment, they leave less savings for the rest of the economy. Higher exogenous revenue implies higher current revenues and higher investment. The net effect is positive, and more exogenous revenue stimulates savings.

5. Long run determinants of fiscal balance

The long run determinants of current revenue and expenditure involve exogenous revenues, demographics and politics. Since the time series is only 10 years, no strong conclusions can be drawn about the long run effects. The estimates imply an elasticity of current revenue with respect to exogenous revenue of about 1.7, presumably reflecting the increased role of earmarked grants during the period studied. Current expenditure over time is driven by the age composition of the population, with high shares of young and old leading to higher spending. The result is consistent with the investigation of demographic effects by Borge and Rattsø (1995). To be expected, long run investments are determined by the same demand factors influencing current expenditure. In particular the share of old in the population has a clear effect on investment spending, probably reflecting the capital intensity of institutional care for the elderly. A high level of debt holds back both current and investment spending. The lack of income effects on investment is at odds with the documentation of clear short and long run effects of revenue by Rattsø (1999).

Changes in local political characteristics have systematic effects on local government revenue generation. According to Table 2, socialist orientation drives up current revenues, while political strength holds down the revenue level. The effects are consistent with the

understanding that ideological dominance and ability to hold back interest group pressure matter. The results are in line with the effects of political structure in Norwegian local governments first documented by Kalseth and Rattsø (1997) in an analysis of administrative spending. The size of the effects are of economic importance. Current revenue increases by more than 100 NOK per capita for each percentage point increase in the socialist share. The effect of strength is harder to interpret quantitatively, but one standard deviation increase in strength reduces current revenue by about NOK 1500 per capita. The effects are fairly consistent with the long time series analysis of revenue growth by Borge and Rattsø (2002). The political effects are statistically significant only for current revenues, but the quantitative effects are about the same for current expenditures.

The identification of political characteristics as important determinants of fiscal behavior is in accordance with several recent international analyses. The main conclusion of US studies is that single party control of states is able to hold down deficits and they adjust more quickly, as shown by Clingermayer (1991). In the Norwegian context, Borge (2003) documents that strength reduces deficits in a study covering all municipalities. Another aspect is analyzed by Baber and Sen (1986), who find that there is a stronger positive effect of deficit in election years in states with divided government. Contrary results are provided by Bohn and Inman (1996). They find no evidence that divided government or party labels have a significant effect on deficit behavior.

The importance of ideology has been investigated in other studies. Borge's (2003) Norwegian study implies a significant and positive effect of socialist influence on actual deficits. His interpretation is that socialists use deficits to expand local government spending in a situation with largely exogenous revenues. In neighboring Sweden, Lundberg (1998) concludes that non-socialist local governments adjust faster to deficit shocks than socialist. This is consistent with his finding that expenditure reduction takes most of the adjustment. Other studies have shown socialism to be associated with deficits. In a broad analysis of OECD countries, Alesina, Cohen and Roubini (1993) and Roubini and Sachs (1989) document a positive relationship between public deficit and socialist influence at the national level.

Also the responses to the actual deficits are analyzed (not reported), and they allow a

comparison with conflicting evidence regarding the pattern of fiscal adjustment to actual deficits. In studies of the US local public sector, Alt and Lowry (1994) conclude that current revenue is the main adjusting factor, while Bayoumi and Eichengreen (1995) and Bohn and Inman (1996) emphasizing regulation constraints find that current spending takes most of the burden. Our results indicate that investments also take the adjustments to actual deficit in Norway. The size of the effect is a bit higher than the responses to the surplus shock. Given that the budgeted surplus is fairly stable, we expect the effects of actual surplus and surplus shocks to be of similar size.

The long run equilibrium relationships between current surplus, savings and economic and political variables can be derived from Table 2. In the long run context, the current surplus should be interpreted in terms of investment financing. Exogenous revenue clearly increases the surplus over time, but does not affect the investment level. It follows that higher exogenous revenue is associated with less external financing of investment. To derive the effects of political variables on savings, we also have to take into account the investment behavior. Socialist influence increases savings by holding down investment.

6. Concluding remarks

Our analysis contributes to the understanding of fiscal adjustment under different systems of fiscal federalism. The Norwegian centralized case looks extreme, but there seems to be a tendency that countries increase their regulation of decentralized government. Mandating, tax limits and equalization policy are on the increase in the decentralized federalism of the US. The experiences with shock and shock adjustments in Norway may be relevant for the US and other countries as regulations increase.

The analysis is based on a unique dataset covering budgets and accounts of 25 local governments over 11 years and has allowed measures of shocks defined as deviations from approved budgets. An important aspect of the centralized Norwegian system is the lack of a clear relationship between economic fluctuations in the local private economy and the shocks to the local public economy. The central government insures the local public sector against macroeconomic shocks to avoid the destabilizing effects of the balanced budget regulation.

The budgetary shocks are basically the result of central government policy and forecasting. Central government has kept up local government revenue growth even when unemployment started to rise in 1988. Countercyclical fiscal policy is the background and this can be understood as central government borrowing on behalf of the local governments during downswings. From the point of view of the central government, the main challenge seems to be the consistent underprediction of current revenue and expenditure. The local public sector has expanded more than budgeted and desired.

The studies of shocks in the US states discuss the balance between current revenue and spending adjustment, and they show that strong anti-deficit rules force decentralized government to adjust both current revenue and expenditure to shocks. The centralized system of Norway holds current revenue and spending independent of shocks. Mandating, wage contracts, and regulated revenue sources reduce the room to maneuver, and local public investment comes out as the main local shock-absorber. Public investment as part of fiscal adjustment is recognized in the macroeconomics literature, and is here confirmed for decentralized government.

The study adds evidence regarding the role of political characteristics in fiscal adjustment. The counterpart to divided government in the US is party fragmentation in multi-party proportional representation systems. This measure of political strength is interpreted as ability to hold back the pressure for more spending from internal and external interest groups. Political strength is shown to hold down the level of local government activity. Strength affects the size of the local public sector, but does not influence the short run fiscal adjustment. This is in contrast with the evidence that divided government leads to less adjustment in the US states. Ideological orientation also is important in European politics. Socialist orientation of the local council is associated with high level of revenue and less investment response to shock. Since surplus shocks dominate, socialists are less willing to channel extra resources into investment.

Investigation of responses to fiscal adjustment allows us to learn about government behavior. The centralized system is more rigid than the fiscal federalism of the US. When current revenue and spending are less responsive to shocks, intertemporal adjustment is more

important. It is of interest in future studies to expand the analysis to countries with different forms of fiscal federalism and institutions and to have more focus on intertemporal government adjustment.

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Appendix: Data and variables

Local government data are collected from the budgets and the accounts of all 25 municipalities of the Sør-Trøndelag county for the period 1983-1993. All definitions are according to the official guidelines for local government accounts. Other data are from national accounts and election statistics, both from Central Bureau of Statistics, Oslo.

Variables at local government level:

Local government i , year t , all economic variables per capita, 1990-NOK

Global average and standard deviation in parenthesis

REV_{it} - Current revenue, 22.410 (8.868)

$REVB_{it}$ - Current revenue budgeted for year t in year $t-1$, 20.872 (7.982)

EXP_{it} - Current spending, 20.530 (7.617)

$EXPB_{it}$ - Current spending budgeted for year t in year $t-1$, 19.306 (6.234)

INV_{it} - Investment, 3.624 (2.872)

$EXOREV_{it}$ - Sum of income tax revenue sharing and lump-sum grants, 15.525 (4.619)

INC_{it} - Private net income, 45.206 (4.498)

$UNEMP_{it}$ - Unemployment rate, percent, 0.0307 (0.0119)

OLD_{it} - Share of inhabitants above 67 years of age, 16.73 (4.17)

$YOUNG_{it}$ - Share of inhabitants below 15 years of age, 21.06 (2.20)

POP_{it} - Population size, 9.992 (26.123)

INT_{it} - Net interest payments, 842.44 (769.78)

$HERF_{it}$ - Index of party fragmentation of local council, 0.277 (0.07)

$SOCSHA_{it}$ - Socialist share of representatives in local council, 0.4431 (0.13)

APPENDIX TABLE 1 - DATA DOCUMENTATION

ECONOMIC VARIABLES 1990-NOK PER CAPITA, UNEMPLOYMENT RATE

	All	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
REV												
Mean	22410	16925	18224	19426	19629	19942	23169	24464	25240	26087	26588	26813
Std. dev.	8868	5224	7421	7911	9055	10390	8538	10052	9435	7031	7941	6953
EXP												
Mean	20530	15039	15599	16708	17136	17999	21686	22190	23119	24667	26037	25648
Std. dev.	7617	3084	2663	4877	6884	7134	7222	6495	6383	7264	10169	7344
INV												
Mean	3624	3162	3182	3182	3333	3795	5105	3451	3649	4885	3625	2495
Std. dev.	2872	1509	3312	3336	2464	2344	3500	3075	3434	3654	2002	1150
EXOREV												
Mean	16773	12683	14147	14759	14389	14642	17314	18471	18729	19577	19854	19931
Std. dev.	7026	4704	8165	6639	6279	7389	5991	7930	7170	5842	6557	5841
UNEMP												
Mean	3.07	2.91	3.15	2.61	1.96	1.69	2.27	3.27	3.46	3.82	4.27	4.35
Std. dev.	0.19	0.94	1.03	0.87	0.63	0.69	0.84	0.81	1.03	0.86	0.81	0.83
SURSHOCK												
Mean	314	429	1402	1069	820	440	-104	716	315	-132	-1110	-395
Std. dev.	2405	932	4146	683	681	1736	1645	1560	763	2385	4877	1874

APPENDIX TABLE 2 - UNIT ROOT TESTS

	OLS	FE
REV	-0.02 (0.51)	-0.20 (3.53)
EXP	-0.02 (0.23)	-0.17 (1.82)
INV	-0.39* (3.77)	-0.83 (7.15)
EXOREV	-0.04 (0.75)	-0.31 (3.06)
UNEMP	-0.11* (3.11)	-0.15 (3.53)
SURSHOCK	-0.60* (3.13)	-0.62 (3.25)

The unit root test is based on the model

$$\Delta X_{it} = \rho X_{it-1} + \varepsilon_{it}$$

which is estimated using the ordinary least squares method (OLS) and fixed effects (FE)

The unit root test assumes $H_0: \rho=0$, and the table reports estimates and t-values. Critical t-values at 5% level are 1.90 for OLS and 7.76 for FE. * indicates rejection of unit root.

TABLE 1 – LOCAL GOVERNMENT SHOCKS AND DEFICITS
SHARES OF CURRENT REVENUE, %

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
REVSHOCK-SH	3.9	5.4	9.7	7.5	6.5	5.9	7.8	6.9	6.6	6.4	5.3
EXPSHOCK-SH	1.8	-0.4	3.8	3.2	5.3	6.1	5.7	5.6	6.2	8.5	6.1
SURSHOCK-SH	2.1	5.0	5.9	4.3	1.3	-0.2	2.1	1.2	0.4	-2.1	-0.8
SUR-SH	9.8	11.1	12.5	11.7	7.7	5.7	7.5	7.0	5.7	3.3	4.6
INV-SH	18.6	16.0	14.9	16.5	19.8	22.3	13.6	13.8	18.0	13.8	9.4
SAV-SH	-8.8	-4.9	-2.4	-4.7	-12.1	-16.6	-6.1	-6.8	-12.3	-10.5	-4.8

Source: Local government budgets and accounts, 25 municipalities in Sør-Trøndelag county

TABLE 2 – FISCAL ADJUSTMENT TO SHOCKS

	Δ REV	Δ EXP	Δ INV
REV ₋₁ , EXP ₋₁ , INV ₋₁	-0.53* (0.06)	-0.76* (0.09)	-0.84* (0.09)
SURSHOCK ₋₁	-0.09 (0.09)	-0.20 (0.16)	0.35* (0.06)
Δ EXOREV	1.07* (0.13)	-0.07 (0.16)	0.24* (0.15)
EXOREV ₋₁	0.91* (0.33)	0.09 (0.21)	-0.01 (0.24)
Δ UNEMP	6862.03 (22398.94)	-10913.23 (28500.12)	-33756.19 (29889.12)
UNEMP ₋₁	-21762.02 (19025.83)	-20323.27 (26623.44)	1852.69 (29168.76)
OLD ₋₁	-491.02 (561.50)	628.49* (331.08)	940.54* (355.18)
YOUNG ₋₁	-225.94 (203.03)	706.03* (381.19)	237.59 (404.29)
INT ₋₁	-0.81* (0.41)	-0.98* (0.43)	-2.47* (0.48)
POP ₋₁	0.11 (0.13)	-0.59 (0.47)	0.36 (0.35)
SOCSHA ₋₁	11608.78* (4648.74)	7687.83 (5605.54)	-4273.57 (3459.56)
HERF ₋₁	-23425.30* (10588.10)	-25461.42 (24672.08)	11133.08 (8202.13)
WALD	7359.32/12	3659.85/12	715.94/12
1. ORDER SC	-2.47	-2.07	-3.32
2. ORDER SC	-0.36	-0.88	0.10

GMM estimates (all variables in first differences)

Fixed effects, time dummies, N=25, T=10

Estimated coefficients and asymptotic one-step standard errors robust to cross-section and time series heteroscedasticity in parenthesis cfr. Arellano and Bond (1991), * significant at 10% level

TABLE 3 – ASYMMETRIC FISCAL ADJUSTMENT AND POLITICS
SELECTED RESULTS PRESENTED

	Δ REV	Δ EXP	Δ INV	Δ INV
SURSHOCK ₋₁	-0.09 (0.09)	-0.20 (0.16)	0.35* (0.06)	0.47* (0.18)
POSITIVE SURSHOCK ₋₁	-0.12 (0.15)	-0.46 (0.25)	0.41* (0.06)	
NEGATIVE SURSHOCK ₋₁	-0.07 (0.05)	-0.14 (0.14)	0.30* (0.07)	
SURSHOCK ₋₁ *D			-0.11 (0.08)	
SOCSHA ₋₁				-4997 (3458)
HERF ₋₁				12902 (7807)
SURSHOCK ₋₁ * DSOCSHA ₋₁				-0.36* (0.10)
SURSHOCK ₋₁ * DHERF ₋₁				-0.09 (0.20)

Asymmetries are identified by regressions adding the regressor D* SURSHOCK where D is a dummy variable representing the sign of the shock, and we have reported coefficients and standard errors for positive shocks, negative shocks and for Δ INV also for the difference between positive and negative shocks (when D is 1 for negative shocks)

GMM estimates (all variables in first differences)

Fixed effects, time dummies, N=25, T=10

Estimated coefficients and asymptotic one-step standard errors robust to cross-section and time series heteroscedastisity in parenthesis cfr. Arellano and Bond (1991), * significant at 10% level