

FISCAL DISCIPLINE AND ASYMMETRIC ADJUSTMENT OF REVENUES AND EXPENDITURES: LOCAL GOVERNMENT RESPONSES TO SHOCKS IN DENMARK

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Abstract

Fiscal discipline is a concern in most countries because of a possible spending and deficit bias in present fiscal and political institutions. Recent research has turned to fiscal federalism as a source of fiscal imbalance and to exploit the variation in fiscal experience. This study allows a comparison of the control regime of decentralized government in Denmark with neighbors Norway and Sweden and with similar analyses of US states. Fiscal adjustments are investigated in the context of responses to shocks. Shocks are measured as deviations from budgeted current surplus, and they motivate an adjustment of tax rates and current expenditure to avoid fiscal imbalance. The econometric results show that local governments in Denmark respond to shocks by compensating adjustment of tax rates and expenditures. The shock responses tend to be asymmetric, in particular for the income tax. Positive shocks hardly affect the income tax rate, while negative shocks induce higher tax rates. We interpret the asymmetry as the result of spending pressure due to redistributive politics, and show that political characteristics are important for tax determination. We conclude that the Danish design of controlling the local public sector avoids fiscal imbalances, but allows a bias towards expansion.

AUTHOR'S NOTE: Ministry of Finance, Denmark, has provided the economic data, and we are grateful for comments at a seminar in the ministry. In particular we appreciate the comments and help from Ole Gregersen, Jørgen Lotz, Nicolai Malm, Martin Paldam, and in particular Poul-Erik Mouritzen for access to his political data. The Ministry of Finance is not responsible for any results or comments. We have enjoyed comments at seminars at the European Public Choice Society, and at the universities in Trondheim, Umeå and Uppsala.

The establishment of a monetary union in the EU, and in particular the stability pact, has stimulated the interest for fiscal institutions and fiscal performance. The background

concern of fiscal discipline is related to possible spending and deficit bias in present fiscal policymaking. The attention has been focused on the role of institutions and procedures in budget processes and distortions in the political process. Roubini and Sachs (1989) started up a series of empirical analyses of how varying economic and political institutions of the OECD-economies account for differences in public sector spending and deficits. Von Hagen and Harden (1994) evaluate alternative budget procedures and budget outcomes in the context of the Excessive Deficit Procedure of the Maastricht Treaty. In the US, the fiscal deficits created under Reagan motivated new studies of budget balance rules and decision making in the Congress. Corsetti and Roubini (1996) present European versus American approaches to handling excessive spending and deficits. The US evidence is based on studies of the states, and the relevance for EMU is summarized by Inman (1997).

The recent research on the US states motivates this study of decentralized government in the Scandinavian setting. Fiscal federalism represents a rich empirical basis for evaluation of both institutional and political designs. Empirical regularities regarding the effects of anti-deficit rules, tax limits and divided governments in the US are discussed by Poterba (1997). The present analysis addresses the control regime of decentralized government in Denmark. Together with existing analyses of Norway and Sweden (Rattsø, 1999 and Lundberg, 1997 respectively), the study allows a comparison of the Scandinavian model against the federalism practiced for the US states.

The broad Scandinavian model of fiscal federalism must be understood in the context of the welfare state. The major welfare services (schools, health care, hospitals etc.) are run by decentralized government under centralized control and financing. The large local public sector of about 15-20% of GDP is financed by income tax revenue sharing and grants. The design is consequently very different from the Musgrave-Oates-Tiebout model of local public goods and benefit taxes. The emphasis on redistributive welfare services delegated by central government represents different challenges of decision making, equalization and macroeconomic stability. Borge and Rattsø (1998), Lotz (1991, 1998) and Søderstrøm (1998) explain how the three Scandinavian countries rely on a mix of local autonomy and national controls to constraint local taxation and expenditure. Differences in local-national interaction are discussed by Blom-Hansen (1999).

Although the broad model of fiscal federalism is similar, there are distinct differences in control systems. Norway has the most centralized control of financing with close to no local tax discretion. Sweden has more centralized control of the welfare services through mandating and standardization. The Danish system is particular in its strict control of loans and investments, where central government regulates the limited loan totals for each local unit and investment activity basically is financed within the current budget. This study of Denmark originated in the work of the Danish Ministry of Finance to oversee and control the local public finances, and a first set of analyses was commissioned by the Ministry (Rattsø and Tovmo, 1998).

The approach is inspired by Poterba's (1994) analysis of fiscal adjustment in the US states. He investigates the dynamics of state taxes and spending as responses to shocks affecting current deficits. The local responses are influenced by the control regime. He finds that tax limits reduce tax response and strong anti-deficit rules increase spending response. Restrictive state fiscal institutions are associated with more rapid fiscal adjustment to unexpected deficits. The centralized Scandinavian model is expected to have responses similar to the restrictive institutions in the US. Shocks are defined as deviations between budgeted and actual current revenues and expenditures and influence the determination of revenues and expenditures in the following year. Compared to Poterba, we develop the understanding of the fiscal adjustment in a two-period intertemporal decision model of revenues and expenditures and estimate a more complete model of fiscal choice. The econometric analysis applies a general error-correction setup, which allows a clear separation between short run and long run effects.

Fiscal bias towards excessive spending may result from asymmetric response to positive and negative shocks. If positive shocks lead to expansion of spending, while negative shocks are compensated by higher taxes, shocks will raise the level of taxation and spending over time even when positive and negative shocks balance out. Asymmetry is discussed in a separate literature on the effects of grants, and is related to the 'flypaper effect'. Asymmetry and flypaper effect may result from the same type of distortions in the decision making system. Gamkhar and Oates (1996) point to the possible importance of bureaucratic power and fiscal illusion in explaining such fiscal biases. They conclude that the evidence is mixed concerning the empirical relevance of the symmetry of the flypaper effect. Asymmetric

responses to shocks are investigated below. The role of political institutions in the fiscal process is addressed by including variables describing the political structure.

The budget implementation in local governments in Denmark is addressed in the first section, while a model framework for intertemporal shock adjustment is presented in the second section. Section three outlines the empirical model specification. Shock adjustments are analyzed in section four, using an error-correction model allowing for the estimation of short and long run determinants of revenues, expenditures and surplus. Concluding remarks are offered at the end.

BUDGET IMPLEMENTATION AND SHOCKS: DEFINITION AND DESCRIPTION

Budget processes are designed to set priorities and control revenues and expenditures. In political institutions, budget processes are typically regulated by law to obey democratic principles and economic constraints. In this study local governments are investigated, and they typically face additional restrictions limiting their freedom to carry over deficits and loan finance investment. The budgets are subject to formal approval by the central government. The focus here is set on the implementation of budgets and how local governments respond to deviations from budgets. Local governments work out budgets based on expectations about future revenue sources and demand for local services. The use of the budget in the decision-making process and the control of the service production clearly vary between local governments (see Houlberg, 1999, in Danish). This study offers a systematic evaluation of the consequences of budget implementation for fiscal balance, spending and taxation.

Shocks related to current revenues and expenditures are identified separately. Consistent with Poterba (1994), shocks are defined as the gap between actual current revenues and expenditures (REV and EXP) and the corresponding budget values (REVB and EXPB). The budget values refer to the official budget decided before the start of the fiscal year. The measures of shocks are not fully exogenous to the local governments, since both budgeted and actual revenues and expenditures are decision variables of the local governments. Poterba was able to correct his measure of shocks for tax and spending revisions during the fiscal year, but such data have not been available to us. Large components of the shocks are clearly beyond political control – and relate to expenditures automatically affected by changes in economic

and demographic conditions, and revenues influenced by shifts in income bases. More narrow measures of shocks related to central government interventions (regulation of taxes, block grants and transfers) have been investigated by Rattsø and Tovmo (1998). Since the results are similar to the broad measure of shock applied here, they are not included in the paper.

Shocks on the revenue side are basically related to the forecasting of tax revenues and grants. The revenue shock in local government i , year t is defined as:

$$(1) \quad \text{REVSHOCK}_{it} = \text{REV}_{it} - \text{REVB}_{it}$$

The gap between budgeted and actual current expenditure is harder to interpret, but is related to implementation of spending plans. Similar to the revenue side, expenditure shock is defined as:

$$(2) \quad \text{EXPSHOCK}_{it} = \text{EXP}_{it} - \text{EXPB}_{it}$$

The development of the average shocks over time are described in Table 1 and they are measured as percentage of average current revenue. Both shocks as a share of revenue (REVSHOCK-SH and EXPSHOCK-SH) have on average been positive and very stable over time, about 1.5-3 % most years.

A positive revenue shock implies that the actual ex post current revenues are larger than in the official budget of the fiscal year, current revenues are underpredicted. On average this is true in all years except for 1985, when the average revenue shock was negative. There is still considerable variation between the municipalities. In most years there are municipalities with actual revenues more than 1.000 – 3.000 1996-kroner per capita (3 - 10 %) below budget and at the same time municipalities with positive shocks above 3.000 kroner per capita (10 %). The total number of positive revenue shocks in the sample period is 2478, while the number of negative shocks is 822.

The expenditure shock shows that local governments have a strong tendency to underpredict actual current expenditures. The size of the average expenditure shock is similar to the revenue shock, about 2 % or 645 kroner, and is positive except for 1995. During the sample period, there are 2478 observations of positive expenditure shocks, while the number

of overpredictions is 822. Underprediction of both current revenue and current expenditure, as defined here, seems to be a common pattern for Norway (Rattsø, 1999), Sweden (Lundberg, 1997) and Denmark.

Table 1 Development of shocks and surplus

Surplus shock is defined as the gap between the actual surplus and the budgeted surplus. The combined revenue and expenditure shocks add up to a surplus shock :

$$(3) \text{SURSHOCK}_{it} = \text{REVSHOCK}_{it} - \text{EXPSHOCK}_{it} \\ = (\text{REV}_{it} - \text{EXP}_{it}) - (\text{REVB}_{it} - \text{EXPB}_{it})$$

Since both revenue and expenditure shocks on average are positive (i.e. revenue and expenditure are both typically underpredicted), they tend to balance each other out in terms of the surplus. Surplus shocks are generally much smaller than expenditure and revenue shocks. The surplus shock on average is above 1 % of current revenue in only 3 years. The revenue shocks are slightly larger than the expenditure shocks, but the average (global) surplus shock is close to zero. Five of the years show a positive average surplus shock. The total number of observations with a positive surplus shock is 1615, while the number of negative surplus shocks is 1685. For specific municipalities, the gap between the actual and the budgeted surplus can be large, as shown by minimum and maximum values of up to 10 % of current revenue. Local governments experience positive and negative revenue and expenditure shocks in all years. There seems to be no common source of shock affecting all local governments in the same direction. In 1986 and 1994, fairly large revenue shocks were not counterbalanced by expenditure shocks. In 1985, a large positive expenditure shock was not counterbalanced by revenue shock. The largest expenditure and revenue shocks on average happened in 1987, but they were both positive and did not add up to much effect on the surplus.

On average, current revenues are consistently higher than expenditures and produce positive current surpluses, $\text{SUR} = \text{REV} - \text{EXP}$. Among the 3.300 observations (275 municipalities in 12 years) only 544 show current deficit, while 2.756 have current surplus. The budgeted revenue on average also is higher than budgeted expenditure. The domination of budgeted and actual surplus over time implies that current revenues in general contribute to the financing of investments.

The development of the shocks can be compared to the broader economic development in Table 2. The business cycle pattern identified is quite distinct. The indicator representing the macro economy, the growth of the unemployment rate (UNEMPG), shows a downswing during 1986-1993 with a rising unemployment rate. Before 1986 and after 1993 the unemployment rate is declining. The development of the income tax base of the local governments (INCOMEG) is fairly consistent with the national trends. The tax base growth has been strong during 1985, 1986 and 1994-96, and rather stagnant during the period 1987-1993.

Tables 2 Business cycle, spending and revenue

The indicators of the local government finances do not follow the national business cycle very closely. Real revenue growth (REVG) was stagnant during the national upswing 1984-86, but was high during the national contraction of 1987-89. In these years, the local governments have had a counter cyclical development, while they seem to follow the national trend from 93-96. Expenditure growth (EXPG) has developed similar to the revenue growth.

The stability of the average revenue and expenditure shocks (REVSHOCK-SH and EXPSHOCK-SH) over time is remarkable given the economic fluctuations. The shocks on average seem to be independent of the cyclical swings of the economy and also of the shifting local economy. Strong revenue growth in 1988-89 and 1994 and declining revenues in 1987 and 1992 do not show up as revenue shocks. For the expenditures, the strong growth in 89, 93, 94 and 96 does not lead to high expenditure shocks.

The actual surplus (reported in Table 1) does not respond strongly to the business cycle fluctuation on average. The actual surplus is somewhat above average during the upswing years 1984 and 1994-96 and below average during the contraction years 1986-87. But also the actual surplus was below average in 1985 and above average in 1992. The number of actual surpluses was high during the booming years 1984 and 1994-95 and low during the years of stagnation 1987 and 1993. But also many had deficit during 1985 and many had surplus during 1988-92.

The surplus shocks (SURSHOCK-SH) are independent of the economy-wide economic fluctuations and also of the local government revenue growth. This is consistent with the experiences in Norway and Sweden (Rattsø, 1999 and Lundberg, 1997), and shows that the Scandinavian countries keep their local public sectors insulated from business cycles. The countercyclical low revenue growth 1984-86 and high revenue growth 1987-89 do not create systematic surplus shocks. The gap between the surplus shock and the actual surplus has fluctuated between 1 and 4 % of current revenues, with an average of 2.8 %. This is reflecting the fact that the local governments have budgeted a steady current surplus on average over the period and that surplus shock and actual surplus tends to move together.

A FRAMEWORK FOR THE ANALYSIS OF FISCAL ADJUSTMENT

Fiscal adjustment is typically understood in a demand framework including the preferences and budget constraints facing a representative voter or a political representative body. Most studies of local government revenue and expenditure look at the static demand determinants of the final outcome without explicit consideration of the budget process. Rubinfeld (1987) offers an overview of this literature. Existing studies of adjustment inertia, such as the partial adjustment model of Borge and Rattsø (1995), do not include decisions of allocations over time. To investigate the fiscal adjustments to shocks, we need an intertemporal model to develop some guidelines for the empirical estimation. There is no established workhorse of local government intertemporal decision-making that addresses these issues. Gramlich (1978, 1991) offers a simple model based on a community preference function including private consumption, local public consumption and stocks of balances. Given budget constraints, demand functions for current revenues and expenditures and stocks of balances are derived. Alt and Lowry (1994) propose an approach inspired by tax smoothing, but with separate decisions related to revenues and expenditures. To clarify the intertemporal choices, we prefer to work with a two-period setup emphasizing social benefits and costs of spending and taxation. The model is a simplification of the two-period model presented by Rattsø (1999). It can also be seen as a simplification of the infinite horizon model of Holtz-Eakin and Rosen (1993).

Local government consumption spending in the two periods EXP_1 and EXP_2 are financed by revenues REV_1 and REV_2 . The local government enjoys utility of consumption

spending, $U_1(\text{EXP}_1)$ and $U_2(\text{EXP}_2)$, assumed to be additively separable over time, and with standard properties ($U_i' > 0$, $U_i'' < 0$). The utility functions characterize both the substitution of consumption spending over time and the attitude to risk. The excess burden of distortionary taxes in each period is a convex function of the revenue level. The social costs of revenue generation are measured by $V_1(\text{REV}_1)$ and $V_2(\text{REV}_2)$, assuming $V_i' > 0$ and $V_i'' > 0$. Investments are excluded since they are strictly regulated in the Danish system.

To investigate the effects of a temporary shock in period 1, we introduce a stochastic shock parameter α in the social cost function, $V_1(\text{REV}_1, \alpha)$, with expected value equal to zero and with fixed variance. The shock represents an exogenous shift in the revenue base, a key component of the surplus shock investigated empirically. A positive temporary revenue shock is assumed to reduce the marginal cost of generating tax revenue REV_1 and consequently the cross-derivative $V_{1\alpha}'' < 0$. A positive shock reduces the social costs of taxation assuming that a given amount of taxes can be collected with less excess burden during an upswing in economic activity.

The time preference rate and the interest rate are both set to zero, and the intertemporal budget constraint is

$$(4) \quad \text{EXP}_1 + \text{EXP}_2 - \text{REV}_1 - \text{REV}_2 = 0$$

The initial plan for spending and revenue is reached by maximizing the expected present value net social welfare $E_1[W]$ given the information available at the beginning of period 1:

$$(5) \quad E_1[W] = E_1[U_1(\text{EXP}_1)] + E_1[U_2(\text{EXP}_2)] - E_1[V_1(\text{REV}_1, \alpha)] - E_1[V_2(\text{REV}_2)]$$

Inserting the budget constraint, we reach the following simple first order condition for planned revenue and spending:

$$(6) \quad E_1[U_1'] = E_1[U_2'] = E_1[V_1'] = E_1[V_2']$$

In this simple setup, the expected marginal utility of local government spending must be equal in the two periods, the expected marginal costs of local government taxation must be equal over time, and the expected marginal utility of spending must be equal to the expected

marginal cost of taxation. In the special case of identical preferences and identical social costs across periods, local government spending is constant over time, $EXP_1 = EXP_2$ and the budget is balanced in each period $EXP_1 = REV_1$ and $EXP_2 = REV_2$. Planned deficit in the first period is the result of either a preference bias towards first period consumption or a cost bias against first period taxation.

A first period shock is a realization of α different from zero and is observed during the period. An unexpected positive shift in the revenue base leads to more revenue than budgeted given tax rates. The local government observes a surplus larger than budgeted in period 1, a surplus shock. The following adjustment depends on the nature of the shock. We assume a temporary shock reducing the marginal cost of taxation, and the consequences can be derived by differentiating the first order conditions:

$$dEXP_1/d\alpha = -1/D U_2'' V_2'' V_{1\alpha}'' > 0$$

$$dEXP_2/d\alpha = -1/D U_1'' V_2'' V_{1\alpha}'' > 0$$

$$dREV_1/d\alpha = 1/D [U_1'' U_2'' - V_2''(U_1'' + U_2'')] V_{1\alpha}'' > 0$$

$$dREV_2/d\alpha = 1/D U_1'' U_2'' V_{1\alpha}'' < 0$$

$$d(REV_1 - EXP_1)/d\alpha = 1/D [U_1'' U_2'' - V_2'' U_1''] V_{1\alpha}'' > 0$$

$$d(REV_2 - EXP_2)/d\alpha < 0$$

where the determinant of the differentiated system D is positive for stability.

When marginal social costs of revenue goes down, net welfare can be increased by raising local government spending in both periods. When the income shock is temporary, the expected relative marginal costs of revenue across periods are changed, and the revenue is shifted from period 2 to period 1. In period 2, spending is increased and revenues are decreased, and the current surplus will decline. In the case of a negative revenue shock, current surplus will go up in the following period. In the empirical analysis below, we

consider deviations from the budget balance in period 1 as a temporary shock with consequences for the determination of revenues and expenditures in period 2. A positive SURSHOCK in period 1 consequently is expected to lead to reduction in revenues and increased expenditures in period 2. A surprise deficit requires adjustment of revenues and/or expenditures in the following period. In this intertemporal understanding, the adjustments in period 2 are similar to the immediate same-period adjustments with strict budget balance rules in Poterba (1994).

There are no adjustment problems in the model and it is silent about politics. These issues are addressed empirically. Fiscal bias towards expansion of the local public sector is investigated as asymmetries in the adjustment process. When responses to positive and negative shocks are symmetric, shocks will not affect the level of revenue and spending over time (when positive and negative shocks cancel out). Asymmetry means that positive and negative shocks are handled differently. An expansionary fiscal bias results if positive shocks are followed by increased expenditure, while revenues are raised as a response to negative shocks.

In an interesting analysis of asymmetries in the response to federal aid in the US states, Stine (1994) shows that the asymmetry can work both ways. Given the existence of the flypaper effect, a 'fiscal replacement' type of asymmetry is expected (Gamkhar and Oates, 1996). In this case, higher grants are channeled into spending, while cuts in grants are compensated by higher taxes. As in the understanding of the flypaper effect, this asymmetry can be understood as the result of fiscal illusion or political distortion (bureaucratic influence). Stine (1994) finds a different type of asymmetry, an 'inducement effect', where cuts in federal grants were accompanied by reduction not only in spending, but also in own revenues. Cuts in grants lead the way for even stronger reduction in spending. The evidence regarding this type of asymmetry, including Heyndels and Van Driessche (1998) for Belgium, is mixed. We have concerns about the methodology that has been applied to investigate the asymmetry, to be discussed in the next section.

As indicated in the introduction, the emphasis on redistributive welfare services (public primary school, care for the elderly etc.) complicates the aggregate decision of resource allocation. The redistribution affects both different social groups and different locations within the municipality (location of institutions). With proportional representation,

many parties are represented in the local council and one party seldom has the majority. No simple hypotheses about the decision making can be made in this setting. Our short story is that characteristics of the local council are expected to affect local fiscal policy. We concentrate on the party fragmentation of the local council. It is assumed that redistributive politics lead to a permanent pressure for higher spending in the local governments. Fragmentation of the council worsens the ability of the political leadership to hold back this spending pressure. Strong local councils then will have lower levels of revenues and expenditures and may avoid asymmetries in their responses to shock. The analysis of party fragmentation under proportional representation is similar to the interest in divided government in the US, as analyzed by Poterba (1994). In the Scandinavian context, Kalseth and Rattsø (1998) have introduced several measures of political strength that are shown to influence administrative spending.

The other political aspect included in the empirical analysis is the ideological orientation of the local council. Ideology, typically separating between socialist and non-socialist parties, is a key element of most studies of European fiscal policy. The conventional hypothesis says that socialists prefer a large public sector, and a socialist orientation of the local council contributes to higher revenues and expenditures. In their struggle to increase the public sector, socialist orientation may lead to the mentioned types of asymmetries.

EMPIRICAL FORMULATION OF THE MODEL

The empirical analysis relates the determination of current revenue and expenditure to local economic and political conditions. The surplus shock is introduced as a separate variable affecting the local fiscal policy. Most of the analysis looks at the consequences of shocks in year $t-1$ for economic variables in year t . The effects on liquidity are analyzed for the same year as the shock. We use the following notation for changes of actual values from year $t-1$ to year t , such as change of revenues $\Delta \text{REV} = \text{REV}_t - \text{REV}_{t-1}$. The dependent variables include changes in income tax rate ΔITAX , property tax rate ΔPTAX , current expenditure ΔEXP and liquidity ΔLIQV .

The background economic conditions are described by three variables. The local governments receive lump sum block grants from the central government (GRANT).

Revenues from income taxation is the most important revenue source for the local governments. The total income tax revenues depend upon the level of private income (INCOME) and the choice of tax rate. To account for business cycle factors, we have included data about the local unemployment rate (UNEMP). The unemployment rate captures economic instability that may affect the implementation of budget policies.

Our measure of political strength is a Herfindahl index of party fragmentation in the local council. The index is defined as $HERF = \sum_{p=1}^P SH_p^2$, where SH_p is the share of representatives of party p . The index is positively related to political strength and takes its maximum value of unity when a single party has all representatives in the local council. Socialist ideology is represented by the share of socialist representatives in the local council (SOC). The economic and political variables above are understood as the main determinants of desired local public current revenue and spending.

The data base for current revenue and expenditure covers 3575 observations, 275 municipalities in 13 years. All economic variables (except the unemployment rate) are measured in 1996 Danish kroner and in per capita terms.

No formal tests of the time series properties of the variables are reported. It is assumed that the shocks are stationary and that the key local decision variables are non-stationary, but $I(0)$ on first difference form. The variables describing local economic conditions, private income and unemployment rate, are treated as $I(1)$, although the unemployment rate in the long run is expected to be stationary. It should be noticed that the current surplus is allowed to be non-stationary, basically implying that current surplus financing of investments can grow with the per capita investment level.

The econometric formulation assumes an error correction model that allows for a separation between temporary and permanent effects. The error correction form of the basic version of the model is (where -1 means one year lag):

$$(7) \quad \Delta \text{REV}, \Delta \text{ITAX}, \Delta \text{PTAX}, \Delta \text{EXP}, \Delta \text{LIQV} \\ = \alpha_0 + \alpha_1 \text{DEPENDENT}_{-1} + \alpha_2 \text{SURSHOCK}_{-1} + \alpha_3 \Delta \text{INCOME} + \alpha_4 \text{INCOME}_{-1}$$

$$+ \alpha_5 \Delta \text{GRANT} + \alpha_6 \text{GRANT}_{-1} + \alpha_7 \Delta \text{UNEMP} + \alpha_8 \text{UNEMP}_{-1} + \alpha_9 \text{SOC}_{-1} + \alpha_{10} \text{HERF}_{-1} + \alpha_{11} \text{Z}_{-1}$$

In addition to the variables described above, a vector Z with control variables are included. The vector include demographic variables like population size and age composition of the population.

The short run effects can be read directly from the variables on first difference form. Grants may illustrate the interpretations made: The short run effect of a change in block grants is reflected by α_5 . The permanent effect of higher block grants is estimated by $-\alpha_6 / \alpha_1$. We allow asymmetric responses to shocks by separating between positive and negative surplus shocks.

The test of asymmetry is straightforward in this dynamic specification, and we have estimated a relationship like:

$$(8) \quad \Delta \text{REV}, \Delta \text{ITAX}, \Delta \text{PTAX}, \Delta \text{EXP}, \Delta \text{LIQV} \\ = \dots + \alpha_{21} \text{SURSHOCK}_{-1} + D \alpha_{22} \text{SURSHOCK}_{-1} + \dots$$

where D is a dummy variable equal to 1 when $\text{SURSHOCK} < 0$. In this case α_{21} represents the effect of a positive shock, while $\alpha_{21} + \alpha_{22}$ is the effect of a negative (deficit) shock. The analysis of asymmetric responses to federal grants by Stine (1994) and followers applies a level form:

$$(9) \quad \text{EXP}_t = a_0 + a_1 \text{GRANT}_t + a_2 D (\text{GRANT}_t - \text{GRANT}_{t-1}) + \dots$$

where D is a dummy variable equal to 1 when $(\text{GRANT}_t - \text{GRANT}_{t-1}) < 0$. This specification treats positive and negative shocks asymmetric and mix levels effects and changes. We prefer the formulation in (8) to reveal asymmetric effects of shocks.

The estimation method takes into account community specific effects by including dummy variables for each municipality, the fixed effect model. The formulation utilizes only time series variation in the data. Time dummies are introduced to control for changes in other

factors over time. Due to change of accounting rules, there is a break in the time series for current revenues and expenditures in 1991. The standard deviations of the growth rates are larger this year, which gives us a reason to suspect that the break will not affect all local governments in the same way. If this is true, the break will not be captured by the time dummies and the estimates will be biased. We handle this by allowing separate coefficients for all variables for 1991. A formal test of joint significance of all these variables reveals that they cannot be left out of the analysis, but they are not reported below.

When the lagged value of the dependent variable is included as a right hand side regressor, it will be correlated with the error term. As shown by Baltagi (1995), this will be the case even when the within transformation in the fixed effects model wipes out the cross section component of the error term. This means that the OLS estimates will be biased and inconsistent even if the residuals are white noise, and we need to use an instrument for the lagged dependent variable. We choose to rely on the Generalized Method of Moments (GMM) as developed by Arellano and Bond (1991). With this technique, the number of valid instruments is growing with t , and we are utilizing all valid instruments in each time period. As instruments for the lagged dependent variable, we use lagged values dated $t-2$ and earlier. Compared to alternative methods, GMM exploits more information by this use of lags.

The model is first-differenced to remove the individual fixed effects. The GMM estimators are calculated using the program package DPD written in Gauss, as documented by Arellano and Bond. The GMM approach provides one-step and two-step estimates. The two-step procedure is efficient in the presence of heteroscedasticity, but as shown by Arellano and Bond (1991), the estimated standard errors tend to be downward biased in finite samples. We use the common practice to report first-step estimates robust to cross-section and time-series heteroscedasticity. If the error terms in the basic version of the 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 models reported have acceptable dynamic properties in this respect. Tests for first- and second order serial correlation and the Sargan specification test are reported. The Sargan tests indicate shortcomings in the dynamic specification even when the autocorrelations are acceptable. In addition to the results reported in the tables, many alternative specifications have been tested, including different control variables and disaggregation to regions. The alternatives investigated confirm the main results reported here.

FISCAL ADJUSTMENT TO SURPLUS SHOCK

The theory framework of section 3 implies that a temporary positive income shock will raise spending in both (all) periods and shift revenue from the future to now. When we study the next-year consequences of shocks this year, we consequently expect reduced revenue and higher expenditure as a reaction to a positive shock, and the current balance is worsened. This response pattern is consistent with the data.

The analysis captures short run and long run determinants of fiscal policy. The results for all of the dependent variables are reported in Table 3. To capture potentially asymmetric responses to positive and negative shocks, two separate regressions are run for all of the dependent variables. Since the effects of other variables are not affected by a separation of positive and negative shocks, we present only the estimates for these variables in the benchmark formulation without separation.

Both current revenues and expenditures are adjusted in response to shocks. On average, if the surplus is 1 krone higher than budgeted, current revenues are reduced by 60 øre and current expenditures are increased by 29 øre in the next year. These results are in accordance with the findings of Poterba (1994), who concludes that the revenue side takes most of the adjustment in US states. The total adjustment of current spending and revenue is larger in Denmark, 89 % in Denmark and 69 % (same year and next year) in the US. Among the Scandinavian neighbors, the fiscal responses are very different. The Norwegian local public sector is more regulated than the Danish, and the local tax discretion certainly is more limited. Rattsø (1999) finds no short run adjustments to shocks in Norway, and all the adjustment is channeled through investment. For Swedish local governments, Lundberg (1997) identifies no revenue adjustment to shock, and surprisingly concludes that the expenditure side absorbs the shock with reductions of about 50 øre per krone deficit shock.

The fiscal adjustment documented above is encouraging for anyone worried about fiscal imbalances generated by shocks. Local governments compensate shocks by adjusting revenues and expenditures, and fiscal imbalances are avoided. However, if the effects of shocks are asymmetric, short run adjustments have long run effects even when the shocks over time are balanced. The coefficient values for positive and negative shocks indicate some

asymmetry for current revenue. 1 krone positive shock reduces revenue by 56 øre, while 1 krone negative shock raises revenue by 65 øre. The difference is not statistically significant. Poterba (1994) finds a more convincing asymmetric response of current revenue and expenditure for the US states, with ‘strong reactions to unexpected deficits and virtually no adjustment to unexpected surpluses’. As will be shown below, asymmetry in Denmark is more marked in the setting of the income tax rate.

The short run determinants of current revenue and expenditure are written out below:

$$(10) \quad \Delta \text{REV} = -0.602 \text{SURSHOCK}_{-1} + 0.030 \Delta \text{INCOME} + 1.019 \Delta \text{GRANT}$$

$$(11) \quad \Delta \text{EXP} = 0.289 \text{SURSHOCK}_{-1} + 0.150 \Delta \text{GRANT} - 117.87 \Delta \text{UNEMP}$$

In addition to the surplus shock, changes in the income tax base, block grants and the unemployment rate affect the short run fiscal adjustment. Higher private income raises revenue without influencing current expenditure, and consequently contributes to higher surplus. When the private income level goes up by 100 kroner, only 3 kroner ends up as increased current revenue. Considering an average income tax rate at 19.2 per cent, the number seems low. The interpretation is that the positive effect of improved tax base is to a large extent offset by the reduction in tax rates and other revenue sources. Grants increase current revenues by about the same amount, and have less immediate effect on current expenditures. The unemployment rate is a control for cyclical factors, and the estimates imply that increased unemployment motivates an immediate reduction of expenditures. The response indicates that there is no sign of counter-cyclical policy at the local government level.

Current surplus is the result of current revenue and spending decisions. It follows that we can derive determinants of current surplus from the estimates in Table 3. The short run relationship is reached by combining (10) and (11):

$$(12) \quad \Delta \text{SUR} = -0.891 \text{SURSHOCK} + 0.030 \Delta \text{INCOME} + 0.869 \Delta \text{GRANT} \\ + 117.87 \Delta \text{UNEMP}$$

Since the surplus shock leads to both higher current revenue and lower current expenditures, the actual surplus definitely is reduced the year following the shock. This is consistent with our theory framework, and the adjustment process is self-correcting and stabilizing. The next-year surplus effect is about 90 % independent of whether the shock is positive or negative. As explained above, both higher private incomes and grants contribute to surplus, since their expenditure effects are small. The positive effect of the unemployment rate reflects a cautionary fiscal policy towards macroeconomic instability. The limited time span of the data does not allow us to draw conclusions about the long term fiscal process.

The adjustment of current revenue involves the setting of tax rates and thereby the determination of the tax structure. Both property taxes and income taxes respond to shocks. A positive surplus shock reduces the tax rates. The adjustment of tax rates is small, but statistically significant. The income tax rate responds asymmetrically to shocks, as shown by the significant interaction term in Table 3. The coefficient value of the negative shock is about four times higher than for the positive shock. Negative shocks drive up the income tax rate. Since the property tax rate is not asymmetric, shocks tend to give a change in the tax structure over time towards income taxation.

The analysis offers a broader understanding of the determinants of taxation. The short run determinants are written out below:

$$(13) \quad \Delta ITAX = - 0.058 SURSHOCK_{-1} - 0.011 \Delta INCOME - 0.054 \Delta GRANT$$

$$(14) \quad \Delta PTAX = -0.120 SURSHOCK_{-1} - 0.059 \Delta INCOME - 0.316 \Delta GRANT \\ + 0.090 \Delta UNEMP$$

Higher private income tax base and block grants lead to reductions in the tax rates, and the size of the effects is quite large. When the private incomes go up by 1000 kroner, the income tax rate is reduced by 1% point, while the property tax rate is reduced by 0.5 % point. Business cycle factors seem to influence the tax setting too, since the property tax is raised when the unemployment goes up. The result confirms the cautionary fiscal policy documented in the aggregate current revenue and expenditure.

As discussed in the introduction, political institutions are shown to be important for fiscal discipline by Roubini and Sachs (1989) and followers. To investigate the situation in Danish local governments, we have estimated the models with variables describing the municipalities with respect to ideological orientation and strength. Political strength measured as party fragmentation of the local councils can be seen as the local counterpart to central government coalition politics. The main empirical result here is that political strength is associated with lower property taxes. While the income tax rate seems to be determined by economic factors independent of the political characteristics of the municipality, the property taxation is more of a political issue. Our interpretation is that the local council faces a spending pressure related to welfare services and that party fragmentation reduces the ability to form majority coalitions to hold down taxes. In their use of this measure of political strength in Norway, Kalseth and Rattsø (1998) find strength to be important to hold down costs. Another aspect of the politics is ideological orientation of the political leadership. The estimates show that a high share of socialists in the local government council leads to an increase in the property tax rate. Socialists apply the property tax in their policy of redistribution of income and wealth.

A similar analysis of Norway shows that a strong political leadership is associated with higher revenues and higher surplus (Rattsø, 1999). Borge (1995) relates strength to lower deficits in an analysis of Norwegian municipalities. Strength has no clear effect on current revenue and expenditures in our estimates. But ideological orientation may influence deficits, since socialist strength in local councils increases current expenditure in our dataset without affecting current revenue. It is of particular interest to investigate the connection between responses to economic shocks and characteristics of the political structure. We have investigated interaction effects between shocks and politics, but no statistical significant interaction effects are found. Poterba (1994) finds that states with single party control is better able to hold down deficits, which is confirmed by Clingermayer (1991).

According to local government accounting, an unexpected surplus must be counterbalanced by changes in liquidity, changes in (other) financial assets or changes in investments in the same year. Since changes in these variables are related to the decisions regarding the taxes and current expenditures in the same year, the surplus shock is not fully exogenous to the changes in the assets and the investments. Given this warning, we find that liquidity absorbs about 50 % of the shock in the same year. The liquidity is also influenced

by the changes in block grants during the year, as the stock of liquidity increases by about 50 % of a change in grants. There is no effect in the short run from changes in private income.

CONCLUDING REMARKS

Fiscal discipline is a concern in most countries, and the local public sector has been the source of fiscal imbalance in many cases. The central government regulation of the local government finances in Denmark seems to be successful in terms of fiscal imbalance. And when shocks are observed, the local governments quickly adjust revenues and expenditures to compensate deviations from the budgeted balance. Another concern is that the adjustment to shocks tends to be asymmetric, which may lead to a bias towards expansion of the local public sector through the adjustment process over time. A part of this asymmetry is the increase of the income tax rate following negative shocks, while positive shocks induce no equivalent reduction in the income tax rate. In the data, the negative and positive shocks are about balanced over time, and shocks then contribute to a drift toward income taxation.

Analyses of fiscal discipline since Roubini and Sachs (1989) emphasize the role of political structure. We have investigated the importance of political strength measured as party fragmentation of the local council. The main empirical result here is that political strength is associated with lower property taxes, the most controversial local tax instrument. Party fragmentation influences the ability to establish strong majority coalitions, and fragmentation may reduce the strength to hold back the spending pressure related to welfare services. However, political strength does not influence the totals of revenues and expenditures, contrary to the analyses of Rattsø (1999) of Norway and Poterba (1994) of US states. Political strength in Denmark therefore is more of an issue of tax structure. Ideological orientation of the local councils is important for both expenditure level and tax structure. Socialists prefer higher expenditures and contribute in this way to higher deficits, as revenues are not affected by ideology. Socialists also prefer to finance a larger share of the revenues through property taxation, as a high share of socialists in the local government council is associated with a higher property tax rate.

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APPENDIX: DATA AND VARIABLES

Local government data are provided by the Ministry of Finance, Denmark and professor Poul-Erik Mouritzen, Odense Universitet. The dataset covers all local governments. Data on current expenditures and revenues and descriptives are available for the period 1984-1996, while complete data on service revenue and expenditure and transfer income and transfer payments have been available for 1989-1996.

Variables at local government level, local government i , year t , all economic variables per capita, 1996-DKK (global average and standard deviation in parenthesis):

REV_{it} - Current revenue, 35548 (7100).

$REVB_{it}$ - Current revenue budgeted for year t in year $t-1$, 34926 (7033).

EXP_{it} - Current expenditure, 34486 (6953).

$EXPB_{it}$ - Current expenditure budgeted for year t in year $t-1$, 33925 (6837).

$LIQV_{it}$ - Stock of liquidity ultimo year t , 3152 (2359).

$ITAX_{it}$ - Income tax rate in year t , percent, 19.2 (1.6).

$PTAX_{it}$ - Property tax rate in year t , per thousand, 9.5 (5.5).

INC_{it} - Private net income, 83724 (17320).

$GRANT_{it}$ - Lump sum block grants, 3336 (2363).

$UNEMP_{it}$ - Unemployment rate, percent, 9.6 (3.0).

SOC_{it} - Share of representatives from socialist parties, 0.408 (0.144).

$HERF_{it}$ - Herfindahl index, 0.321 (0.081).

We define the following parties as socialists:

The 1981 election: Socialdemokratiet, Socialistisk Folkeparti, Internationalen-Socialistisk Arbejderparti, Danmarks Kommunistiske Parti, Arbejderpartiet, Venstresocialisterne.

The 1985 election: Socialdemokratiet, Socialistisk Folkeparti, Internationalen-Socialistisk Arbejderparti, Danmarks Kommunistiske Parti, Arbejderpartiet, Venstresocialisterne, De Grønne, Det Humanistiske Parti.

The 1989 election: Socialdemokratiet, Socialistisk Folkeparti, Danmarks Kommunistiske Parti, De Grønne, Det Humanistiske Parti, Felles Kurs.

The 1993 election: Socialdemokratiet, Socialistisk Folkeparti, Enhetslisten De Rød-Grønne.