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BUDGETARY DYNAMICS IN THE LOCAL AUTHORITIES IN ISRAEL[1]

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This study examines the short-run effects and dynamics of exogenous shocks to the regular budgets of the local authorities in Israel with emphasis on the reduction in government participation and taking into account the heterogeneity of the local authorities. To accomplish this, the study uses a panel of 193 local authorities for the years 1996–2002 and estimates a dynamic model for the components of the regular budget. This makes it possible to examine the dynamics of fiscal adjustment in response to changes in the size of the deficit and in the components of the budget. The changes in revenue from municipal taxes and other independent revenues, expenditure and participation and equalization grants were estimated by means of a Vector Error Correction model. The main findings are as follows: (a) Exogenous changes in the components of the budget, such as a reduction in government grants, affect the level of the per capita deficit in the short run but following that the deficit converges to its original level. (b) A reduction in government grants leads to an immediate cutback in services to residents and increased deficits. (c) The process of adjustment in the non-Jewish local authorities is twice as long as that in the Jewish ones. Therefore, the reduction in grants leads to an increase in deficits for a longer period in non-Jewish local authorities. (d) The process of budgetary adjustment differs among local authorities according to socioeconomic ranking. The weakest local authorities (clusters 1-3) and the strongest local authorities (clusters 8-10) respond to a change in the deficit primarily by reducing labor costs while the development town local authorities cut back their services to residents.

1. INTRODUCTION

The local authorities account for a significant proportion of the general government's activity and exhibit a high degree of heterogeneity in the structure of their economic activity. The goal of this study is to examine the dynamics of fiscal adjustment in the local authorities' budgets to exogenous shocks. This is particularly relevant in view of the reduction in government funding of the local authorities' budgets during the years 2002–04

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which led to a serious deterioration in the services provided by many local authorities and in some cases led to liquidity problems and an inability to meet current obligations for an extended period of time. The cutback in government grants primarily affected local authorities whose populations have a low socioeconomic ranking.[3] This was in contrast to the long-run improvement in the local authorities' fiscal management which led to a halt in the growth of their debt to the banks in the mid-90s. This was accomplished without any increase in government transfers relative to the local authorities' activity. This improvement was to a large extent the result of the more efficient enforcement of financial reporting requirements which began with the publishing of audited financial reports for the local authorities. It was also due to the tighter budget constraints placed by the government on decision makers in the local authorities (following the Suari Commission of 1993) and the increased ability of voters to assess the financial management of their local authority (Diskin, 1999; Brender, 2003). These processes, along with the recovery plans implemented in many of the local authorities, transformed the local authorities from a sector that increased the government deficit each year to one that makes only a marginal contribution to the deficit (although there remain a number of local authorities whose management is problematic).

The sharp reduction in equalization grants and in the government funding of the local authorities' budgets can be viewed as an experiment and provides us with the opportunity to test the reaction of the local authorities to exogenous shocks while taking into account the heterogeneity of the sector. To this end, the study uses panel data on 193 local authorities[4] for the period 1996–2002 prior to the reduction in grants. The unique feature of this study is the use of panel data and the simultaneous and dynamic estimation of the regular budget.[5] The proposed behavioral model makes it possible to forecast the budget dynamics created as a result of shocks to the various budget components, such as cuts in government grants. The Vector Error Correction (VEC) method was chosen to estimate the budget dynamics. As part of the VEC model, a Granger causality analysis was performed for changes in independent revenues, government transfer payments to the local authorities, municipal expenditure and the cost of debt service. The model is similar to Vector Auto Regression (VAR) which was first applied by Dahlberg and Johansson (1998, 2000) and by Holtz-Eakin et al. (1989). In the VEC model, in contrast to VAR, the estimated vector also includes the deficit which makes it possible to differentiate between short- and long-run effects. Since the estimated budget components are determined simultaneously, a system of equations was estimated that explains the short- and long-run dynamics of the regular

[3] For a more detailed discussion of this topic, see the 2003 Report of the Research Department, Bank of Israel, pp. 192–196.

[4] During the period of the sample, there were 210 local authorities in Israel. Jerusalem was not included in the panel due to its special characteristics and neither were small local authorities for which data was not accessible.

[5] The budgets of the local authorities are divided into two main types: the regular budget, which is designated for the financing of current activity, and the development budget. This study is concerned with short-run dynamics and therefore concentrates on the activity financed by the regular budget and ignores the development budget. The financial data for the regular budget include data on the composition of expenditure, revenue, grants and the deficit.

budget components, including independent revenue per resident, grants per resident and expenditure per resident. The model assumes that the local authorities affect their budgets through non-negligible fixed effects. The variation in the budget response is dependent on the physical characteristics of the local authorities, as well as on their budgetary characteristics. The use of this method makes it possible to isolate the effects of the various groups of local authorities. In the second stage of the study, use is made of the VEC model in order to detect differences between the budget dynamics of the Jewish and Arab local authorities and between socioeconomic clusters of local authorities.

This study follows previous ones which examined the relationship between budget components and a local authority's characteristics. Using cross-section samples, previous studies found strong causal relationships between a number of fiscal variables though they used models for estimation that ignore intertemporal dynamics (Ben-Ali, 1999; Razin, 1998, 1999 and 2002). These studies found that there are economies of scale in budget management whereby the larger local authorities benefit more from budget stability than smaller ones. An additional advantage they identified is the existence of a possible correlation between a local authority's socioeconomic ranking and the exploitation of independent revenue potential. Razin (2002) showed that local authorities with a high socioeconomic ranking rely less on the participation of the government (i.e. government grants account for a lower proportion of their total revenue). An additional finding of these studies is that socioeconomic ranking is positively correlated with a local authority's per capita expenditure, its per capita revenue and the per capita size of the grants and loans it receives. The issue of the local authorities' deficits is more complex than simply the question of which factors influence revenues and expenditures since the size of the deficit is also dependent on the unquantifiable characteristics of each local authority, such as the quality of its management. Nevertheless, we can expect budget changes to be correlated with changes in the size of the deficit.

The article is divided as follows: Section 2 describes the equation for the local authorities' sources and uses. Section 3 presents the possible causal relations between the components of the budget. Section 4 outlines the empirical framework for the estimation of the budgetary dynamics of changes in the size of the deficit and the budget components. Section 5 describes the database. Section 6 presents the estimation results. Section 7 presents conclusions drawn from the estimation of the model. The appendices present the detailed estimation results and a description of the variables and their treatment.

2. THE LOCAL AUTHORITIES' BUDGETS

The local authorities, like the government, manage their budgets on a cash basis while the Auditing Branch of the Ministry of the Interior publishes the local authorities' audited financial reports on a uniform accounting basis. Thus, the deficit that the mayor relates to is calculated on a cash basis and does not include special loans and grants on the revenue side nor the debt that is to be redeemed on the expenditure side. This deficit is smaller and more stable over time. The increased involvement of the Ministry of Finance, beginning in the mid-90s, and the expanded auditing of the local authorities by the Ministry of the Interior

led to the publishing of audited financial reports on a uniform and comparable basis. The accounting budget lines, as they appear in the published reports, include repayments of loans and therefore do not reflect the local authority's economic activity or the behavioral mechanism of its decision makers.

The expenditures of the local authorities are divided between two types of services: public services such as education and welfare and municipal services such as cleaning and sanitation, water, sewage and urban planning. The expenditure on services includes municipal and public services (education and welfare) and is broken down into expenditure lines for salaries and expenditure lines for activity. Some of the local authorities outsource their municipal services (water, sewage and garbage collection) through independent municipal corporations while the rest provide these services themselves. For the purposes of this study, expenditures on the water and sewage system were combined as part of the local authority's activity, even for local authorities that purchase water services from an outside party. An additional component of a local authority's expenditure is the financing of the deficit and the redemption of debt.

The sources available to the local authority (for current uses and the provision of services but not for development needs) can be divided into independent revenues, revenue from government participation in the financing of public services that are mandated by law, designated grants and other revenues (donations, revenues from joint projects with other local authorities and funding from public institutions).

The independent revenues of the local authority are defined as funds that are collected directly from the residents and businesses within the jurisdiction of the local authority. Independent revenues come from four sources: 1) arnona (municipal taxes on residences and businesses); 2) fees for municipal services; 3) revenues from various bylaws, fees and levies; and 4) fees for the use of municipal property. Arnona is the main source of a local authority's independent revenues.

The participation grants are transferred directly from the budgets of various government ministries (primarily from the Ministry of Welfare and the Ministry of Education) to the local authorities for the purpose of providing public services that are mandated by law or as general financing. Participation grants are also provided by the Ministry of the Interior (to finance firefighting services, for example), the Ministry of Agriculture, the Ministry of Absorption, the Ministry of Defense, etc. The proportion of these transfers within a local authority's budget is relatively small and is generally related to programs that are dependent on unique local characteristics. The size of the participation grants is calculated according to tables which are decided on by each ministry and are available to the public. Appendix 1 describes the participation grants from the various ministries in greater detail.

3. ESTIMATION

An analysis of the fiscal dynamics of the local authorities and their reaction to exogenous shocks requires a long-run view and the use of a panel in order to control for the fixed effects that influence the activity of the local authority and which vary with a local authority's location, its unobservable characteristics, etc. These fixed factors are liable to

affect the budget components in different ways but it can be assumed that there are links between these components since they are determined simultaneously. The empirical method chosen to estimate the behavioral equations of the local authority's decision makers is the Vector Error Correction (VEC) model as presented by Bohn (1991) and applied for the first time by Buettner and Wildasin (2002). Buettner and Wildasin analyzed the variation in the deficits of local authorities in the US. The model is similar to a constrained Vector Auto Regression (VAR) model; however, unlike VAR, the VEC model is appropriate for variables that are non-stationary but are linked through a long-run cointegrative relation and therefore the model allows for dynamics between the endogenous variables.

The model assumes that the per capita economic deficit is sustainable[6] and that the local authorities face an inelastic intertemporal budget constraint. This specification makes it possible to differentiate between short-run and long-run relations. As part of the VEC model, a Granger causality analysis was carried out on tax collection, government transfer payments to the local authorities, revenue and expenditure. This framework makes it possible to obtain a broad perspective on the short- and long-run relations between the budget variables and local authority characteristics. It should be remembered that the estimated equations are not based on a structural/behavioral model of the local authorities but rather represent a reduced form for the fiscal adjustment of the various budget variables to budgetary changes which is similar to the behavioral model of Dahlberg and Johansson (2000).

3.1 The model

In contrast to the budget of the national government, a significant proportion of the funds available to local authorities is provided by unilateral government transfers to fund the cost of municipal activity[7] and from designated equalization grants. For many local authorities, particularly weak ones, these grants are essential for balancing the budget and therefore revenues are broken down into independent revenues and revenue from grants. The budget for local authority i in year t is therefore dependent on its revenues and expenditures and can be written as follows:

$$(1) \qquad D_{i,t} = E_{i,t} + DS_{i,t} - R_{i,t} - G_{i,t}$$

where the deficit is dependent on a number of endogenous variables: (1) the local authority's salary expenses (E_t); (2) the cost of servicing the debt (DS_t) – the redemption of loans and other financing expenses; (3) independent revenues (R_t) – revenues from arnona and other independent revenues from education and welfare; and (4) government transfers (G_t) – equalization grants and participation grants for municipal activity in education and welfare. The components of revenue, i.e. (3) and (4), can be divided into free revenues (arnona and equalization grants) and revenues from activity. The free revenues can be divided into arnona (R_arnona) and revenues from education and welfare services (R_other). In the same way the revenue from grants can be divided into equalization grants

[6] That is, the local authority is able to finance the deficit over the long run.

[7] For further details on participation and equalization grants, see Appendix 1.

(G_izun) and participation grants (G_partic) which are paid to the local authority in order to finance specific expenses. Similarly, expenditure can be divided into salary expenditure (E_wage) and expenditure on activity (E_activ) although, in contrast to the breakdown of revenue components, this breakdown is not as precise since the provision of services by the local authority necessitates the payment of salaries to the workers involved.

Most of the current deficit, as it appears in the audited financial reports, is composed of the costs of loan redemption while it is the economic deficit[8]— calculated on a cash basis— that the local authority's decision makers take into consideration. Therefore, the estimated model uses the deficit on a cash basis rather than the budget deficit. This deficit is composed of the accounting deficit minus the redemption of loans and plus transfers from the regular budget. Thus, equation (1) can be rewritten as follows:

$$(2) \qquad ED_{i,t} = E_{i,t} - R_{i,t} - G_{i,t}$$

where ED_t is the economic deficit and where financing expenditures from the debt service budget line have been added to expenditure. The VEC model is one of the accepted methods of estimating budgetary adjustments in response to shocks and the causality between the various budget lines. The rationale for this model is that if local authorities, on average, maintain budget discipline in order to remain within the intertemporal budget constraint, the components of the budget will be linked through a cointegrative relationship and in the long run the deficit will be sustainable (Holtz-Eakin, 1989; Bohn, 1991). Since the number of residents in a local authority changes over time and these changes are unrelated to the intertemporal budget constraint, equation (2) needs to be normalized for the number of residents within the local authority's jurisdiction.

$$(3) \qquad \frac{ED_t}{n_t} = \frac{E_t}{n_t} - \frac{R_t}{n_t} - \frac{G_t}{n_t} = \hat{E}_t - \hat{R}_t - \hat{G}_t$$

The econometric theory behind the VEC model assumes that the deficit is stationary (since it is sustainable) and that the changes in the budget components (the dependent variables) can be the result of lagged changes in the various budget components, the size of the deficit and other exogenous variables. Thus, the behavioral equation describing the budget dynamics between the endogenous components can be described using a simultaneous system of behavioral equations (Model 1):

$$(4) \qquad \begin{aligned}
\Delta\hat{R}_t &= \alpha_1 + \sum_{i=1}^{2} \beta_{1i} \Delta\hat{R}_{t-i} + \sum_{i=1}^{2} \gamma_{1i} \Delta\hat{G}_{t-i} + \sum_{i=1}^{2} \delta_{1i} \Delta\hat{E}_{t-i} + \theta_1 E\hat{D}_{t-1} + \phi_1 Z_{t-1} + \varepsilon_1 \\
\Delta\hat{G}_t &= \alpha_2 + \sum_{i=1}^{2} \beta_{2i} \Delta\hat{R}_{t-i} + \sum_{i=1}^{2} \gamma_{2i} \Delta\hat{G}_{t-i} + \sum_{i=1}^{2} \delta_{2i} \Delta\hat{E}_{t-i} + \theta_2 E\hat{D}_{t-1} + \phi_2 Z_{t-1} + \varepsilon_2 \\
\Delta\hat{E}_t &= \alpha_3 + \sum_{i=1}^{2} \beta_{3i} \Delta\hat{R}_{t-i} + \sum_{i=1}^{2} \gamma_{3i} \Delta\hat{G}_{t-i} + \sum_{i=1}^{2} \delta_{3i} \Delta\hat{E}_{t-i} + \theta_3 E\hat{D}_{t-1} + \phi_3 Z_{t-1} + \varepsilon_3
\end{aligned}$$

[8] See Section 4 for a more detailed explanation of the difference between the economic and budgetary deficits.

Each of the simultaneous equations appearing in Model 1 is explained by two lags of the endogenous variables and the lagged economic deficit (ED_t), as well as a vector of exogenous control variables (Z_t): the average wage per salaried position among the residents of the local authority (wage) as an indicator of the local authority's socioeconomic situation; the dependency ratio[9] (tlut_ratio) as a demographic control variable; the government deficit as a percentage of GDP (gov_def) which acts as a control variable for the government's economic situation; and a dummy variable for 1998 which was an election year in most of the local authorities (elections_98). The dummy variable receives a value of 1 in the year 1998 for local authorities in which elections were held and 0 for all other years and for local authorities that did not hold elections in 1998.

The model allows for correlation between the residuals of the estimated equations. The equations, which are estimated by the addition of lags of the other dependent variables, make it possible to test for Granger causality between the variables. The model is estimated using the Full Information Maximum Likelihood (FIML) method where θ_j (the coefficients of the deficit in each of the equations) are the Error Correction (EC) coefficients.

It can be seen that the EC variables of revenue and expenditure will have opposite signs ($\hat{\theta}_1 > 0$, $\hat{\theta}_3 < 0,$) in order that the long-run stationarity conditions be fulfilled. The estimated equations in the model do not directly control for the existence of fixed effects for each local authority; however, on the assumption that these effects do not change over time, estimation of an equation of differences of the VEC type solves the problem and makes it possible to test the differences in budgetary dynamics between groups of local authorities. In order to control for the differences in characteristics between the local authorities (religion and socioeconomic ranking) the model must be estimated for each group separately.

4. THE DATA

The research uses panel data on local authorities for the years 1996–2002. Seventeen of the 210 local authorities were omitted due to lack of data.[10] Since the panel has only 7 years of data, conclusions cannot be drawn regarding long-run budget dynamics but it is possible to analyze the short-run effects of fiscal shocks.

The final sample included 193 local authorities. A breakdown by dominant religion shows that 121 of them have Jewish majorities (17 of which have mixed populations) and the rest have non-Jewish majorities. The division according to socioeconomic ranking for 2001 shows that 66 of the local authorities are within ranking 1-3, 57 are within ranking 4-5, 34 are within ranking 6-7 and the remaining 36 are within the highest ranking of 8-10. The sample includes financial data from the audited financial reports and data on the physical characteristics of the local authorities. The data was obtained from the Branch for Auditing of Local Authorities and from publications of the Central Bureau of Statistics. The

[9] The ratio between residents who are not of working age (0-14, 65+) and those who are (16-64).

[10] The Central Bureau of Statistics does not publish population statistics for local authorities whose population is less than 5,000.

data are normalized according to number of residents, unless otherwise noted, in order to take into account the variation in population among the local authorities. The treatment of the dependent variables is explained in Appendix 2.

Table 1, which presents the variables used in the estimation, shows that the local authorities in the sample are relatively large ones with an average population of 36 thousand as compared to 27 thousand for all local authorities during the period 1996–2002. This is due to the fact that the Central Bureau of Statistics does not publish data on the population breakdown of local authorities with less than 5,000 residents. The data in the table also show that 55 percent of the local authorities' revenue is from grants with only the remaining 45 percent from independent revenue. The proportion of equalization grants within total grants is an average of 54 percent for the sample. The average deficit of the local authorities in the sample is 5.2 percent. Another interesting feature of the data is the very large standard deviation for most of the variables which is an indication of the high level of variation among the local authorities.

Table 1
Main Variables, 1996 to 2002 (NIS per resident, in 2002 prices)

Variable	Average	Standard Deviation
Residents (thousands)	33.8	51.8
Dependency ratio (percentage)	63.8	31.9
Proportion of jobseekers	3.9	1.3
The average wage per salaried employee – males	6,692	2,250
Sources		
Independent revenues	2,154	1,354
of this: Revenue from arnona	1,244	885
Grants	2,628	1,317
of this: Equalization grants	1,428	1,067
Uses		
Independent expenditures	4,246	1,506
of this: Salary expenditure	1,907	620
Economic deficit	85.7	602.0

4.1 Socioeconomic ranking

As part of an analysis carried out by the Central Bureau of Statistics[11], which was published in January 2004, the local authorities were ranked according to the socioeconomic level of their populations in 2001. The ranking was done on the basis of demographic variables,

[11] "Characterization of the Local authorities and their Ranking according to their Population's Socioeconomic Status in 2001", January 27, 2004. http://www.cbs.gov.il/hodaot2004/13_04_22.htm

standard of living, education, employment and unemployment and pensions. The result is a ranking of local authorities into ten clusters. The lowest two clusters contain 41 local authorities which are primarily Arab ones and the lowest ranked of those are Bedouin local authorities in the Negev. These clusters also include a number of Jewish local authorities which contain ultra-Orthodox populations (Beitar Illit, Modiin Illit and Bnei Brak). Only in the third cluster are there a number of local authorities which are (still) called development towns (Netivot in 60th place and Ophakim in 71st place). The rest of the development towns are located in the fifth cluster between the 80th and 110th places. Beyond the 123rd place there are no Arab towns. Thus, the top-ranked local authority with a minority population (which is a Druse town) is located in the middle of the table. The highest cluster (9-10) is made up of Jewish local authorities, most of which are located in the Center of the country. Givatayim, whose local authority is in the highest place (193rd), is in the 8th ranking.

Table 2 shows that the local authorities' revenues and expenditures are correlated with their socioeconomic status. Thus, per capita revenue and expenditure increase with socioeconomic ranking. At the same time, per capita government participation in the local authorities' expenses decreases with socioeconomic ranking. The data on socioeconomic ranking is only available for the years 1995, 1999 and 2001 and therefore the average wage per position among men was used in all the equations in order to control for socioeconomic ranking. This variable was found to be correlated with the local authority's socioeconomic ranking (in 1999 the correlation was found to be 0.95) and, in contrast to socioeconomic ranking, is available for all years of the sample.

Table 2
Main Economic Characteristics according to Socioeconomic Status, Average for 1996-2002

Cluster	1–3	4–5	6–7	8–10
Per capita independent revenue	1,007	2,045	2,917	3,705
of this: per capita arnona	539	1,257	1,683	2,088
Per capita grants	2,818	2,934	2,229	2,209
of this: Per capita equalization grants	1,564	1,533	1,190	1,265
Per capita expenditure	3,386	4,485	4,562	5,181
Per capita economic deficit	65	54	51	202

Source: Audited Financial Reports, Branch for Auditing of the Local Authorities, in NIS according to 2002 prices.

4.2 The local authority's dominant religion

The distribution of local authorities according to the ranking of the Central Bureau of Statistics suggests the hypothesis that there is a significant difference between local authorities according to religion. To test this hypothesis, the local authorities were divided into two main groups: Jewish and mixed local authorities in one group and the rest in the other. The grouping of the local authorities in this manner is meant to take into account the significant differences between the two groups. Thus, the minority local authorities are located primarily in the periphery which is characterized by a wide dispersion of the

population and problems of accessibility to centers of employment. Indeed, the comparison of the main characteristics of the local authorities according to dominant religion (Table 3) reveals significant differences in the local authorities' financial condition. Thus, the Jewish local authorities are 3.4 times larger on average than the non-Jewish ones and their per capita independent revenue is three times larger (primarily because per capita revenue from arnona is much lower in non-Jewish local authorities). Accordingly, per capita expenditure in the non-Jewish local authorities is about 30 percent lower than in the Jewish ones. Therefore, the non-Jewish local authorities are dependent to a larger extent on government grants, particularly the equalization grants, in order to balance their budgets.

4.3 Unit roots in panel data

Estimation of time series requires that the variables be stationary in order for the Gauss-Markov assumptions to hold. In order to ensure that the estimated coefficients in the model are stationary, an Im, Pesaran and Shin test (IPS, 2003) was carried out in order to test for unit roots in the panel data. This involves testing for the existence of a unit root in each of the local authorities (193 equations for each variable) and then weighting the statistics obtained for each local authority into one final statistic. The reason for choosing the IPS test rather an alternative one, such as the one suggested by Leven, Lin and Chu (LLC, 2002) or the Breitung-Meyer test (BM, 1994), is that the alternative tests assume that all the local authorities have the same unit root. The IPS, in contrast, is free of that assumption and allows for each local authority to have a different root. This is accomplished by applying an Augmented Dickey-Fuller (ADF) test to each local authority separately.

Table 3
Main Characteristics According to Dominant Religion Average for 1996-2002

	Jewish Local Authorities	Non-Jewish Local Authorities
Number of residents (thousands)	34.4	10.2
Socioeconomic cluster (median)**	6	3
Average wage per salaried position	7,671	5,867
Independent revenues	2,876	939
of this: Revenue from arnona	1,686	496
Grants	2,541	2,793
of this: Equalization grants	1,352	1,571
Expenditures	4,786	3,364
Deficit	636	368

Source: Audited Financial Reports, Branch for Auditing of the Local Authorities; NIS in 2002 prices.

* The financial data is per capita in NIS.

** According to the division into clusters for 2001.

Table 4 presents the statistics for the IPS test: once for the levels of the budgetary variables and once for the first differences where the null hypothesis is the existence of a unit root. Because of the small number of years for which data is available, the test was carried out with one lag. As expected, independent revenues and expenditures were only stationary after taking differences while the government grants and economic deficit were stationary without taking differences (at a 5% level of significance). A possible explanation of these results is that per capita independent revenues and expenditures are dependent on the residents' standard of living which has increased over time (including the sample period).

Table 4
The Im, Pesaran and Shin Test for Unit Roots in Panel Data[12]

Variable[13]		W-Statistics
R	Per capita independent revenue	-0.82
G	Per capita government grants	-3.43*
E	Per capita expenditure	-1.26
ΔR	Δ(Per capita independent revenue)	-33.16*
ΔG	Δ(Per capita government grants)	-10.29*
ΔE	Δ (Per capita expenditure)	-4.53*
ED	Per capita economic deficit	-7.68*

In contrast, the economic deficit is restricted to a low level due to long-run budget constraints and therefore is stationary. These results provide support for performing the estimation of the budgetary variables using differences.

5. ESTIMATION RESULTS

As mentioned earlier, the estimation of the model creates a large number of estimated parameters since the set of equations includes a number of simultaneous difference equations. We will first present the results of the test for the optimal number of lags in the basic model (Equation 4) in which total independent revenue, total grants and total expenditure are dependent on their own lagged values and on the level of the economic deficit. In the second stage, estimation results are presented for the various categories of local authorities (Table 5) and finally an analysis of causality is presented.

Although the testing of budgetary dynamics in the relatively short run (1996–2002) is problematic, the large number of cross-section dimensions, i.e. the large number of local authorities, enables us to test whether the estimates are consistent. The estimation of the VEC model (Equation 4) requires testing for the optimal number of lags. Since the data is

[12] An asterisk indicates the rejection of the null hypothesis at a level of 5% according to Im et al. (1997, Table 2). One lag.

[13] All the variables are expressed in 2002 prices.

Table 5
Stages of Estimation

Specification	Model
Estimation of the basic model (Equation 4) for independent revenues, grants and expenditure.	Model 1
Model 1 + separation between revenue from arnona and other independent revenues, between the equalization grants and participation grants and between expenditure on salaries and expenditure on activity.	Model 2
Model 2 + interactive variables for non-Jewish local authorities	Model 3
Model 3 + interactive variables for the clusters	Model 4

annual and there are only a few years in the sample, the model was first estimated as an unrestricted model with two annual lags and then used to test for the optimal number of lags.[14] As can be seen from Table 6, which presents the test statistics for the likelihood ratio test of the number of lags estimated in Model 1, the null hypothesis that the second lag is not significant cannot be rejected and therefore the model was estimated with two lags. Three other criteria that were tested (Schwarz, Akaike and Hannan-Quinn) also supported the estimation of a model with two annual lags.

Table 6
Test for the Optimal Number of Lags[15]

Number of lags	Log(L)	LR	AIC	SC	HQ
0	-13347.37	-	56.35	56.42	56.37
1	-13260.25	172.03	56.05	56.26	56.13
2	-13176.25	164.45*	55.76*	56.11*	55.90*

Note: log(L) – log of the likelihood, LR – test of the likelihood ratio, AIC – Akaike criterion, SC – Schwarz criterion, HQ – Hannan-Quinn criterion.
* Number of optimal lags.

5.1 Error correction

The physical dynamics of the changes in the level of the deficit are manifested in the error correction estimates. This dynamic describes the short-run relation. The model is estimated using two different specifications: Model 1 which is the basic model and does not

[14] It should be remembered that two differences in the differences equation translate into three annual lags.
[15] The unrestricted model is the one with two lags.

differentiate between revenue and expenditure components and Model 2 which differentiates between revenue from arnona and other independent revenues on the one hand and between equalization and participation grants from the various ministries on the other. This makes it possible to determine whether there is a difference between the adjustment of unrestricted sources, which are unrelated to the actual provision of services, and the adjustment of sources that are conditional on the provision of services, as well as between the adjustment of expenditure on salaries and that of expenditure on activity.

Table 7 presents the EC estimates for each of the equations in Model 1 and 2 which show that there is convergence to the intertemporal budget constraint in the long run even though exogenous shocks that affect the size of the deficit are possible in the short run. In the two specifications (Model 1 and 2), the coefficients receive the expected signs: the EC coefficients for expenditures are negative and those of independent revenues are positive. It was also found that the budgetary adjustment to change in the level of the deficit is carried out through changes in expenditure. Thus, an increase in the current deficit leads to a reduction in expenditure through a positive and statistically significant effect. The detailed

Table 7
Error Correction Estimates

Equation	Model 1	Model 2
D(E)	-0.128* (0.036)	
D(E_wage)		-0.029* (0.010)
E_activ(D)		-0.095* (0.035)
D(R)	0.016 (0.021)	
R_arnona(D)		0.004 (0.019)
R_other(D)		0.016 (0.021)
(G)	-0.011 (0.017)	
G_izun(D)		-0.017 (0.015)
G_partic(D)		-0.002 (0.014)

Source: Models 1 and 2. Detailed results of the estimation are presented in Appendix 3 and 4. Standard deviations appear in parentheses.

* Significant at a level of 5%.

model (Model 2) indicates that the dynamic of budgetary adjustment differs between components: a shock that increases the deficit will lead to a reduction in expenditure on activity and to a lesser reduction in expenditure on salaries. A possible explanation is that the local authorities are unable to alter labor agreements and the expenditure on salaries in the short run and therefore reduce the level of services they provide to their residents. The detailed results of the estimation appear in Appendix 3 and 4.

5.2 The budgetary dynamics in the non-Jewish local authorities

Brender (2005) points out that ethnic diversity negatively affects the level of economic activity in local authorities. He claims that one of the main reasons for this is the lack of trust between the groups. Brender also shows that the rate of arnona collection in non-Jewish local authorities is significantly lower than in Jewish ones. Other studies, which compare Jewish and non-Jewish local authorities, have demonstrated significant differences in their financial situations. Razin (1999) explains the differences as being the result of, among other things, the fact that Jewish local authorities are larger than non-Jewish ones (in number of residents) and that per capita independent revenues are higher in the Jewish local authorities. This hints at a difference in behavior between the local authorities, as well as in budgetary dynamics. In view of this, Model 2 was estimated with the addition of interactive variables[16] (slope dummies) for non-Jewish local authorities. According to this method, the interaction between the dummy variables for the non-Jewish local authorities and the budget components represents a difference in the speed of fiscal adjustment between Jewish and non-Jewish local authorities. This makes it possible to statistically test whether the behavior patterns of the two categories of local authorities are the same. Due to the relatively small number of observations for non-Jewish local authorities in the sample, no differentiation was made between Arab (including Bedouin) local authorities and local authorities with a Druse majority. Such a differentiation is in fact desirable since the Druse serve in the army and are engaged in Israeli society more than Arab Israelis. Thus, it can be assumed that the Druse have more trust in the government and that the budgetary dynamic of Druse local authorities differs from that of Arab ones. Such a comparison can be made in the future when data becomes available for additional time periods. A t-test which was used to determine whether the EC estimates are identical for the two groups showed a significant difference (at a level of 5 percent) in the dynamics of the wage expenditure equation ($t=2.24$) and that the dynamics of wages in the non-Jewish local authorities is slower than in Jewish ones. Thus, the null hypothesis—that there is no difference between the local authorities—can be rejected for the rest of the budget components.

The EC estimates from Model 3 (Table 8) indicate that indeed the budget dynamic differs between Jewish and non-Jewish local authorities: (1) The Jewish local authorities carry out a rapid adjustment in the size of the deficit through the adjustment of expenditure on salaries and on activity while Arab local authorities carry out the adjustment only

[16] A multiplicative of the situation variables and the dummy variable for Arab local authorities. In this way, the behavior of the local authorities can be compared according to their characteristics in the same estimation.

through a change in expenditure on salaries. (2) The speed of adjustment of budget components to changes in the economic deficit is slower which is manifested in lower

Table 8
Error Correlation Estimates according to Religion

Equation	Jewish Local Authorities	Non-Jewish Local Authorities
D(E_wage)	-0.030 *	-0.019 *
	(0.010)	(0.008)
D(E_activ)	-0.099 *	-0.059
	(0.036)	(0.032)
D(R_arnona)	0.096	0.005
	(0.019)	(0.018)
D(R_other)	0.017	0.009
	(0.021)	(0.020)
D(G_izun)	0.027	0.022
	(0.015)	(0.013)
D(G_partic)	0.004	0.004
	(0.014)	(0.011)

Source: Model 3. The regression printouts can be obtained from the author. Standard deviations appear in parentheses.

* Significant at a level of 5%.

estimates (in absolute terms). The standard deviations of the EC coefficients for non-Jewish local authorities are lower than for the Jewish ones which may indicate a larger variation within the non-Jewish local authorities. The Impulse Response analysis of short-run relations between the four endogenous budget components (in which they react to a one-time unexpected reduction of one standard deviation—165 NIS per capita—in government grants) indicates that the reduction of grants to non-Jewish local authorities leads to a reduction of expenditure in the subsequent two years and the return of the deficit to its stable level. This reduction also leads to the lengthening of the period during which the unexpected shock in grants is corrected for, such that over a period of 10 years correction is only made for 44 percent of the reduction. This is primarily because the EC coefficient of expenditure (which is the primary component of the correction) in the non-Jewish local authorities is lower by almost half than in the Jewish local authorities.

5.3 Budgetary dynamics according to socioeconomic ranking

One of the claims made during the crisis of the local authorities in 2003, which was partly the result of a sharp cutback in equalization and participation grants, was that the reaction of a local authority to the budget crisis is dependent on its socioeconomic situation.[17] In other words, the lower a local authority's socioeconomic ranking, the more dependent it is on external sources, i.e. government grants, in order to finance its expenditure. A cut in grants is liable to lead to chronic deficits among weak local authorities while stronger local authorities (cluster 8-10) are less dependent on grants and therefore can be expected to more easily weather similar shocks. It should be mentioned that in 2001, only 15 of the 210 local authorities were independent, i.e. did not receive equalization grants, and all of those were Jewish and located in the 8-10 cluster. In order to test this claim, and the more general hypothesis that budgetary dynamics are dependent on the local authority's socioeconomic ranking, Model 2 was reestimated with the addition of slope dummies for clusters (which had been aggregated into main groups). Since the non-Jewish local authorities are located in the lowest cluster (rankings 1-4), they were omitted from the estimation. The clusters were grouped as follows: (1) Ranking 1-3 which includes the ultra-Orthodox local authorities and a number of development towns; (2) Ranking 4-5 which primarily includes development towns (Jerusalem is in ranking 4 and not included in the sample); (3) Ranking 6-7; (4) Ranking 8-10 which includes the strong local authorities in the Center of the country as well as well-off local authorities such as Omer and Savion. The estimation of the model through the addition of interactive variables (between the dummy variables for cluster groups and the EC variables) makes it possible to test, among other things, whether the reaction to an impulse differs among the local authorities. The estimated equation (Model 4) describes the budgetary dynamics of the local authorities according to the breakdown into ultra-Orthodox local authorities, development towns and strong Jewish local authorities.

The results of the estimation of Model 4 (Table 9) show that the reaction to an impulse differs significantly between groups. Thus, it was found that ultra-Orthodox local authorities (Jews in clusters 1-3) and weak development town local authorities (Jewish local authorities in clusters 4-5) react to a deficit increase by adjusting their labor costs and by reducing the services to residents while stronger local authorities react only through a reduction in services. A comparison between Arab and ultra-Orthodox local authorities (Jewish local authorities in clusters 1-3) showed a significant difference in the reactions of the government (through the equalization grants) to increased local authority deficits. Thus, an increase in the deficit of an Arab local authority leads to an increase in the equalization grant which is not the case for an ultra-Orthodox local authority. As a result, the reduction in labor costs, through the firing of workers or by delaying the payment of salaries, is more pronounced in ultra-Orthodox local authorities.

[17] For further discussion see the 2003 Report, Bank of Israel, the Research Department, pp. 192-6.

Table 9
Error Correction Estimates according to Cluster for Jewish Local Authorities

Equation	Clusters 1–3	Clusters 4–5	Clusters 6–7	Clusters 8–10
D(E_wage)	-0.124*	0.143*	0.091	0.068
	(0.048)	(0.052)	(0.054)	(0.052)
D(E_activ)	-0.494*	0.417*	0.496*	0.481*
	(0.181)	(0.194)	(0.203)	(0.195)
D(R_arnona)	0.025	0.077	-0.148	-0.070
	(0.103)	(0.111)	(0.116)	(0.111)
D(R_other)	0.046	0.064	0.022	0.081
	(0.120)	(0.128)	(0.134)	(0.129)
D(G_izun)	-0.262*	0.225*	0.336*	0.236*
	(0.074)	(0.079)	(0.083)	(0.079)
D(G_partic)	-0.042	0.010	0.062	0.061
	(0.066)	(0.070)	(0.074)	(0.071)
Number of local authorities in sample	65	58	34	36

Source: Model 4. The detailed results of the regression appear in Appendix 4. Standard deviations appear in parentheses.

* Significant at a 5% level.

5.4 Control variables

The two models estimated (Models 1 and 2) include a vector of control variables (Z) which have the function of controlling for the effect of external factors on the budget components in the short run. This vector includes: the dependency ratio between residents who are not of working age (children aged 0-14 and the elderly aged 65 and over) and residents of working age[18] (aged 15-64); the average wage per salaried position for residents of the local authority; the overall government budget as a percentage of GDP; and a dummy variable for the year 1998 (which was an election year in most of the local authorities). As mentioned above, the average wage of a salaried position serves as an instrumental variable for the socioeconomic index of the local authority (Table 10; Appendix 3, 4 and 5). An

[18] In computing the dependency ratio, the proportion of children aged 0-18 can be used instead of children aged 0-14; however, the results obtained are similar and therefore the calculation which is accepted in the literature was chosen.

increase in the dependency ratio, which reflects an increase in the proportion of residents who are not of working age, leads, as expected, to an increase in expenditure (on wages and activity) and to an increase in the equalization grants. This result is explained by the fact that the increase in the proportion of residents aged 0-14 and/or 65+ in the population leads to an increase in the expenditure on education and/or welfare. Furthermore, according to the formulas which are used to determine the size of the grants, it also leads to greater compensation of the local authority from the government budget. Thus, the compensation received by the local authority is less than the increase in expenditure.

Table 10
Estimates for the Exogenous Variables (Model 2)

	E_wage	E_activ	R_arnona	R_other	G_izun	G_partic
D(TLUT_RATIO)	* 4.801	* 18.846	-0.912	-3.578	* 6.228	4.123
D(WAGE)	* 0.302	*-0.442	0.079	0.123	0.109	* 0.295
D(GOV_DEF)	*-21.443	*-24.897	2.459	1.193	4.995	*-13.616
D(ELECTIONS_98)	*-43.452	*-287.337	20.948	-31.639	*-158.962	-42.614

Note: The full results of the estimation are presented in Appendix 4.

* Significant at a level of 5%.

5.4.1 The overall government deficit

In years during which the government deficit grew, one can expect to see a worsening in the financial situation of the local authorities. From the results of the estimation of Model 2, it appears that an increase in the deficit has a double effect: in the initial stage: the government reduces the participation grants and as a result expenditures on municipal services also decline; however, at a later stage the government reacts to the deterioration in the local authorities' fiscal state and increases the equalization grants.

5.4.2 Election years

The estimation of the VEC model, on the assumption that the local authorities face a stable intertemporal budget constraint, assumes that an election year will not influence the components of the budget in the long run. However, it is certainly reasonable to assume that in the short run local authorities will be interested in influencing the voters by increasing local expenditure in that year and therefore will not remain within the budget framework. On the other hand, during the period under study, a number of mechanisms were put into place which created a more rigid budget constraint: (1) In 1993, parts of the report of the Suari Committee were implemented, thereby establishing clear criteria for the calculation of the equalization grants. The dependency on clear and fixed criteria helped reduce the manipulative behavior of the local authorities and the government. (2) During the period 1997–99, recovery plans were initiated. The innovation in these plans was the increased involvement of the Ministry of Finance and the Ministry of the Interior in the management

of the local authorities for the duration of the plans and the linkage of the payment of grants to progress in implementing the plans. As part of the involvement of the government ministries in the recovery plans, the local authorities were required to maintain budget transparency which was also manifested in the increased scope of the auditing of their financial reports. The more rigid budget constraint and the availability of trustworthy data on the financial and fiscal situations of the local authorities made it possible for the residents to punish mayors for improper management (Brender, 2003). The results of the estimation show that the mayors indeed had internalized this fact. Thus, in the election year, municipal expenditure declined and the local surplus increased temporarily which constituted a clear sign of managerial responsibility.

6. CAUSALITY TESTS

This section presents possible theoretical connections between the budget components and the results of the relevant empirical tests. It is worth mentioning that the short sample makes it difficult to draw conclusions from these tests. The first part will focus on the connection between independent revenue and expenditure. The second part will deal with the intertemporal relationship between government grants on the one hand and revenue and expenditure on the other. The second part is of particular importance in research of this type since the model (which is presented below) assumes that the economic deficit is sustainable and that only exogenous changes in its components will shift it from a stable situation.

6.1 The connection between independent revenues and expenditure

The political economy literature discusses at length the budgetary connection between independent revenue and expenditure. In this context, a number of theoretical claims are made regarding the possible causal links between the budget components:

1. *Independent revenue and expenditure are dependent on one another.* This hypothesis assumes that these two budget components are related to one another and change simultaneously. Therefore, Granger causality tests will find a two-way link between them. Thus, an increase in independent revenue will lead to an increase in expenditure and vice versa. The main theoretical model which can explain this behavior is the External Voter model presented in Black (1958).
2. *Expenditure leads independent revenue*. This connection is derived from the tax-smoothing model presented in Barro (1979). If expenditures rise as a result of an exogenous shock, the local authority will act to increase its independent revenue. According to this hypothesis, the voters can be persuaded of the necessity of increasing independent revenue only by an unexpected – and temporary – shock in expenditure. However, since the municipal tax mechanism is determined as part of the Arrangements Law and not by the local authority itself, it cannot be expected that the increase in expenditure will lead to an increase in independent revenue from taxes (arnona) except on the margin (for example, by increasing the number of parking tickets).

3. *Independent revenue leads expenditure.* This causal relationship is derived from the theory that the local authority maximizes its revenue subject to the constraint that the residents react to the increased tax rate by changing their place of residence (Niskanen, 1971). The solution of the maximization problem determines the level of revenue and therefore the level of expenditure as well. On the assumption that the residents have full information on the tax rate and that they have mobility, we cannot expect this hypothesis to hold. However, since individual mobility is limited as a result of the adjustment of property prices to changes in the tax rate, it is possible that this relationship will exist in the short run.

6.2 The relationship between government grants and the local authority's independent revenue and expenditure

The intertemporal connection between government grants and the local authority's revenue and expenditure has been studied by Holtz-Eakin et al. (1989) though it has still not been sufficiently clarified. They examined the relationship between the size of grants and the level of expenditure though they did not test the opposite relationship according to which the central government can change the size of its grants in reaction to changes in either independent revenues or expenditures. For example, per capita grants can be reduced as a result of the actions of the local government to reduce its deficit (or to increase its surplus). The importance of examining these relationships is related to the fact that the size of the grants is not dependent on the local authority's decision regarding expenditure and revenue but rather is determined by uniform objective criteria. There are a number of possible hypotheses related to these relationships:

1. *The size of the grants simultaneously determines expenditure and independent revenue.* According to this hypothesis, an increase in participation grants is expected to increase the expenditure on the relevant activity without influencing the rest of the revenue sources (since the participation grants are linked to specific activities). In contrast, the reaction to an increase of the equalization grants should be identical to the reaction to an exogenous growth in revenue, i.e. a reduction in arnona. As a result, local authorities with a low socioeconomic ranking will tend to undercollect municipal taxes. Thus, the actual tax collection relative to its potential should be lower in weak local authorities than in strong ones. However, since the government in general ties the equalization grants to recovery plans, we can expect that this relationship will not exist or will be a weak one.

2. *The levels of expenditure and independent revenue determine the size of the grants*. According to this hypothesis, the size of the government grants is dependent on the difference between independent revenue and expenditure. A local authority facing a shock in expenditure (a sharp increase) or in revenue (a sharp decrease) will be compensated with larger grants in order to balance its budget. The problem with this hypothesis is that it implies an unstable situation in which the government provides the local authorities with a guarantee that reinforces their tendency toward irresponsible budget behavior and the reduction of the local tax burden. However, since the

government in general also acts strategically, there is reason to believe that this connection will be a weak one.

3. *The levels of expenditure and independent revenue and the size of the grants are not dependent one on the other*. This hypothesis complements the previous two and implies that there are situations in which the government does not distribute grants according to known criteria and therefore there is a lack of certainty as to the size of the grant a local authority will receive. An example is the situation in which the size of the grant is determined by, among other things, the overall government budget, which is what occurred indirectly in the years 2002 and 2003. No support for this hypothesis can be found in the economic literature although, as was explained above, it can be assumed that in certain situations there is no direct link between the local authority's collection of municipal taxes and expenditure on the one hand and the actions of the central government in setting the size of the grants on the other. Furthermore, as was explained in the previous section of the article, the main component of government grants (about 64 percent in 2002) is the participation of the government in the funding of activity (primarily education and welfare). From this we can conclude that in a stable situation, the per capita size of the grants will be stationary and the exogenous change in the level of independent revenues will not lead to a change in the size of the grants but only to a change in the size of the deficit. In contrast, we can expect that a reduction in expenditure on activity will lead to a parallel reduction in participation grants.

In order to analyze the intertemporal relationships between revenue, expenditure and grants, a Granger (1969) test was carried out. The statistics for the Granger test are presented in Table 10. These intertemporal relations can also be seen in the results of the Impulse Response analysis presented in the appendices. The main results of the test are as follows:

a) *Expenditure is exogenous to independent revenue but not vice versa:* Expenditure on salaries leads revenue from arnona and the rest of the independent revenues. This result is similar to that of Holtz-Eakin et al. (1989).

b) *An increase in grants leads to an increase in expenditure and vice versa (i.e. an increase in expenditure or a reduction in revenue leads to an increase in grants)*. The simultaneous relationship between the two components of the budget provides support for the External Voter model according to which an increase in revenue received from the central government encourages local expenditure. According to this model, the reaction to central government grants is identical to the reaction to an exogenous increase in revenue. Therefore, an increase in grants will bring about an increase in expenditure. The importance of this result lies in the conclusion that not only an increase in participation grants leads, as expected, to an increase in expenditure but also an increase in equalization grants and to an even greater extent. This result explains why local authorities with a low socioeconomic ranking are characterized by undercollection of local taxes. In other words, the rate of tax collection relative to its potential in low-ranked local authorities is lower than in higher-ranked local authorities. The reverse causality, i.e. that the rate of expenditure determines the size of the grants, supports the hypothesis that the size of government grants is dependent on the difference between independent revenue from taxes and expenditure. This means that the government provides guarantees to the local authorities. Thus, a local

authority which faces an expected shock in its expenditures or in its revenues (such as a fall in revenue due to a deterioration in the financial situation of its residents) will receive higher grants in order to balance its budget. This reinforces the tendency of local authorities to behave in an irresponsible manner and to reduce the local tax burden.

c) *Independent revenue from arnona and other independent revenues are simultaneously correlated.* This result is explained by the dependence of revenues from arnona on the level of economic activity in the local authority which simultaneously affects the other per capita independent revenues.

A particularly interesting result of the Impulse Response (IR) analysis of the short- run connections between the endogenous variables relates to the effect of an unexpected decrease (or increase) in government grants, as occurred in 2003. Thus, a one-time unexpected reduction of one standard deviation (about 203 NIS per capita) in the equalization grants leads to a simultaneous increase in participation grants of about 28 percent of the size of the reduction already during that same period and to an increase in the current budgetary deficit by about the remaining 72 percent. This gap is closed by the reduction in activity during the subsequent three years and the reduction in wages which reaches a maximum four years after the reduction in equalization grants. The one-time reduction in grants continues to affect the four budget components for an additional five years though the size of the impulse declines from year to year. This is particularly

Table 11
Granger Causality Tests in the Short Run (Model 2)

Explanatory Variables	The Equation (dependent variables)					
	E_wage	E_activ	R_arnona	R_other	G_izun	G_partic
E_wage		1.39	*6.50	*9.18	*17.40	*25.65
E_activ	3.80		3.42	1.57	*9.15	0.99
R_arnona	0.06	1.70		*10.92	1.00	1.70
R_other	0.90	3.96	*10.72		1.02	0.84
G_izun	*7.20	1.16	5.50	0.47		*23.32
G_partic	*6.25	8.44	*8.23	1.78	*25.34	
All of them (as a group)	*17.05	*27.32	*37.33	*31.80	*47.79	*79.16

Source: Granger causality test on panel data; from the results of Model 2.

* Significant at a level of 95%.

interesting since in recent years cuts in the budget have led to reductions in grants to the local authorities and have thus contributed to increasing the current deficit. The IR analysis of a reduction of one standard deviation (178 NIS per capita) in participation grants leads to similar results although the local authorities' speed of response to the reduction is much more rapid. This is apparently because the reduction in participation grants reflects a reduction in public services to residents. The IR results are presented in the appendices.

7. CONCLUSION

This study has examined the short-run budgetary dynamics of the local authorities in response to changes in the deficit. The motivation for the study lies in the sharp cutback in government funding of the local authorities' expenditures during the period 2002–4 which led to a serious deterioration in the situation of many of the local authorities. This was accompanied by a reduction in services to residents and, in some local authorities, led to liquidity shortages and an inability to meet payments for an extended period. The unique contribution of this study is the use of panel data on 193 local authorities for the period 1996–2002 and the use of macroeconomic magnitudes as explanatory variables. As a result, the model is able to simultaneously estimate the dynamics of fiscal adjustment to budgetary shocks.

According to the results of the estimation, Jewish local authorities adjust to a change in the size of the deficit by rapidly changing their expenditure on salaries and by cutting back the municipal services they provide while Arab local authorities carry out budgetary adjustment only through a change in their expenditure on salaries but not through an adjustment in their level of activity. An example is the delaying of the payment of salaries in the Arab local authorities during the years 2002–4 which followed the reduction in government grants. As a result, the duration of fiscal adjustment to changes in the deficit takes twice as long in Arab local authorities. It was also found that ultra-Orthodox local authorities and strong local authorities react to an increase in the deficit by reducing expenditure on salaries without changing the level of services to residents while development town local authorities (which are ranked in cluster 4-5) react to a similar change by cutting services to residents. The comparison between Arab and ultra-Orthodox local authorities (which are ranked in cluster 1-3) shows that there is no significant difference in their reaction to a deficit increase. However, a significant difference was found in the reactions of the government (via the equalization grants) to increases in the local authorities' deficits. Thus, an increase in the deficits of the Arab local authorities leads to an increase in equalization grants while in the case of ultra-Orthodox local authorities it does not. As a result, the reduction in expenditure on salaries, either through the firing of workers or the delaying of payment of salaries, is more pronounced in ultra-Orthodox local authorities.

The results also showed that an election year has no long-run influence on the budget components although it is reasonable to assume that in the short run the local authorities are interested in influencing voters by increasing municipal expenditure during the election year and thus exceeding the budget framework. On the other hand, there have been steps taken which have contributed to constraining the manipulative behavior of the local authorities and the government in the distribution of grants. These include the introduction of mechanisms to reinforce budget constraints, the greater involvement of the Ministry of Finance and the Ministry of the Interior in the management of the local authorities and the introduction of budgetary transparency. The results of the estimation show that the influence of an election year on the budget components is restricted to the reduction of expenditure. Mayors are aware of the ability of voters to punish them if they exceed the budget framework. The addition of exogenous variables to control for the business cycle

and the local authority's socioeconomic situation show that an improvement in the local authorities' socioeconomic ranking leads to a reduction in equalization grants but does not affect the level of per capita independent revenues and per capita expenditure. It was also found that the government reacts to both its own situation and that of the local authorities. Thus, during periods in which the overall government deficit is growing, the government reduces participation grants, thus leading to a reduction in services to residents. At the same time, it partially compensates the local authorities by increasing equalization grants.

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9. APPENDICES:

APPENDIX 1: GOVERNMENT GRANTS

The participation grants from the Ministry of Education are paid to the formal education system based on a calculation of standard costs (rather than actual costs). In addition, the Ministry of Education budgets numerous activities in the informal education system (primarily sports and youth activities) according to clear-cut criteria. The education grants are calculated according to the number of classes and the number of schools and are intended to meet the needs of municipal education in the areas of school security, financing of the general pedagogic administration, organized transportation of students and the State's part in financing elementary and high school education. The ranking of per capita education grants according to geographic location (district) shows that the grants are highest in Judea and Samaria followed by grants to local authorities in the periphery. In contrast, local authorities in the Tel Aviv and Haifa districts receive particularly small per capita grants. The reason for this disparity is the greater dispersion of the population in Judea and Samaria and in the periphery. In addition, the local authorities in the periphery are smaller and are compensated for this relative disadvantage through equalization grants.

The grants from the Ministry of Welfare constitute a payment for welfare services which the local authority provides to its residents. The Ministry of Welfare finances about 75 percent of the cost of welfare services while the local authority covers the remaining 25 percent. The cost of services is determined by the Ministry of Welfare which defines the rules of eligibility, the quotas and the cost prices of welfare institutions. Thus, the rate of local participation is in actuality higher than 25 percent. These grants are also based on clear and uniform criteria which include the socioeconomic ranking of the local authority, income levels, unemployment and demography. In the formula for the distribution of grants, weight is given to the local authority's geographic location according to a map of national priorities. Thus, preference is given to National Regions of Priority A and B and to local authorities on the Lebanese border.

In addition to the participation grants, the local authorities receive equalization grants and other designated grants which are meant to bridge between the local authority's revenue and expenditure and are calculated according to an allocation formula determined by the Ministry of the Interior ("normative expenditures"). The objective of the equalization grant is to enable all the local authorities to provide their residents with basis services, some of which are mandated by law. In 2002, only 15 of the approximately 266 local authorities did not require equalization grants in order to provide their residents with a basic level of services. Factors such as the local authority's socioeconomic situation, the residential meterage for arnona, changes in the number of residents and the usage of the grants in the previous year are taken into account in determining the size of the equalization grant with the goal being to reduce socioeconomic disparity between the local authorities.

In addition to equalization grants, the government provides other grants to the local authorities, such as the "capital grant" to the Jerusalem local authority[19] and grants to implement recovery programs. These are the only grants that are not linked to a designated expenditure. Therefore, government grants can be divided into designated grants which are linked to a specific expenditure and general grants to reduce disparity.

APPENDIX 2: VARIABLES

Variable Name	Description of the Variable	Explanation and Comments	Source of the Data
G	Total grants divided by number of residents	In 2002 prices.	Ministry of the Interior
G_izun	Equalization grants divided by number of residents	Equalization grant + equalization loan (to finance recovery programs). In 2002 prices.	Ministry of the Interior
G_partic	Rest of grants divided by number of residents	Education and welfare grants and other designated grants (to finance activity). In 2002 prices.	Ministry of the Interior
R	Total independent revenue divided by number of residents.	In 2002 prices	Ministry of the Interior
R_arnona	Revenue from arnona divided by number of residents.	Net of discounts and returned funds. In 2002 prices.	Ministry of the Interior
R_other	Rest of independent revenues divided by number of residents	Revenue from education, welfare, water distribution and other independent revenues.	Ministry of the Interior
E	Total expenditure divided by number of residents	Including the purchase of water in local authorities with an independent water corporation. In 2002 prices.	Ministry of the Interior
E_wage	Salary expenditures divided by number of residents	Municipal salaries, education salaries and welfare salaries. In 2002 prices.	Ministry of the Interior

[19] As already mentioned, Jerusalem is not included in the panel due to its unique characteristics and its relative size.

Variable Name	Description of the Variable	Explanation and Comments	Source of the Data
E_activ	Rest of the expenditures divided by number of residents	Expenditure on municipal activity, education, welfare and financing costs in the regular budget. In 2002 prices.	Ministry of the Interior
D	Budget deficit divided by number of residents	In 2002 prices	Ministry of the Interior
ED	Current economic deficit divided by number of residents	Budget deficit (D) less the redemption of loans and the relevant transfers from the regular budget.	Ministry of the Interior
Elections_98	Dummy variable for the election year.	Receives a value of 1 in 1998 and 0 in all other years.	Ministry of the Interior
POP	Number of residents.	Number of residents in thousands at the end of the year.	Central Bureau of Statistics
Tlut_ratio	Dependency ratio	The ratio between the working age population (15-64) and non-working age population (0-14 and 65+)	Central Bureau of Statistics
Wage	Average monthly wage per salaried position (males)	Among residents of the local authority. In 2002 prices.	Central Bureau of Statistics
Gov_def	The actual overall government deficit	As a percentage of GDP.	Bank of Israel

APPENDIX 3: ESTIMATION RESULTS FOR MODEL 1

	D(E)	D(R)	D(G)
D(E(-1))	-0.313	0.012	-0.049
	(0.040)	(0.024)	(0.020)
D(E(-2))	-0.146	0.097	0.051
	(0.045)	(0.027)	(0.022)
D(R(-1))	0.092	-0.383	-0.022
	(0.066)	(0.039)	(0.032)
D(R(-2))	0.016	-0.194	-0.009
	(0.067)	(0.039)	(0.032)
D(G(-1))	0.283	-0.124	-0.031
	(0.082)	(0.048)	(0.040)
D(G(-2))	0.237	-0.014	0.048
	(0.070)	(0.041)	(0.034)
C	-314.536	160.766	39.154
	(36.818)	(21.649)	(17.811)
ED(-1)	0.128	-0.016	0.012
	(0.036)	(0.021)	(0.018)
D(TLUT_RATIO)	24.526	-3.702	11.007
	(7.837)	(4.608)	(3.791)
D(WAGE)	-0.351	0.181	0.420
	(0.160)	(0.094)	(0.077)
D(GOV_DEF)	-50.467	3.287	-5.938
	(9.308)	(5.473)	(4.503)
D(ELECTIONS_98)	-259.778	-6.020	-209.611
	(68.581)	(40.325)	(33.177)
R-squared	0.231	0.193	0.178
F-statistic	17.814	14.184	12.865

Note: 666 observations following adjustments.
Standard deviations appear in parentheses.

APPENDIX 4: ESTIMATION RESULTS FOR MODEL 2

	D(E_WAGE)	D(E_ACTIV)	D(R_ARNONA)	D(R_OTHER)	D(G_IZUN)	D(G_PARTIC)
C	69.074	-374.746	140.102	22.298	-83.734	137.066
	(10.469)	(35.517)	(19.633)	(21.152)	(14.861)	(13.908)
ED(-1)	0.030	0.096	-0.005	-0.016	0.018	0.002
	(0.010)	(0.035)	(0.019)	(0.021)	(0.015)	(0.014)
D(TLUT_RATIO)	4.801	18.846	-0.912	-3.578	6.228	4.123
	(2.199)	(7.459)	(4.123)	(4.442)	(3.121)	(2.921)
D(WAGE)	0.302	-0.442	0.079	0.123	0.109	0.295
	(0.048)	(0.164)	(0.091)	(0.098)	(0.069)	(0.064)
D(GOV_DEF)	-21.443	-24.897	2.459	1.193	4.995	-13.616
	(2.657)	(9.013)	(4.982)	(5.367)	(3.771)	(3.529)
D(ELECTIONS_98)	-43.452	-287.337	20.948	-31.639	-158.962	-42.614
	(20.038)	(67.980)	(37.578)	(40.485)	(28.444)	(26.620)
Autoregression lags	YES	YES	YES	YES	YES	YES
R-squared	0.289	0.226	0.208	0.249	0.175	0.253
F-statistic	15.458	11.106	9.997	12.649	8.059	12.939

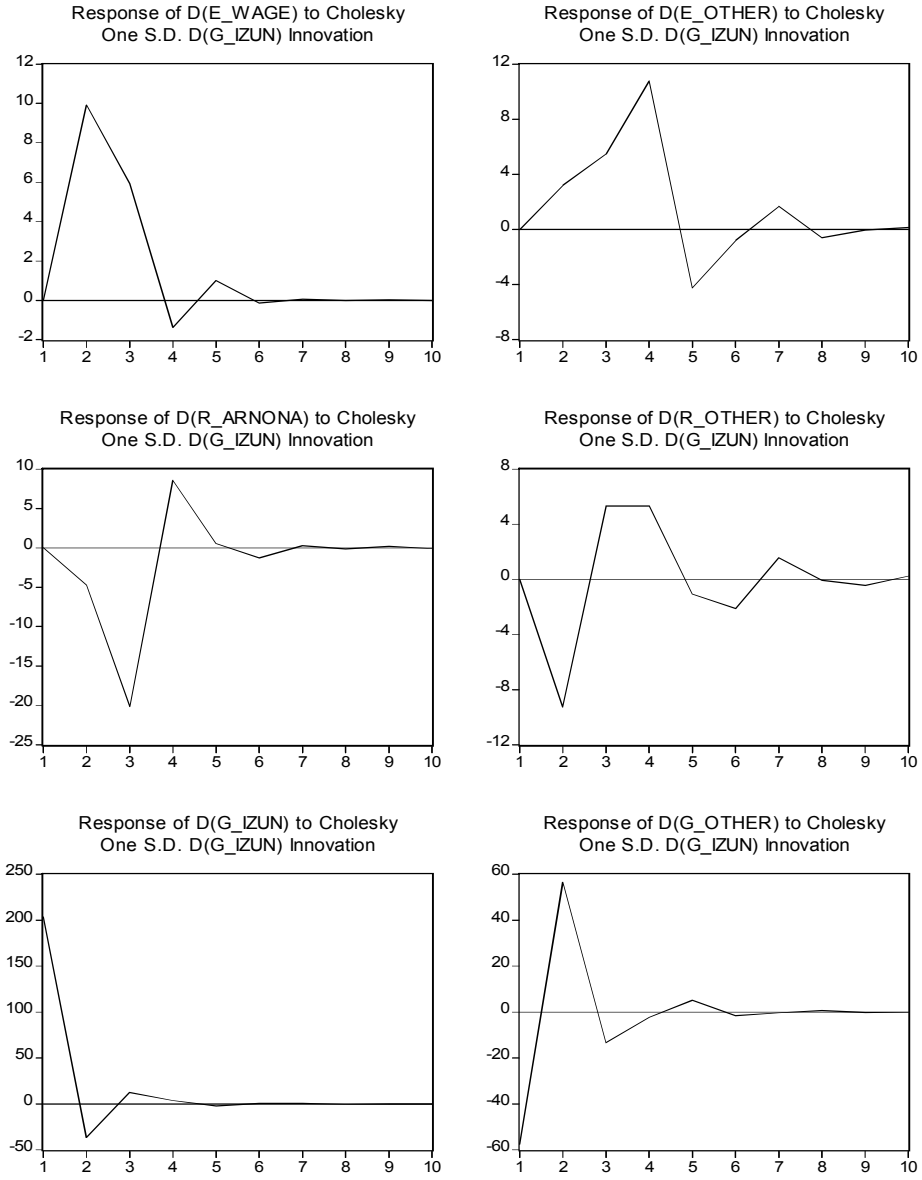
Note: 666 observations following adjustments. Standard deviations appear in parentheses.

APPENDIX 5: ESTIMATION RESULTS FOR MODEL 4

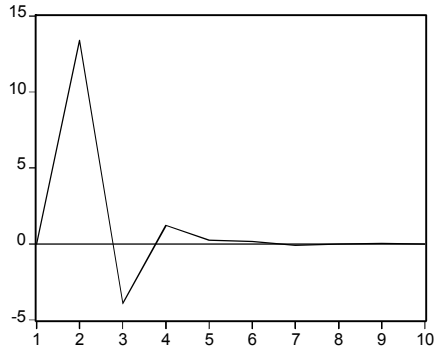
	D(E_WAGE)	D(E_OTHER)	D(R_ARNONA)	D(R_OTHER)	D(G_IZUN)	D(G_OTHER)
C	46.598	-427.396	179.776	4.484	-94.898	112.608
	(13.670)	(51.114)	(29.138)	(33.746)	(20.770)	(18.509)
ED(-1)	0.124	0.494	-0.025	0.046	0.262	0.042
	(0.048)	(0.181)	(0.103)	(0.120)	(0.074)	(0.066)
ED_C2(-1)	-0.143	-0.417	-0.077	-0.064	-0.225	-0.010
	(0.052)	(0.194)	(0.111)	(0.128)	(0.079)	(0.070)
ED_C3(-1)	-0.091	-0.496	0.148	-0.022	-0.336	-0.062
	(0.054)	(0.203)	(0.116)	(0.134)	(0.083)	(0.074)
ED_C4(-1)	-0.068	-0.481	0.070	-0.081	-0.236	-0.061
	(0.052)	(0.195)	(0.111)	(0.129)	(0.079)	(0.071)
D(TLUT_RATIO)	-9.678	61.296	-1.316	-8.834	14.355	-17.482
	(4.555)	(17.031)	(9.708)	(11.244)	(6.920)	(6.167)
D(WAGE)	0.281	-0.459	0.139	0.100	0.093	0.199
	(0.057)	(0.214)	(0.122)	(0.142)	(0.087)	(0.078)
D(GOV_DEF)	-21.483	-30.841	10.381	3.333	0.131	-18.479
	(3.346)	(12.510)	(7.131)	(8.259)	(5.083)	(4.530)
D(ELECTIONS_98)	-38.273	-347.410	27.604	-37.330	-177.832	9.130
	(23.531)	(87.987)	(50.158)	(58.090)	(35.753)	(31.861)
Autoregression lags	YES	YES	YES	YES	YES	YES
R-squared	0.342	0.278	0.267	0.261	0.253	0.323
F-statistic	10.594	7.854	7.436	7.199	6.900	9.712

Note: 429 observations following adjustments. Standard deviations appear in parentheses.

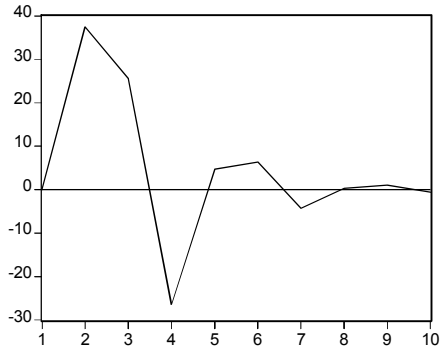
APPENDIX 6: IMPULSE RESPONSE



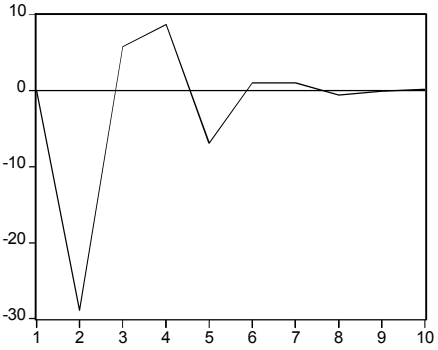
Response of D(E_WAGE) to Cholesky
One S.D. D(G_OTHER) Innovation



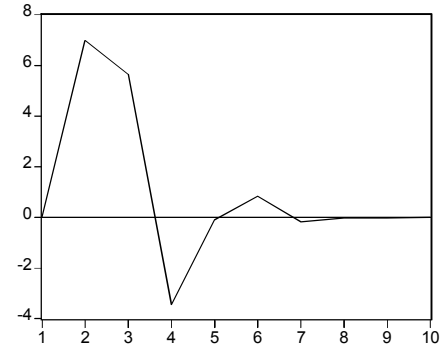
Response of D(E_OTHER) to Cholesky
One S.D. D(G_OTHER) Innovation



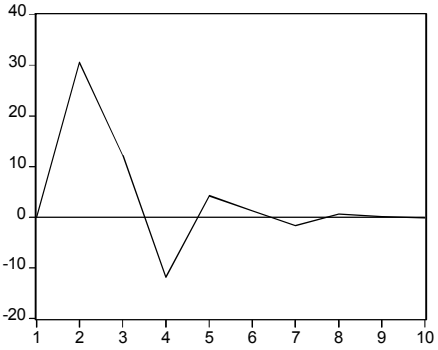
Response of D(R_ARNONA) to Cholesky
One S.D. D(G_OTHER) Innovation



Response of D(R_OTHER) to Cholesky
One S.D. D(G_OTHER) Innovation



Response of D(G_IZUN) to Cholesky
One S.D. D(G_OTHER) Innovation



Response of D(G_OTHER) to Cholesky
One S.D. D(G_OTHER) Innovation

