Output fluctuations and fiscal policy: U.S. state and local governments 1978–1994

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Abstract

We study the cyclical properties of U.S. state and local government fiscal policy. The budget surpluses of both are procyclical over short- and medium-term horizons. Procyclical surpluses are the result of strongly procyclical revenue and weakly procyclical expenditure. These results hold whether aggregate (U.S.-wide) fluctuations are controlled for or not. Federal grants to state and local governments are procyclical, but this is due to aggregate output fluctuations: With respect to state-level output fluctuations, federal grants are countercyclical. The budget surpluses of trust funds and utilities are also procyclical, but there is no evidence that this effect is stronger in states where balanced budget rules are tighter. The cyclical patterns of state and local budget surpluses are affected by various political institutions; for example, budget surpluses are less procyclical in conservative states. In an election year that occurs in 'good times', state governments refrain from accumulating a larger surplus. In 'bad times', no such asymmetry between election and non-election years is apparent. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

We investigate the cyclical properties of U.S. state and local government finances. Such an investigation is called for in light of the renewed interest, as illustrated by many recent studies, in fiscal responses to fluctuations in Gross Domestic Product (GDP). For instance, Gavin and Perotti (1997) stress the need for better understanding of fiscal – as opposed to monetary – factors affecting the macroeconomic performance of Latin American countries (see also Talvi and Vègh, 1998). Sørensen and Yosha (1998) examine the response of the budget surplus to asymmetric fluctuations within the European Union and OECD countries, whereas Lane (1999) studies the cyclical properties of government spending in OECD countries (see also Goodhart and Smith, 1993; von Hagen and Eichengreen, 1996). From these and other studies, a central stylized fact emerges: While fiscal policy in OECD countries is countercyclical (budget surpluses are higher when GDP rises), it is not so in Latin American countries.

The menu of potential explanations is quite rich. If the persistence in GDP fluctuations differs across countries, we should expect qualitatively different fiscal responses (Gavin and Perotti, 1997). Borrowing constraints may play a role in some countries, preventing governments from borrowing during 'bad times' (Gavin and Perotti, 1997) and fiscal policy may complement market mechanisms for smoothing shocks – an idea consistent with the presence of borrowing constraints at the individual or firm level (Sørensen and Yosha, 1998; see also Gali, 1994; Rodrik, 1998). Fiscal policy may also be affected by opportunistic behavior of governments seeking re-election (Rogoff, 1990; see Alesina et al., 1997; Drazen, 2000 for a comprehensive discussion).[1] 'Keynesian' reverse causality might be at work with fiscal policy affecting GDP fluctuations (Gavin and Perotti, 1997; in particular, the volatility of GDP fluctuations, Fatas and Mihov, 1999). Finally, to explain the special fiscal patterns observed in Latin America – strongly procyclical spending and acyclical surpluses – several economists have suggested that governments reduce budget surpluses during upturns for fear that any accumulated surplus will be spent by others (see Talvi and Vègh, 1998; Stein et al., 1998; Lane and Tornell, 1998a, b; Velasco, 1999; Tornell and Lane, 1999, who refer to this phenomenon as the 'voracity effect').

We perform a comprehensive panel data analysis of these issues for U.S. state and local governments. The budgets of these governments are large relative to U.S. GDP and it is important to understand their behavior. Since institutional

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[1] Barro's (1979) classic tax-smoothing theory is yet another potential explanation for countercyclical fiscal policy. Unfortunately, a central implication of Barro's theory – that tax rates are unpredictable – is rejected in many empirical studies. (The tax-smoothing model is rejected also with the data used here, although we will not report results of such tests.) This does not, however, rule out that tax-smoothing considerations are important.

structures vary across states we can exploit this variation in order to uncover determinants of fiscal behavior. We do not adopt a structural approach, but draw on the existing menu of models for interpretation.

Previous empirical work on the topic includes Gramlich (1991), Poterba (1994) and Eichengreen and Bayoumi (1994).[2] We devote Section 3.5 to a comparison of our work to the results and methodology in these papers. One contribution of our study is that it uses state-level panel data for a reasonably long period of time and addresses the various issues in a unified framework. In addition, it addresses several issues that have not been studied before. Most of the analysis is carried out using univariate regression specifications. Obviously, such a framework does not fully capture the dynamic patterns in the data, and we, therefore, study more elaborate dynamic specifications in Section 3.3. The results indicate that the main qualitative conclusions from the univariate regressions hold up, but yield interesting new insights regarding the temporal response of various fiscal components to output fluctuations.[3]

In many instances, local government finances are dictated by state governments through legislation and grants. The latter may off-load fiscal burdens to local governments in order to balance the state budget, or may be pressured to help local governments in bad times.[4] For example, some states – notably Michigan, South Dakota, and Wisconsin – increased state taxes in recent years because they were concentrating on reducing local property taxes.[5] We, therefore, also study the finances of local governments and compare their cyclical properties to those of state governments.

As stressed by Gavin and Perotti (1997), it is of great interest to study the finances of non-financial public enterprises separately since such entities often play an important role in overall fiscal performance. In the United States, state and local governments control insurance trust funds, utilities, and liquor stores. Their operations are less conspicuous than other activities (being 'off-budget'), so state and local governments may be tempted to shift deficits to these entities.[6]

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[2] See also Alesina and Bayoumi (1996), Bohn and Inman (1996), and Inman and Mark (1998).

[3] We thank Valerie Ramey for encouraging us to pursue the dynamic analysis.

[4] In fact, the 'division of labor' between state governments and local governments is constantly changing. Over the past few years, there have been many shifts in state versus local government responsibilities with large variation among states: A few states have taken over responsibility for local courts, some have implemented welfare reform by shifting more responsibility to local governments, and most states have been shifting mental health patients from state institutions to local community programs.

[5] See State Policy Reports, 1998, Vol. 16.

[6] Of related interest is Inman and Mark's (1998) study of the determinants of underfunding of U.S. state-level public employee pension plans and Auerbach's (1994) argument that mechanisms designed for deficit reduction failed at the U.S. national level due to 'budget gimmicks' and intertemporal reallocation of expenditure items. For a picturesque exposition of this line of argument, see Bennett and DiLorenzo (1983).

We, therefore, also study – to our knowledge for the first time – the cyclical patterns in the finances of trust funds (mainly unemployment and pension funds), utilities, and liquor stores.

It is also important to examine which budget components dominate the cyclical behavior of budget surpluses.[7] We study the behavior of three such components over the cycle: Intergovernmental grants, other revenue, and expenditure. We make no assumption as to whether taxes or expenditure are exogenous and do not attempt to separate tax-smoothing motives from other motives for cyclical fiscal policy; nor do we attempt to separate predictable from non-predictable shocks to output. We do, however, distinguish between state-specific and U.S.-wide output fluctuations – a distinction which yields interesting findings.[8]

Unlike country-level governments, virtually all U.S. states have adopted balanced-budget restrictions.[9] The stringency of these restrictions varies across U.S. states which has helped researchers explore if such rules are effective in reducing fiscal deficits.[10] We examine the effect of the stringency of these rules on the cyclical patterns of fiscal policy (as others have done), and test the conjecture that more stringent balanced budget restrictions create stronger incentives for off-budgeting. We further investigate the effect of historical debt levels on the procyclicality of budget surpluses and whether low historical debt levels simply proxy for tight balanced budget restrictions.

We then briefly explore institutional and political economy issues. For example, we look at whether reliance on certain types of taxes (e.g., income taxes versus indirect taxes) or the occurrence of state gubernatorial elections affect the cyclical behavior of the surplus. A central result is that state governments refrain from accumulating larger surpluses in 'good years' that also happen to be election years. No such asymmetry (between election and non-election years) is apparent in 'bad years'.

We conclude the empirical analysis with a comparison to estimates reported in Asdrubali et al. (1996) regarding the amount of income and consumption

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[7] Lane (1999), for example, focuses entirely on government spending (rather than on the budget surplus) in OECD countries.

[8] Of course, cyclical fiscal policy may be an unintended result of institutional rigidities in tax-collecting and budgeting (although tax collection and budgeting practices would eventually be changed if such rigidities caused major departures from the desired consumption path). We address this issue in our empirical work.

[9] The closest institutions to balanced-budget rules at the country level are the 1992 Maastricht Treaty requirements that were adopted by European countries prior to Monetary Unification. See Poterba and von Hagen (1999), who stress the importance of assessing how effective such institutions are in shaping fiscal policy.

[10] See Eichengreen and Bayoumi (1994), Poterba (1994), Alesina and Bayoumi (1996) and Bohn and Inman (1996).

smoothing achieved among U.S. states through various mechanisms. Using the method developed in that paper, we find that state and local governments smooth on average 3.7 percent of state-specific output fluctuations. This is not a negligible number, but it is small in comparison to the estimates for national OECD governments reported in Sørensen and Yosha (1998).

In the next section we describe the sample. In Sections 3–7 we present the empirical analysis and the empirical results, including a detailed comparison with earlier work. Section 8 concludes the paper.

2. Data

The data are from *Governmental Finances*, U.S. Bureau of the Census, covering the period 1978–1994.[11] We were not able to obtain data for some of our series prior to 1978. We refer to utilities, insurance trust funds, and liquor stores as UILs. Our sample includes the 48 mainland states.[12] Table 1 displays the average per capita real surplus, revenue, and expenditure of state and local governments and the surplus of UILs for our sample period.[13] In the rows labeled std1 and std2, we show, for each variable, the cross-state standard deviation (averaged over the years) and the time-series standard deviation (averaged across states).

To further illustrate the order of magnitude of state and local budget items, we note that in 1994, for example, total (general + UILs) per capita revenue and expenditure of state governments were each on the order of 12–13% of per capita gross state product (GSP), with the total surplus (including UILs) amounting to approximately 1% of GSP.[14]

The 1994 revenue of state insurance trust funds was about 2% of GSP whereas the revenue of local insurance trust funds as a fraction of GSP was negligible. In the same year, the budget size of state-managed utilities was very small as a fraction of GSP, while the expenditure of local government managed utilities was about 1% of GSP.

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[11] We also benefited from estimates of the liabilities of state pension funds kindly provided to us by Robert Inman and Stephen Mark. We present further details regarding these estimates later.

[12] Alaska relies heavily on severance taxes and exhibits a huge variation in several fiscal components as a result of variability in oil prices. Hawaii has a very particular institutional structure.

[13] In *Governmental Finances*, the accounts of utilities, liquor stores, and insurance trust activities are displayed separately.

[14] GSP is the state-level counterpart of country-level GDP. General revenue and expenditure refer to all the revenue and expenditure of a state government which are quite different from the revenue and expenditure associated with the more restricted 'general fund'.

Table 1
State and local government per capita surplus, revenue, and expenditure (dollars)[a]

		State governments 1978–1994	Local governments 1978–1994
General	Mean	5	30
surplus	std1	93	58
	std2	64	48
Revenue	Mean	1492	1273
	std1	325	337
	std2	202	135
Expenditure	Mean	1447	1243
	std1	283	318
	std2	207	147
Insurance	Mean	111	8
trusts	std1	76	13
surplus	std2	51	7
Utilities	Mean	−18	−39
surplus	std1	26	59
	std2	11	25
Liquor	Mean	9	3
stores	std1	7	2
surplus	std2	3	1

[a]'std1' (cross section): Time average of $[(1/n)\sum_i (X_{it} - \bar{X}_t)^2]^{1/2}$ where $\bar{X}_t$ is the period t average of X_{it} across states, and n is the number of states. 'std2' (time series): Average over i of $[(1/T)\sum_t (X_{it} - \bar{X}_i)^2]^{1/2}$ where $\bar{X}_i$ is the time average of X_{it} for state i, and T is the number of years in the sample. Real per capita 1983 dollars. General surplus: Does not include revenue and expenditure of utilities, liquor stores, and insurance trust funds. Insurance trusts: 48 state-run; 44 local-run. Utilities: 13 state-run; 48 local-run. Liquor stores: 17 state-run; 4 local-run. Averages and standard deviations are calculated including only states where the relevant budget component is non-zero.

Table 2 displays intergovernmental per capita net transfers across various levels of government. In 1994, these transfers constituted roughly 3.1, 0.3, and 2.9 percent of GSP.

3. Cyclical properties of fiscal policy

3.1. Budget surpluses

We first want to determine whether U.S. state and local governments exhibit procyclical budget surpluses, as do OECD country-level governments, or

Table 2
Intergovernmental net per capita transfers[a]

		1978–1994	% GSP in 1994
Federal to state	Mean	379	3.1
	std1	100	—
	std2	64	—
Federal to local	Mean	72	0.3
	std1	21	—
	std2	25	—
State to local	Mean	426	2.9
	std1	139	—
	std2	54	—

[a]'std1' (cross section): Time average of $[(1/n)\sum_i (X_{it} - \bar{X}_t)^2]^{1/2}$ where $\bar{X}_t$ is the period t average of X_{it} across states, and n is the number of states. 'std2' (time series): Average over i of $[(1/T)\sum_t (X_{it} - \bar{X}_i)^2]^{1/2}$ where $\bar{X}_i$ is the time average of X_{it} for state i, and T is the number of years in the sample. The column '% GSP' displays the amount of the relevant transfer aggregated across states as a fraction of GDP (= GSP aggregated across states). Real per capita 1983 dollars. All state and local governments receive revenue from the federal government. All local governments receive revenue from their state government.

acyclical surpluses, as in Latin America. To capture this empirically in a simple manner, we estimate the following model:

$$s_{it} = \alpha_{iS} + \gamma_{tS} + \beta_S \Delta GSP_{it} + \varepsilon_{itS}. \tag{1}$$

The α_{iS} variables are 'state-fixed effects' (dummy variables for each state) that control for any cross-sectional variation that is constant over the sample period, such as the relative size of state i. The 'time-fixed effects' (time dummies), γ_{tS}, control for *any* aggregate time-series variation, including macroeconomic variables such as U.S.-wide GDP or monetary policy. The coefficient β_S is interpreted as the response of the surplus to an idiosyncratic (state-specific) change in GSP. The advantage of this simple specification is that the coefficients are easily interpretable and coefficients estimated for various budgets and budget components can be easily compared since they represent dollar-to-dollar responses. For better exposition, we multiply the estimated coefficient by 100, so that the displayed coefficient is interpreted as the response of the budget surplus to a 100 dollar change in output. We run all the regressions with and without time-fixed effects. Since the budget surplus (i.e., state and local government saving) is stationary while GSP is not, we regress the per capita budget surplus on the first

difference of GSP.[15] We correct for autocorrelation in the residuals using a standard two-step Prais–Winsten procedure, and for heteroskedasticity using a two-step procedure which allows for different error variances across states.

In the various tables, we display the results of two types of regressions. The numbers in columns with the heading $k = 1$ are obtained by regressing the current budget surplus on 1-year differenced GSP. The numbers displayed in columns with the heading $k = 3$ are obtained by regressing the total budget surplus over 3 years, $s_{it} + s_{i,t-1} + s_{i,t-2}$, on 3-year differenced GSP, $\text{GSP}_{it} - \text{GSP}_{i,t-3}$, using non-overlapping data. The interpretation of the coefficient in the latter regression is the net 3-year response of the budget surplus, in dollars, to a 100 dollar increase in GSP. Comparing the estimated coefficient from a 3-year regression with the coefficient from a 1-year regression gives us a sense of the dynamic response of budget surpluses to GSP fluctuations. For example, a 3-year response that is much larger than a 1-year response indicates that surpluses revert to zero very slowly after output shocks.

Table 3 displays the cyclical properties of state and local total (including UILs) budget surpluses, with and without time-fixed effects. From the estimated coefficients of the regressions without time-fixed effects, we learn that the surpluses of state and local governments are strongly and significantly procyclical, especially at the 3-year frequency. Interpreting the magnitude of the coefficients, if the change in per capita state output over a 3-year period is 100 dollars, the cumulative (over 3 years) per capita state and local government surpluses increase by 8.62 and 2.57 dollars, respectively. The results with time-fixed effects are similar and suggest that state and local governments do not respond differently to idiosyncratic and aggregate output shocks.

3.2. Budget components

Next, we want to determine which budget components are responsible for the procyclicality of state and local government budget surpluses. The year t budget surplus of state i's government can be broken down as follows:

$$s_{it} = \text{GRANTS}_{it} + \text{OWNREV}_{it} - \text{EXP}_{it}, \qquad (2)$$

where GRANTS are federal grants,[16] OWNREV is the revenue of the state government raised within state (total tax revenue, including fees, excluding federal

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[15] We performed Dickey–Fuller tests for unit roots in the GSP and budget surplus series. The tests easily reject unit roots in the budget surplus, but never reject unit roots in GSP. Since the tests have low power due to the relatively short data series, we also based our judgement on visual inspection of the series. Since aggregate (longer) time-series of output behave like unit root or near unit root processes, we used the GSP series in first-differenced form in order to avoid potentially spurious inferences.

[16] More precisely, we use net federal grants calculated as state government revenue from the federal government minus federal revenue from the state government.

Table 3
Cyclical patterns of the total surplus of state and local government budgets[a]

	$k = 1$	$k = 3$
Without time-fixed effects[b]		
State	2.98	8.62
	(8.25)	(14.99)
Local	0.92	2.57
	(4.72)	(9.73)
With time-fixed effects[c]		
State	3.12	9.35
	(6.01)	(11.68)
Local	0.35	1.69
	(1.34)	(5.26)

[a]The '$k = 3$' column reports the $\hat{\beta}$-coefficient from a regression of $s_{it} + s_{i,t-1} + s_{i,t-2}$ on $GSP_{it} - GSP_{i,t-3}$ using non-overlapping data, allowing for fixed effects. Estimates are scaled by 100 to reflect the response of the corresponding budget surplus to a \$100 increase in per capita gross state product. Real per capita 1983 dollars. t-statistics in parentheses. Total surplus includes revenue and expenditure of utilities, liquor stores, and insurance trust funds. OASDI = federal old-age, survivors' and disability insurance. Sample period: 1978–1994.
[b]Coefficient $\hat{\beta}$ from regression $s_{it} = \alpha_i + \beta \Delta GSP_{it} + \varepsilon_{it}$, where s is the total surplus, GSP is gross state product, and α_i are cross-sectional fixed effects.
[c]Coefficient $\hat{\beta}$ from regression $s_{it} = \alpha_i + v_t + \beta \Delta GSP_{it} + \varepsilon_{it}$, where v_t are time-fixed effects.

grants), and EXP is the total expenditure of the state government. An analogous breakdown holds for local governments with GRANTS representing federal grants plus state government grants. Intergovernmental grants are studied here since they are part of the state and local government budgets and potentially affect the cyclical behavior of deficits and surpluses.

While state government budget surpluses behave like stationary time series, the components of the surplus in Eq. (2) behave like unit root processes.[17] We, therefore, analyze the comovement of the first difference of each component with the first difference of GSP by estimating the following models:

$$\Delta GRANTS_{it} = \alpha_{iG} + \gamma_{tG} + \beta_G \Delta GSP_{it} + \varepsilon_{itG}, \tag{3}$$

$$\Delta OWNREV_{it} = \alpha_{iR} + \gamma_{tR} + \beta_R \Delta GSP_{it} + \varepsilon_{itR}, \tag{4}$$

$$\Delta EXP_{it} = \alpha_{iE} + \gamma_{tE} + \beta_E \Delta GSP_{it} + \varepsilon_{itE}. \tag{5}$$

We estimate the models with and without time-fixed effects.

[17] This, of course, implies that we regard grants, revenue, and expenditure as cointegrated. The time-dimension of our sample is too short for formal tests to have reasonable power so we do not report Dickey–Fuller and cointegration tests. We return to this issue in Section 3.3.

Table 4
Cyclical patterns of state government budget components[a]

	Federal grants	Own revenue	Expenditure
Without time-fixed effects[b]			
$k = 1$	0.43	5.42	1.01
	(2.89)	(17.92)	(2.94)
$k = 3$	1.01	6.37	2.95
	(8.43)	(25.47)	(8.98)
With time-fixed effects[c]			
$k = 1$	− 0.35	3.17	0.53
	(− 2.35)	(7.89)	(1.46)
$k = 3$	− 0.48	5.94	1.33
	(− 3.54)	(14.58)	(4.28)

[a]The '$k = 3$' rows report the $\hat{\beta}$-coefficient from a regression of $X_{it} − X_{i,t-3}$ on $GSP_{it} − GSP_{i,t-3}$ using non-overlapping data, allowing for fixed effects. Estimates are scaled by 100 to reflect the response of the corresponding budget surplus to a \$100 increase in per capita gross state product. The budget components refer to the total state government budget including utilities, insurance trusts, and liquor stores. Real per capita 1983 dollars. t-statistics in parentheses. Note that although Total Surplus = Federal Grants + Own Revenue – Expenditure, the coefficients associated with these individual components will not add up to the coefficient for state government total surplus reported in Table 3 since the individual budget components are first-differenced (being non-stationary) whereas in the regressions reported in Table 3 the state government total surplus is not differenced (as it is stationary). Sample period: 1978–1994.
[b]Coefficient $\hat{\beta}$ from regression $\Delta X_{it} = \alpha_i + \beta \Delta GSP_{it} + \varepsilon_{it}$, where X is the budget component indicated in the column title and GSP is gross state product.
[c]Coefficient $\hat{\beta}$ from regression $\Delta X_{it} = \alpha_i + v_t + \beta \Delta GSP_{it} + \varepsilon_{it}$.

Table 4 displays the regression coefficients (multiplied by 100).[18] It is readily apparent from the two panels that state government revenue raised within state is strongly procyclical; namely, revenue is higher during upturns. This is not surprising since many taxes are proportional to income and the personal income tax is typically progressive. Later, we explore this issue in more detail by checking whether the procyclicality of the surplus varies systematically between states with different tax structures.[19]

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[18] The reported numbers for the three budget components do not exactly add up to the numbers reported in Table 3 since the left-hand side variables in the regressions of Table 4 are first-differenced while the left-hand side variable (the budget surplus) in the regressions of Table 3 is not.

[19] Valerie Ramey, in her discussion of this paper, suggested the following exercise: Plot the GSP and state government revenue of New Hampshire (where there is no income tax) and California (where the income tax is highly progressive). As one might expect, revenue tracks GSP more closely in California than in New Hampshire. Our empirical analysis in Section 6 confirms this intuition.

State expenditure is also procyclical, but the procyclicality of revenue dominates so that budget surpluses are procyclical as reported in the previous subsection.

We turn to federal grants. When time-fixed effects are not included, these grants are positively correlated with GSP fluctuations, increasing the resources available to state governments in good times and decreasing them in bad times (other things being equal, of course). Since many grants are 'progressive', in the sense that they are directly tied to the level of poverty within a state (Medicaid, in particular), an opposite result might have been expected. When we control for U.S.-wide effects by including time-fixed effects – see the lower panel of Table 4 – we find that federal grants indeed possess insurance properties: They are negatively correlated with idiosyncratic GSP fluctuations, and are higher in state-specific slumps.[20] The effect is rather small, since federal grants typically constitute no more than 25% of total state government revenue. Our interpretation of these results is that federal grants do provide some insurance against state-specific downturns and that, in addition, federal grants are more generous during U.S.-wide upturns.

In Table 5 we display the cyclical properties of the components of local government budget surpluses: Federal grants, state government grants, own revenue, and expenditure. The results are overall similar to those for state governments. When time-fixed effects are not included, federal and state grants are positively correlated with output, but when we control for U.S.-wide fluctuations by including time-fixed effects – see the lower panel of Table 5 – we find that federal grants to local governments are slightly (although not significantly) countercyclical.

Looking at the top panel of Table 5, where time-fixed effects are not included, we find that the own revenue of local governments is procyclical, but to a much smaller extent than state government revenue, probably because local government taxes are less directly tied to income. Local government expenditure is also procyclical and the regression coefficients are of the same order of magnitude as those for state government expenditure.

In the bottom panel, with time-fixed effects, we see that at the 3-year horizon, federal government grants to local governments do not exhibit significant

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[20] Since federal grants are a source of revenue not raised from the residents of the state, an increase in grants received, for a given expenditure and budget surplus, allows the state government to tax the residents of the state by a smaller amount. Thus, federal grants smooth income in a state if they vary negatively with gross state output (that is, if $\beta_G < 0$). Our findings here are in line with studies documenting the federally provided income insurance to state output through the federal tax-transfer system; see, e.g., Sala-i-Martin and Sachs (1992), von Hagen (1992), Asdrubali et al. (1996) and Sørensen and Yosha (1999).

Table 5
Cyclical patterns of local government budget components[a]

	Federal grants	State grants	Own revenue	Expenditure
Without time-fixed effects[b]				
$k = 1$	0.14	0.89	1.66	1.53
	(2.70)	(7.05)	(8.47)	(5.19)
$k = 3$	0.20	1.51	2.35	3.42
	(3.12)	(10.24)	(17.24)	(12.67)
With time-fixed effects[c]				
$k = 1$	−0.08	0.24	0.17	−0.42
	(−1.33)	(1.44)	(0.71)	(−1.26)
$k = 3$	−0.11	1.17	0.72	2.26
	(−1.88)	(5.76)	(2.10)	(6.03)

[a]The '$k = 3$' rows report the $\hat{\beta}$-coefficient from a regression of $X_{it} - X_{i,t-3}$ on $GSP_{it} - GSP_{i,t-3}$ using non-overlapping data, allowing for fixed effects. Estimates are scaled by 100 to reflect the response of the corresponding budget surplus to a \$100 increase in per capita gross state product. The budget components refer to the total budget including utilities, insurance trusts, and liquor stores. Real per capita 1983 dollars. *t*-statistics in parentheses. Note that although Total Surplus = Federal Grants + State Grants + Own Revenue – Expenditure, the coefficients associated with these individual components will not add up to the coefficient for local government total surplus reported in Table 3 since the individual budget components are first-differenced (being non-stationary) whereas in the regressions reported in Table 3 the local government total surplus is not differenced (as it is stationary). Sample period: 1978–1994.

[b]Coefficient $\hat{\beta}$ from regression $\Delta X_{it} = \alpha_i + \beta \Delta GSP_{it} + \varepsilon_{it}$, where X is the budget component indicated in the column title and GSP is gross state product.

[c]Coefficient $\hat{\beta}$ from regression $\Delta X_{it} = \alpha_i + \nu_t + \beta \Delta GSP_{it} + \varepsilon_{it}$.

cyclical patterns, although we still see significant procyclical movements in state government grants to local governments. Local government revenue and expenditure do not vary significantly with output at the 1-year frequency, but both components are procyclical at the 3-year frequency.[21]

We do not find it attractive to regress the *growth rate* of the surplus on GSP growth, since the surplus hovers around zero; but for expenditure and revenue components one might prefer regressions in log-differences. We experimented with such regressions and found results qualitatively similar to those reported for level regressions.[22]

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[21] We further studied the response of state and local government fiscal policy to positive and negative output shocks, and did not find much evidence of asymmetric fiscal responses to such shocks. This is unlike the findings for national governments reported in Gavin and Perotti (1997).

[22] No coefficients changed sign or statistical significance. The magnitude of the estimated coefficients changed, of course, as the coefficients in 'Δ-log' regressions are interpreted as elasticities. The only fact revealed by such regressions, not observable from our tables, is that grants have a slightly higher elasticity with respect to GSP fluctuations than own revenue.

3.3. A more explicit dynamic analysis

The empirical analysis so far captures dynamic effects through the length of the differencing interval (1 or 3 years). In order to examine if this approach misses any salient features of the data, this subsection presents the results of explicit dynamic regressions. To ascertain that the results are not driven by the way we difference the data, we start out by estimating the following dynamic relations in levels, for state governments:[23]

$$\text{REV}_{it} = \alpha_{iR} + v_{tR} + \beta_{0R}\text{GSP}_{it} + \beta_{1R}\text{GSP}_{i,t-1} + \cdots + \beta_{8R}\text{GSP}_{i,t-8} + \varepsilon_{itR}, \tag{6}$$

$$\text{EXP}_{it} = \alpha_{iE} + v_{tE} + \beta_{0E}\text{GSP}_{it} + \beta_{1E}\text{GSP}_{i,t-1} + \cdots + \beta_{8E}\text{GSP}_{i,t-8} + \varepsilon_{itE}, \tag{7}$$

$$s_{it} = \alpha_{iS} + v_{tS} + \beta_{0S}\text{GSP}_{it} + \beta_{1S}\text{GSP}_{i,t-1} + \cdots + \beta_{8S}\text{GSP}_{i,t-8} + \varepsilon_{itS}, \tag{8}$$

using eight lags, where REV_{it} is total revenue ($\text{OWNREV}_{it} + \text{GRANTS}_{it}$), EXP_{it} is total expenditure, and s_{it} is total surplus.[24]

The variables in these regressions, except the surplus, are non-stationary so the estimated t-statistics do not follow standard t-distributions and we do not tabulate the parameter estimates. The results are, nevertheless, simple to interpret from a graph displaying the predicted response of the fiscal variables to a one-time permanent increase in GSP (see Fig. 1). The following patterns are clearly visible: (1) both revenue and expenditure respond positively over several periods; (2) revenue responds immediately and more sharply while expenditure responds more gradually; (3) this results in a positive response of the surplus; (4) after 3–4 years, expenditure catches up with revenue so that the positive effect on the surplus vanishes.[25]

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[23] The results for the consolidated budgets of state and local governments are very similar.

[24] The overall results are not sensitive to the exact number of lags used.

[25] The results are not very sensitive to the specification of the dynamic model. We experimented with a bivariate specification where a second equation allowed for lagged output and surplus to feed back into GSP. Parameter estimates from such a standard vector auto-regressive (VAR) model, with the identifying assumption that current GSP is exogenous to current state government surplus, imply an impulse response function for the surplus that is very similar to the graph for the impact of a permanent GSP shock displayed in Fig. 1. This is due to the impact of GSP shocks on the surplus being rather small. Therefore, although our point estimates imply positive feed-back from lagged surplus to GSP, this effect is too small to change the overall picture. Furthermore, in a VAR model, one traces the impact of an innovation to GSP rather than a one-time permanent increase; but since GSP is so close to a random walk, the difference is minor. (Our point estimates indicate that, typically, a 100 dollar shock to GSP will grow to a 110 dollar increase after a year but will settle down to an increase of about 90 dollars after several years.) We chose not to display the results of a standard VAR model for two reasons: First, we prefer to maintain the assumption that GSP is exogenous to be consistent with the analysis in other sections of the paper; and second, including lagged fiscal variables results in the loss of a full year's worth of observations for every lag included which is not attractive given our short sample.
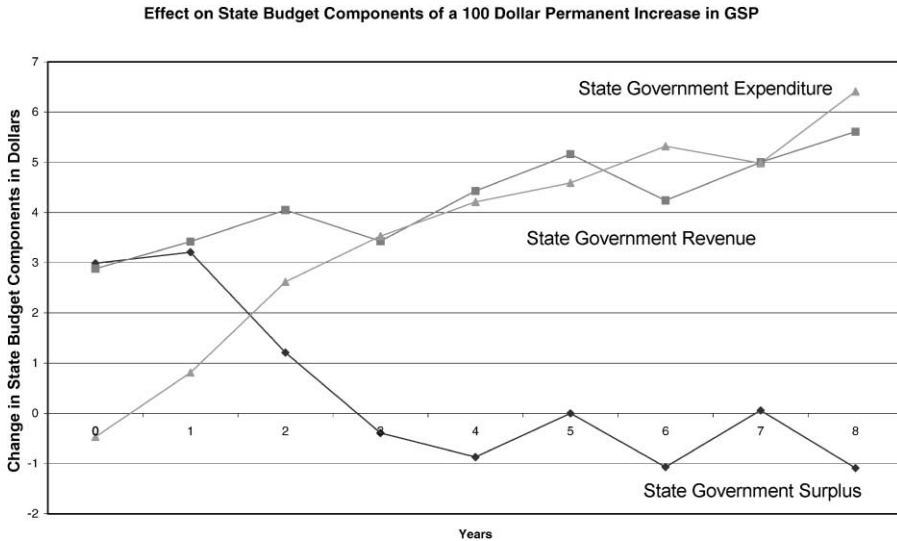
Fig. 1. The graph shows the effect (in real per capita dollars) on state government total revenue, expenditure and surplus from a one time permanent change of 100 dollars in real per capita GSP. The graph is based on regressions of budget components on current and lagged GSP (see Eqs. (6)–(8)). Sample: 1978–1994.

It is clearly visible from Fig. 1 that revenue and expenditure are not stationary processes (assuming that GSP is not stationary), since the impact of a permanent GSP shock does not diminish over time. By contrast, the surplus is clearly mean reverting. Since the surplus is revenue minus expenditure, this implies that revenue and expenditure are cointegrated processes, with the latter 'catching up' with the former in finite time (approximately 3–4 years). Paraphrasing a well-known saying, Fig. 1 is 'worth more than a thousand cointegration tests'.

Do the qualitative implications of our results depend on whether the data are differenced or not? To address this issue, we estimate similar regressions using stationary variables:

$$\Delta \text{REV}_{it} = \alpha_{iR}(+ v_{tR}) + \beta_{0R}\Delta\text{GSP}_{it} + \beta_{1R}\Delta\text{GSP}_{i,t-1} + \cdots + \beta_{5R}\Delta\text{GSP}_{i,t-1} + \varepsilon_{itR},$$
(9)

$$\Delta \text{EXP}_{it} = \alpha_{iE}(+ v_{tE}) + \beta_{0E}\Delta\text{GSP}_{it} + \beta_{1E}\Delta\text{GSP}_{i,t-1} + \cdots + \beta_{5E}\Delta\text{GSP}_{i,t-1} + \varepsilon_{itE},$$
(10)

$$s_{it} = \alpha_{iS}(+ v_{tS}) + \beta_{0S}\Delta\text{GSP}_{it} + \beta_{1S}\Delta\text{GSP}_{i,t-1} + \cdots + \beta_{5S}\Delta\text{GSP}_{i,t-1} + \varepsilon_{itS}.$$
(11)

The results, with and without time-fixed effects, are displayed in Table 6.[26] The results in these regressions are comparable to those in Eqs. (1), (4), and (5).[27]

The time-fixed effects are potentially important since they control for all nation-wide effects, including federal government fiscal policy and monetary policy as well as changes in federal legislation and adjustment in federal grants to states. The results in Table 6 show a clear pattern that does not depend on whether time-fixed effects are included or not, and resembles the patterns obtained from regressions in levels (Fig. 1). Revenue reacts instantly (and positively) to a positive GSP shock and continues to increase substantially in the first and second years after the shock. Expenditure also reacts positively to a positive GSP shock, but much slower than revenue. In both regressions, with and without time-fixed effects, the largest increase in expenditure occurs in the second year after the shock. There seems to be a small further increase in subsequent years but this effect is not very robust. (For instance, in the regression without time-fixed effects, the coefficient of 3-year lagged GSP is negative.) The surplus rises substantially in the first years after a positive GSP shock and then declines, reaching zero after 3–5 years.

Revenue and expenditure react more strongly to GSP shocks when time-fixed effects are not included. This means that the fiscal response of a single state is stronger to nation-wide than to state-specific shocks. This may reflect some kind of herd behavior, or a common response to changes in federal government legislation (e.g., the federal government changes the 'rules of the game' in response to a U.S.-wide GDP shock and all state governments respond in a similar manner). Alternatively – on the revenue side – the stronger response to GSP shocks when time-fixed effects are not included may reflect changes in federal grants policy.

The empirical results in this subsection are consistent with those reported above, using 1-year versus 3-year differencing. There, at the 1-year frequency, we saw a strong positive response of revenue and a weaker response of expenditure to a positive GSP shock, whereas at the 3-year frequency the response of revenue less than doubles while that of expenditure triples (Table 4). The 1-year versus 3-year analysis captures the increase of the surplus in each of the first years following a positive GSP shock well, but it does not capture the subsequent reversion to the mean. Nevertheless, in the remainder of the paper we will concentrate on the simpler specification with 1- and 3-year differencing. This specification captures the essential dynamics in the data reasonably well and is substantially more parameter parsimonious.

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[26] In these regressions too, the results for the consolidated budgets of state and local governments are similar. The results are also invariant to the exact number of lags used.

[27] The revenue variables differ somewhat (in Eq. (4) federal grants are not included), but for brevity we do not present more detailed regressions since the main patterns in the data are not very sensitive to these details.

Table 6
Dynamic response of state government budget components to GSP fluctuations[a]

Regression: $y_{it} = \alpha_i(+\nu_t) + \beta_0 \Delta GSP_{i,t} + \beta_1 \Delta GSP_{i,t-1} + \beta_2 \Delta GSP_{i,t-2} + \cdots + \beta_5 \Delta GSP_{i,t-5} + \varepsilon_{it}$

		Without time-fixed effects			With time-fixed effects		
	y_{it}:	Revenue	Expenditure	Surplus	Revenue	Expenditure	Surplus
β_0		5.21	1.71	4.33	2.43	0.19	3.34
		(12.54)	(4.54)	(10.52)	(4.61)	(0.48)	(6.03)
β_1		1.67	0.19	4.54	0.40	0.28	3.65
		(4.06)	(0.51)	(10.51)	(0.69)	(0.62)	(6.02)
β_2		1.06	3.68	1.71	1.43	2.55	1.57
		(2.35)	(9.24)	(4.15)	(2.44)	(5.36)	(2.63)
β_3		− 2.56	− 1.27	1.11	− 0.44	0.76	0.05
		(− 7.19)	(− 3.41)	(2.88)	(− 0.80)	(1.70)	(0.10)
β_4		0.35	1.26	1.07	0.33	1.43	− 0.43
		(0.79)	(3.37)	(2.73)	(0.61)	(3.50)	(− 0.79)
β_5		1.52	1.11	0.40	1.34	0.02	0.32
		(4.18)	(3.22)	(1.20)	(2.67)	(0.05)	(0.62)

[a] Revenue equals Own Revenue plus Federal Grants. These budget components refer to the total state government budget including utilities, insurance trusts, and liquor stores. Revenue and Expenditure are first-differenced at the 1-year frequency. All the variables in these regressions are stationary. Real per capita 1983 dollars. *t*-statistics in parentheses. Sample period: 1978–1994. The results for the consolidated budgets of state and local governments are similar.

3.4. Interpretation

The procyclicality of state and local government expenditure is consistent with the findings of Gavin and Perotti (1997), Talvi and Vègh (1998), and Lane (1999) for country-level governments.[28] A possible explanation is that government consumption behaves according to the 'Permanent Income Hypothesis' with government consumption responding positively to persistent positive output shocks. A second explanation is that the federal government, or the courts, impose higher expenditure on state governments in business cycle upturns (e.g.,

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[28] Talvi and Vègh (1998) argue that government expenditure in the G-7 countries is acyclical, and is procyclical only for developing countries. This observation is based on simple correlations (not regression analysis) which may be the cause of this (minor) difference in results.

more generous health care benefits or better schooling services that the state or local governments must provide). The recent tax increases in many states due to state court orders to equalize school finance are a pertinent example.[29] A third potential explanation is that the procyclicality of expenditure is driven mainly by capital expenditure since some parts of such expenditure are better regarded as investment than as consumption: For example, necessary spending on the maintenance of highway and school structures. In the next section we demonstrate that capital spending indeed is procyclical, but that it is not the main underlying source of procyclical state government expenditure.

Procyclical expenditure is also consistent with voracity: During upturns, governments spend more for fear that any accumulated surplus will be spent by others. Talvi and Vègh (1998) argue that such behavior is more likely the more volatile the tax base. State-level gross product is considerably more volatile than U.S. GDP, which is in line with the Talvi–Vègh interpretation but, nevertheless, we find this hypothesis less appealing since U.S. state and local government revenue and surpluses are highly procyclical, while state government expenditure is much less so, a pattern that does not provide strong support for a voracity effect.[30]

A potential interpretation of the procyclicality of surpluses is that state and local governments use the budget to smooth the disposable income of state residents. This might be optimal if some consumers are not able to diversify income sources on nation-wide or international capital markets or are unable to smooth consumption due to credit constraints. Such an interpretation corresponds well with the findings in Sørensen and Yosha (1998) regarding the consumption smoothing role of OECD national-level governments (especially over longer horizons).[31] We return to this issue in Section 7.

Turning to the fiscal behavior of local governments, the results in Table 5 indicate that local government budgets move together with those of state governments. This may be because local governments face the same environment as state governments or, perhaps, because state governments off-load part of the fiscal burden to local governments. We will return to this issue.

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[29] State Budget & Tax News, April 3, 1998.

[30] Following the suggestion of a referee we split the sample of U.S. states according to the variability of GSP and according to the 'asymmetry' of output fluctuations using a measure calculated in Kalemli-Ozcan et al. (2000). (Roughly, output fluctuations of a state are asymmetric if they have a low correlation with aggregate fluctuations and if they are more variable than aggregate fluctuations.) We did not, however, see any difference in budget cyclicality across those groupings for state governments. (For local governments, we found minor – but hard to interpret – differences.)

[31] See also Arreaza et al. (1999).

3.5. Comparison with results in the literature

This is a good junction to pause and check whether our results fit with what is already known on this topic, and whether some of the empirical regularities can indeed be regarded as stylized facts. We begin with Eichengreen and Bayoumi (1994), who regress the surplus/GSP ratio on the growth rate of GSP and on the one period lagged surplus/GSP ratio, using year-by-year observations for the period 1971–1990. A positive coefficient on the growth rate of GSP is interpreted as 'stabilizing fiscal policy'. The numerical value of the coefficient cannot be compared to our coefficient (which measures the dollar response of the surplus to a dollar change in output) but qualitatively, a positive coefficient indicates that the budget surplus grows more than proportionately than output in years with high output growth. Eichengreen and Bayoumi obtain a positive and significant coefficient for state governments, which is fully consistent with our results, but an insignificant coefficient for local governments which appears at first sight inconsistent with our results. The results of Eichengreen and Bayoumi can be thought of as measuring the amount of 'income stabilization' provided through the budget, since their regressions measure how government saving, measured as a fraction of GSP, varies over the cycle. These results are more comparable to (and agree with) our results for income smoothing reported in Section 7.[32]

Gramlich (1991) uses annual aggregate (U.S.-wide) data on state and local government budgets for the period 1955–1990. He regresses the ratio 'spending/GNP' and the ratio 'taxes/GNP' on the lagged stock of debt, federal grants, other grants, a price deflator for state and local government purchases, the health cost price deflator, and the current and lagged unemployment rate.[33] He finds that spending is affected positively by the U.S.-wide unemployment rate whereas we found that spending is affected positively when GSP *rises*. These results do not point in the same direction, but need not be regarded as contradicting since there is no year-by-year correspondence between GSP changes and the unemployment rate. Gramlich further finds that taxes are affected negatively by the lagged unemployment rate. This is fully consistent with our finding of higher tax revenue when GSP is high.[34]

Poterba (1994) is concerned with the fiscal response of state governments to fiscal *surprises* (fiscal shocks). He cleverly exploits a yearly survey by the

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[32] Those results confirm that local government surpluses provide very little income insurance.

[33] The independent budgetary variables are also divided by GNP, and the price deflators are divided by the GNP deflator.

[34] Gramlich does not report results regarding the response of state and local government budget *surpluses* to the national unemployment rate, nor does he disentangle state government and local government budgets.

National Association of State Budget Officers (NASBO) that reports information about actual revenue and expenditure in the previous fiscal year, current fiscal year revenue and expenditure as projected at the beginning of the year, and any 'planned' spending or tax changes that have been enacted during the current year.[35]

Poterba regresses the 'planned' change in taxes and in spending of state governments on the fiscal shocks. (The 'planned' changes in taxes and spending are regarded as the *response* of state governments to fiscal shocks.) He finds a negative response of 'planned' expenditure changes to deficit shocks (expenditure increases in good years and decreases in bad years) and a positive response of 'planned' tax changes to deficit shocks (taxes decrease in good years and increase in bad years). If we draw an analogy between a positive fiscal shock and a rise in GSP, we can say that Poterba's finding regarding expenditure is qualitatively consistent with our finding but that his finding regarding taxes is not. The analogy, however, is far from obvious due to the different nature of the regressor in these papers, and to the fact that Poterba constructs an estimate of the *unpredictable* component of the budget surplus whereas we do not attempt to isolate the unpredictable component in GSP.

Despite the differences in sample and methodology, our reading of the overall results is that state and local government fiscal policy responds to the cycle with expenditure and taxes increasing in good times. The latter effect seems to dominate in the short run, resulting in procyclical surpluses. Poterba's (1994) analysis raises some questions as to *why* this happens and how governments determine fiscal policy – questions that we will not be able to answer in the present paper.

4. Cyclical properties of capital outlays

In this section, we study the cyclical properties of state and local government capital outlays. In Tables 4 and 5, we reported the cyclical properties of state and local government expenditure. In those calculations we implicitly regarded

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[35] Poterba (1994) defines a revenue shock as '(actual revenue – 'planned' tax change) – forecast revenue' and an expenditure shock as '(actual outlays – 'planned' spending change) – forecast outlays'. The magnitude '(actual revenue – 'planned' tax change)' measures the revenue that would have been collected absent the change in taxes, namely, prior to the response to the shock. Therefore, to obtain an estimate of the shock, forecast revenue should be subtracted from this magnitude (not from actual revenue). In a similar fashion, estimates for spending shocks are obtained. A fiscal (deficit) shock is defined as the difference between the expenditure and revenue shocks.

Table 7
Cyclical patterns of state and local government capital outlays[a]

		Total capital outlays	Construction outlays	Land and equipment outlays
State	$k = 1$	0.40 (3.59)	0.13 (1.29)	0.17 (5.62)
	$k = 3$	1.02 (10.13)	0.52 (5.89)	0.15 (3.74)
Local	$k = 1$	0.07 (0.55)	— —	— —
	$k = 3$	0.98 (7.19)	— —	— —

[a]Coefficient $\hat{\beta}$ from regression $\Delta X_{it} = \alpha_i + \beta\Delta GSP_{it} + \varepsilon_{it}$, where X is the budget component indicated in the column title and GSP is gross state product. The '$k = 3$' rows report the $\hat{\beta}$-coefficient from a regression of $X_{it} - X_{i,t-3}$ on $GSP_{it} - GSP_{i,t-3}$ using non-overlapping data, allowing for cross-sectional fixed effects. Estimates are scaled by 100 to reflect the response of the corresponding budget component to a \$100 increase in per capita gross state product. The capital outlays refer to the total state government budget including utilities, insurance trusts, and liquor stores. Real per capita 1983 dollars. *t*-statistics in parentheses. Capital Outlays = Construction Outlays + Land and Equipment Outlays. Construction and Land and Equipment Outlays data are not available for the whole sample period for local governments. Sample period: 1978–1994. Time-fixed effects not included.

all expenditure, including capital outlays, as consumption expenditure or transfers. Of course, certain capital outlays should be regarded as consumption (e.g., a more lavish mansion for the governor), but we cannot quantify which constitute 'necessary' investment. In any event, the saving aspect of capital expenditure implies that the procyclicality of expenditure reported in Tables 4 and 5 may be overstated, an issue we address now.

In Table 7 we display results confirming that capital outlays of both state and local governments are procyclical. The results displayed in this table are not sensitive to the inclusion of time-fixed effects. We, therefore, only present the results without time-fixed effects. Similarly, for the remainder of the paper, if the results are not sensitive to the inclusion of time-fixed effects, only results without time-fixed effects are displayed. For state governments, we can break down capital outlays into construction outlays, and land and equipment outlays. At the 1-year horizon, equipment outlays are slightly more procyclical than construction outlays, but at the 3-year horizon construction outlays are

considerably more procyclical.[36] A natural interpretation is that state governments quickly adjust expenditure on equipment, whereas construction projects (e.g., highways) are not quickly adjusted. Over longer horizons, expenditure on construction projects is adjusted and, therefore, follows output fluctuations more closely.[37]

Since the estimates in Table 7 are statistically significant and imply that capital outlays are procyclical, the estimates of the procyclicality of state and local government expenditure reported in the third column of Tables 4 and 5 are indeed likely to overstate the procyclicality of government spending on public goods and transfers. However, the point estimates in Table 7 are considerably smaller than the corresponding point estimates of procyclical government expenditure (especially for local governments). Therefore, controlling for the procyclicality of capital outlays does not alter the qualitative conclusions regarding the procyclicality of state and local government spending.[38]

5. Is there deficit off-loading?

State and local governments control trust funds, utilities, and liquor stores (UILs) whose operations are not part of the official budget and, thus, are less conspicuous than other activities. Anecdotal evidence suggests that state and local governments are frequently tempted to shift deficits to these entities. For example, New Jersey governor Christine Whitman has on several occasions balanced the state budget by reducing the state government's payment to the state pension funds,[39] while Indiana allocated $170 Million of the budget surplus to the teachers' pension fund in fiscal (surplus) year 1998.[40]

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[36] Total Capital Outlays equals Construction Outlays plus Land and Equipment Outlays, but this identity is not imposed in the regressions.

[37] Gramlich (1991) finds that the ratio of (aggregate) state and local government construction expenditure to U.S. GNP responds negatively to the lagged unemployment rate.

[38] Notice that capital outlays (when regarded as investment) smooth consumption if they vary procyclically (assuming that the alternative use of a dollar spent on capital is consumption). Government consumption expenditure and transfers smooth consumption if they vary countercyclically.

[39] New York Times, April 22, 1997.

[40] U.S.A. Today, January 5, 1998. See also Bunch (1991) and Kiewiet and Szakaly (1996). Closely related are Inman and Mark (1998), who study the determinants of underfunding of U.S. state-level public employee pension plans – we describe their main results later.

It is reasonable to conjecture that such behavior is exacerbated by the balanced budget restrictions that most U.S. states have adopted.[41] The more stringent these restrictions, the stronger the incentive for such deficit shifting, an issue we shall explore in some detail.[42]

5.1. Trust funds, utilities, and liquor stores

Table 8 displays the cyclical properties of UIL budgets. The budget surpluses of liquor stores are acyclical – they are even weakly (and significantly) countercyclical at the 3-year frequency. This may reflect a countercyclical demand for liquor, i.e., people may buy more alcoholic beverages during slumps. Liquor store revenue is, however, a small and declining fraction of state and local government revenue, which is reflected in the tiny estimated coefficients, so we will not pursue the issue further. The budget surpluses of public utilities are procyclical, in particular at the local level. (The latter is not surprising as they are mainly managed by local governments.) Insurance trust fund surpluses are strongly procyclical at the state level, and this may partly reflect off-budgeting (deficit shifting). (The coefficients are small at the local level since trust funds are mainly managed by state governments.)

All in all, the evidence is consistent with the idea that state and local governments systematically shift deficits to off-budget accounts. Such behavior would be consistent with the desire to smooth residents' income and consumption. If tax-collection costs are convex budget-by-budget then such behavior is

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[41] In virtually all states, balanced budget rules apply to the general fund, and in many states the rules also apply to other budget accounts such as the capital fund, or the federal funds account. State governments can run deficits even where balanced budget rules are tight as long as they have accumulated savings (which are often accumulated in 'rainy day funds'). See National Association of State Budget Officers (NASBO) (1992), Bohn and Inman (1996) and Wagner (2000) for details. The balanced budget restrictions in the United States are mainly self-imposed by the states themselves but, in general, this need not be the case. von Hagen and Eichengreen (1996) explain why central governments may want to limit deficits of sub-central governments: If sub-central governments have less taxing power than central governments then central governments may be under pressure to bail out sub-central governments in a debt crisis. Anticipating this, higher level governments will impose limitations on the borrowing ability of lower level governments.

[42] The underlying theory is discussed extensively in Drazen (2000). The logic can be summarized as follows. Time inconsistency is the greatest concern in implementing fiscal policy since ex-post, governments are often tempted to increase spending and raise taxes which affects incentives ex-ante (underinvestment, mis-reporting of income sources and so forth). Institutions, laws, and regulations that prevent opportunistic behavior by governments are a potential remedy; the harder it is to amend these laws and institutions the more credible the policy (hence the case for adopting *constitutions* that are very hard to change or repeal). Balanced budget rules are a prime example of an institution that is intended for precisely this purpose. Deficit off-loading through off-budget activities is a prime example of why institutions may not, after all, be effective as the discussion in Drazen (2000, Chapter 5), suggests. See the analysis in Section 6.

Table 8
Cyclical patterns of the budget surplus of utilities, insurance trust funds, and liquor stores

	Utilities		Trust funds		Liquor stores	
	$k = 1$	$k = 3$	$k = 1$	$k = 3$	$k = 1$	$k = 3$
Without time-fixed effects[a]						
State	− 0.00	0.19	0.72	2.56	− 0.02	− 0.08
	(− 0.01)	(3.68)	(4.20)	(7.34)	(− 1.61)	(− 2.11)
Local	0.08	0.38	0.01	0.11	− 0.00	− 0.02
	(1.80)	(5.22)	(2.50)	(3.83)	(− 0.54)	(− 0.78)

[a]Coefficient $\hat{\beta}$ from regression $s_{it} = \alpha_i + \beta \Delta GSP_{it} + \varepsilon_{it}$, where s is the total surplus and GSP is gross state product. The '$k = 3$' column reports the $\hat{\beta}$-coefficient from a regression of $s_{it} + s_{i,t-1} + s_{i,t-2}$ on $GSP_{it} - GSP_{i,t-3}$ using non-overlapping data, allowing for cross-sectional fixed effects. Estimates are scaled by 100 to reflect the response of the corresponding budget surplus to a $100 increase in per capita gross state product. Real per capita 1983 dollars. *t*-statistics in parentheses. Sample period: 1978–1994.

also consistent with equalization of the fiscal burden at the margin across budgets.

There is nothing 'wrong' with such behavior per se: A fiscal authority should make use of all the budgets at its disposal to achieve its goals (tax smoothing, consumption smoothing, or any other goal). The question is whether the use of an off-budget account as a fiscal tool is intended to circumvent balanced budget restrictions to the extent that the balanced budget rules do not effectively cover the off-budget accounts. We address this important issue later.

5.2. *Insurance trust funds*: *A closer look*

5.2.1. *Unemployment insurance funds versus pension and other trust funds*

The estimates of procyclical surpluses of insurance trust funds reported in Table 8 are based on a broad definition of state (and local) government-managed trust funds that includes unemployment insurance funds. Since state unemployment insurance trust funds are managed by the Treasury, and since there is federal legislation regarding minimum contributions and defining benefits, it would also make sense to regard unemployment contributions and benefits as part of the federal (rather than the state-level) tax-transfer system. The results in Table 8 may, thus, confound the role of the state and the federal levels of government.

On the other hand, there are good arguments for regarding unemployment insurance as a state-level institution, the main argument being that many states contribute beyond the minimum requirement imposed by the federal authorities. Rather than taking a stand on this issue, we decompose the trust fund

surpluses to surpluses of unemployment insurance funds and of other (including pension) funds, and measure the cyclical properties of each class of funds separately. The results, displayed in the top panel of Table 9, indicate that both types of funds exhibit statistically significant procyclical surpluses at both differencing frequencies.[43]

5.2.2. Pension fund assets and liabilities: Is there buffer-stock saving behavior?

So far we concentrated on the behavior of trust fund surpluses – a flow measure of the excess of current receipts over current expenses – in response to output fluctuations. It is also of interest to study the response of the stock of the assets managed by these funds to fluctuations in output. For example, acyclical behavior of the stock of assets would suggest that funds distribute more benefits (or raise less revenue) during booms, and vice versa during recessions, in order to maintain a constant stock of assets over the cycle. Procyclical behavior of assets would mean that funds accumulate a buffer stock of savings during booms to be run down during recessions. The more interesting variable to look at may be assets net of discounted future pension liabilities, since this amount of 'over-funding' is in principle the correct measure of the net saving of a pension fund. Since over-funding is difficult to estimate, we report results using different measures of trust fund saving.

For pension funds we focus on two variables: Financial assets of state public employee pension funds – the major subset of the trust funds considered above – and financial assets of these funds net of future pension liabilities. These variables were estimated following the econometric approach described in Inman (1986), and constructed by Inman and Mark (1998).[44] Define ASSETS_{it} and NETASSETS_{it} to be the change from year $t-1$ to year t in the financial assets and the net assets (i.e., assets minus future liabilities), respectively, of the pension funds.[45] In the bottom panel of Table 9, we display coefficients from the

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[43] Since the pension and other trust fund surplus series look non-stationary, the results in the second column are calculated by regressing first-differenced surplus series on the first-differenced GSP series. Therefore, adding the coefficients from regressions for both types of funds (e.g., 0.39 and 0.18 for $k=1$) does not exactly yield the corresponding number reported in Table 8 (0.72 for $k=1$). Inman and Mark (1998) study the time-series properties of the actuarial underfunding of state public employee pension plans, concluding that underfunding is a mean-reverting process. As is well known, unit root tests typically have low power, so it is hard to determine what exactly lies behind the different conclusion we reach regarding the time-series properties of the trust fund surplus. It may well be that the *actuarial* surplus, as calculated by Inman and Mark, is stationary, while the simple 'pay-as-you-go' surplus is not.

[44] We are grateful to Inman and Mark for providing us their estimates of pension fund assets adjusted for the present value of accumulated pension liabilities.

[45] The change in assets is comparable to the surpluses of the pension funds in the top panel of Table 9.

Table 9
Insurance trust funds: A closer look[a]

Unemployment insurance funds versus pension funds and other trust funds

	Unemployment insurance[b]	Pension and other[c]
$k = 1$	0.39	0.18
	(5.32)	(2.68)
$k = 3$	0.97	0.78
	(8.40)	(6.61)

Pension fund assets and liabilities: Do pension fund assets buffer output shocks?

	Assets[d]	Assets less pension liabilities[d]
$k = 1$	0.51	0.07
	(1.85)	(0.14)
$k = 3$	2.61	2.67
	(3.96)	(5.19)

[a]'$k = 3$': See notes to previous tables. Estimates are scaled by 100 to reflect the response of the corresponding budget surplus to a \$100 increase in per capita gross state product. Real per capita 1983 dollars. t-statistics in parentheses. 'Pension' refers to the employee-retirement systems of state and local governments. 'Other' include state insurance programs such as accident, sickness, and disability benefit systems. 'Assets' are cash and investment holdings of the state employee-retirement systems. The estimated coefficients for Unemployment Insurance funds and Pension and Other funds do not exactly add up to those for State Insurance Trust Funds reported in Table 8 due to differencing. Time-fixed effects not included. Assets and Pension Liabilities data are courtesy of Robert Inman and Stephen Mark. Sample period: 1978–1992 for Assets and Pension Liabilities, 1978–1994 for other data.

[b]Coefficient $\hat{\beta}$ from regression $X_{it} = \alpha_i + \beta \Delta GSP_{it} + \varepsilon_{it}$, where X is the surplus of the unemployment trust fund and GSP is gross state product.

[c]Coefficient $\hat{\beta}$ from regression $\Delta X_{it} = \alpha_i + \beta \Delta GSP_{it} + \varepsilon_{it}$, where X is the (non-stationary) surplus of pension and other trust funds.

[d]Coefficient $\hat{\beta}$ from regression $\Delta X_{it} = \alpha_i + \beta \Delta GSP_{it} + \varepsilon_{it}$, where X is the change in the pension fund assets. For 'Assets Less Pension Liabilities', replace ΔX_{it} with X_{it}.

regressions of $\Delta ASSETS_{it}$ and $NETASSETS_{it}$ on ΔGSP_{it}.[46] A positive regression coefficient is interpreted as buffer-stock accumulation of assets. The results indicate clear and strong buffer-stock saving behavior at the 3-year horizon for both series, and significant buffer-stock behavior at the 1-year horizon for the series $ASSETS_{it}$.

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[46] The $NETASSETS_{it}$ series look stationary, while the $ASSETS_{it}$ series do not. Therefore, $ASSETS_{it}$ is first-differenced whereas $NETASSETS_{it}$ is not.

We repeated the regressions allowing for time-fixed effects to examine if the results might be driven by U.S.-wide procyclical capital gains of pension funds (driven in turn by a general increase in asset prices). These regressions (details not reported) resulted in somewhat smaller coefficients for the buffering by assets alone, but the results for net assets are very similar.

5.3. Off-budget accounts and balanced budget rules

State governments are subject to restrictions on their ability to manipulate budgets. For example, from 1992 to 1994 California governor Pete Wilson withheld about $700 million in pension plan contributions. However, this diversion was declared unconstitutional in court and the state government was ordered to repay.[47] This anecdote clearly illustrates how big the temptation is for politicians to use off-budget accounts such as pension funds to alleviate revenue short-falls, even in the face of possible court reversals. This is consistent with our finding of statistically significant procyclicality of trust fund surpluses and we, therefore, pursue this issue in greater detail. Our goal is to determine whether state and local governments use off-budget accounts to circumvent such balanced budget restrictions.

We first establish that these restrictions indeed affect fiscal behavior. Following Poterba (1994), Eichengreen and Bayoumi (1994), Bohn and Inman (1996), and Alesina and Bayoumi (1996), we use the index of balanced budget stringency suggested in Advisory Commission on Intergovernmental Relations (ACIR) (1987) that ranks states on a scale of 0 to 10 (where 0 is the least stringent). There are 13 states with an index of 6 or lower, while the rest have an index of 8 or higher. No state has an index of 7 so we use 7 as our cut-off value for splitting the sample.[48] The results for the low and high stringency sub-samples are displayed in Table 10.[49] At the 1-year differencing frequency we find that the budget surpluses of states with more stringent budget rules exhibit less procyclicality: The *P*-values of the test statistic of the null hypothesis that there is no difference between the estimates for the two groups are 0.06 for the total surplus and 0.05 for the general surplus, confirming the general perception that fiscal discipline comes with a cost in the form of a reduced ability to respond to output

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[47] Forbes, June 5, 1995.

[48] The median state is not a good cut-off point for the sample since more than 25 states have an index of 10.

[49] In our setup, with cross-sectional fixed effects and state-specific error variances, splitting the sample is equivalent to estimating the model $s_{it} = \alpha_i + \beta_L D_i^L \Delta GSP_{it} + \beta_H (1 - D_i^L) \Delta GSP_{it} + \varepsilon_{it}$, where s is the total surplus, GSP is gross state product, and D_i^L is a dummy variable which is 1 if state i's balanced budget rules are less stringent and 0 otherwise.

Table 10
The effect of balanced-budget rules on the cyclical patterns of budget surpluses[a]

Stringency of rule:		Total		General	
		Low[b]	High[b]	Low[b]	High[b]
State	$k = 1$	4.23	2.62	3.13	1.98
		(5.56)	(6.41)	(6.28)	(6.61)
	P-value:		0.06		0.05
	$k = 3$	8.94	8.49	4.92	4.08
		(8.25)	(12.47)	(7.13)	(8.38)
	P-value:		0.72		0.31
Local	$k = 1$	1.01	0.87	0.85	0.71
		(2.85)	(3.70)	(2.59)	(3.68)
	P-value:		0.73		0.71
	$k = 3$	2.81	2.14	1.75	1.27
		(8.86)	(4.80)	(3.62)	(3.22)
	P-value:		0.22		0.44

[a]The '$k = 3$' rows report the $\hat{\beta}$-coefficients from a regression of $s_{it} + s_{i,t-1} + s_{i,t-2}$ on $GSP_{it} - GSP_{i,t-3}$ interacted with the dummy variables, using non-overlapping data, allowing for cross-sectional fixed effects. Estimates are scaled by 100 to reflect the response of the corresponding budget surplus to a \$100 increase in per capita gross state product. Real per capita 1983 dollars. *t*-statistics in parentheses. *P*-values are for the null hypothesis that there is no difference in the point estimates across the low- and high-stringency groups. Index of balanced-budget stringency is from ACIR (1987), ranging from 0 (least stringent) to 10 (most stringent). Cutoff at index = 7, yielding groups of size 13 and 35. Total Surplus includes revenue and expenditure of utilities, liquor stores, and insurance trust funds, while General Surplus does not. Sample period: 1978–1994.
[b]Coefficients $\hat{\beta}_L$ and $\hat{\beta}_H$, respectively, from the regression $s_{it} = \alpha_i + \beta_L D_i^L \Delta GSP_{it} + \beta_H (1 - D_i^L) \Delta GSP_{it} + \varepsilon_{it}$, where s is the total surplus, GSP is gross state product, and D_i^L is a dummy variable which is 1 if state i's balanced budget rules are less stringent and 0 otherwise.

fluctuations. Similar results were found by the above-mentioned studies. The point estimates for 3-year differencing and for local government surpluses are in the same direction as the results for 1-year differencing, but the differences between the estimates for the two groups are clearly small and not statistically significant.[50]

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[50] Without a clear understanding of *why* governments adopt procyclical surpluses it is hard to say whether this empirical result is 'good news' or 'bad news'. If one believes that procyclical surpluses (in particular, lower surpluses during slumps) help credit constrained individuals smooth consumption, then balanced budget restrictions limit the ability of governments to do so. An obvious counter argument is that without such restrictions, fiscal discipline will be poor, forcing state and local governments to pay higher rates for funds, which will render them ineffective as providers of consumption smoothing. Furthermore, there is no consensus that governments should have such a role to begin with.

We turn to the question of deficit off-loading. We find no direct evidence of deficit off-loading intended to circumvent balanced budget restrictions. In states with stringent balanced budget rules, local governments do *not* exhibit stronger procyclicality of the surplus (nor do UILs). It is possible that we find no deficit off-loading to pension funds because balanced budget rules cover pension funds only in some states. A sharper test examines if there is more off-loading when balanced budget rules do not apply to trust funds. We classified states using this criterion,[51] finding no strong differences in the amount of procyclicality of pension fund surpluses and in the cyclical behavior of the assets of the funds across the two groups. This, again, indicates that the procyclical behavior of trust fund surpluses does not in general arise from attempts to circumvent balanced budget rules on the general budget. (Details not provided.)

5.4. Historical debt levels

Governments with a high level of debt may be more constrained in their ability to maintain procyclical budget surpluses. Alternatively, governments that are more prone to smoothing residents' consumption through procyclical surpluses may build up higher debt. To explore if there is a relation between debt levels and the cyclical properties of budget surpluses, we split the states according to the 1978 per capita levels of state government net long-term debt.

Table 11 indicates that state governments with higher levels of debt exhibit more cyclical budget surpluses. This is true for the total and, in particular, the general surplus, for both 1-year differencing and 3-year differencing. These results are consistent with the view that high debt levels are a result of consumption smoothing through deficit spending (i.e., through procyclical surpluses), and that these debt levels are moderate enough so as not to interfere with the ability of state and local governments to use the budget as a tool for smoothing residents' consumption.[52]

It is conceivable that low historical long-term debt levels proxy for credit market imperfections, with poor states being more credit constrained. To explore this issue, we split the states according to wealth (per capita state GSP) and according to output growth, and find (details not reported) that neither is correlated with the extent to which fiscal policy is procyclical. That is, historical debt levels do not simply proxy for credit market imperfections. Our favored

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[51] According to National Association of State Budget Officers (NASBO) (1992), it is often a matter of judgment of state officials if generally worded balanced budget rules cover trust funds. National Association of State Budget Officers (NASBO) (1992) estimates that balanced budget rules cover trust funds in 30 states.

[52] For OECD country-level governments, Arreaza et al. (1999) find little correlation between the average size of the *deficit* and the amount of smoothing achieved through procyclical surpluses.

Table 11
The effect of historical long-term debt levels on the cyclical patterns of state government budget surpluses[a]

Level of long-term debt:	Total surplus		General surplus	
	Low	High	Low	High
$k = 1$	2.39	3.95	1.68	3.34
	(5.21)	(6.76)	(5.11)	(8.07)
P-value:		0.04		0.00
$k = 3$	8.04	9.41	3.19	5.90
	(10.86)	(10.43)	(6.39)	(9.79)
P-value:		0.24		0.00

[a]The regressions are similar to those reported in Table 10. Real per capita 1983 dollars. *t*-statistics in parentheses. *P*-values are for the null hypothesis that there is no difference in the point estimates across the two groups. States are classified according to 1978 net per capita state government debt levels. Groups are of equal size. Total Surplus includes revenue and expenditure of utilities, liquor stores, and insurance trusts funds, while General Surplus does not. Sample period: 1978–1994.

interpretation is that a general 'fiscally conservative' attitude in some states manifests itself in both low debt and little cyclical response to output shocks.

We carried out the test of the effect of long-term debt on the cyclicality of budget surpluses for local governments, using another criterion for splitting the sample: 1978 gross long-term debt,[53] finding no significant effect. (Details not reported.)[54]

5.4.1. Disentangling the effect of balanced budget rules and of historical debt levels

Conceptually, the stringency of balanced budget rules is not independent of the level of long-term debt. Stringent budget rules may affect the debt level in a state directly by limiting the size of the deficit that the government can run, or may simply be correlated with debt levels since both reflect underlying attitudes to fiscal policy. Recalling that a high stringency index is associated with low procyclicality of the budget surplus (Table 10), and that a low historical debt level is also associated with low procyclicality of state-level budget surpluses (Table 11), it is natural to ask whether these effects are one and the same.

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[53] Offsets to gross local government debt are not available for 1978.

[54] We also split the states by the level of historical debt using 1984 as the starting year. We did so separately for state and local governments using net long-term debt issued by state and local governments, respectively. (For 1984, offsets were available for both state and local governments.) Hence, the sample is 1984–1994. We found little difference between the results using 1978 as a starting year and those using 1984.

In order to provide some evidence on this question we go beyond the simple univariate regressions employed so far. First, we estimate the cyclical properties of the total state government budget for each state i using the following time-series regression:

$$s_{it} = \alpha_i + \beta_i \Delta \mathrm{GSP}_{it} + \varepsilon_{it}. \tag{12}$$

The coefficients for the individual states are estimated imprecisely, being based on short samples of time series, but each estimate is unbiased and we can therefore perform a cross-sectional multivariate regression of the form

$$\hat{\beta}_i = \alpha_0 + \alpha_1 \log \mathrm{GSP}_i + \alpha_2 \log \mathrm{LTDS}_{i,t_0} + \alpha_3 \mathrm{INDEX}_i + \varepsilon_i, \tag{13}$$

where $\hat{\beta}_i$ is the estimated coefficient in Eq. (12), GSP_i is the average of GSP_{it} over the sample years, LTDS_{i,t_0} is the level of long-term debt in 1978 (the first year of the sample) of state i's government, and INDEX_i is the balanced budget stringency index for state i. The estimated coefficients represent the marginal impact of each right-hand side variable on the procyclicality of the state government budget surplus. We include the level of output per capita as a regressor since a high level of wealth may itself facilitate procyclical surpluses, and a state's debt level need not be independent of the wealth of the state. By including both the debt level and the stringency index we can evaluate the marginal impact of each when the other is controlled for.

The results, shown in Table 12, indicate that the historical debt level is positively related to surplus procyclicality, with the coefficient being significant

Table 12
Disentangling the effect of balanced budget rules and of historical debt levels[a]

Regression: $\hat{\beta}_i = \alpha_0 + \alpha_1 \log \mathrm{GSP}_i + \alpha_2 \log \mathrm{LTDS}_{i,t_0} + \alpha_3 \mathrm{INDEX}_i + \varepsilon_i$

	α_0	α_1	α_2	α_3
$k = 1$	-4.07	-1.28	1.41	-0.28
	(-0.72)	(-0.27)	(2.71)	(-1.02)
$k = 3$	-3.68	-5.66	1.39	-0.03
	(-0.43)	(-0.80)	(1.76)	(-0.07)

[a] We first estimate the cyclical response of state i's government budget surplus using the time-series regression coefficient $\hat{\beta}_i = 100 \, \mathrm{Cov}(S_{it}, \Delta \mathrm{GSP}_{it})/\mathrm{Var} \, \Delta \mathrm{GSP}_{it}$ ('$k=1$') and the coefficient $\hat{\beta}_i = 100 \, \mathrm{Cov}(S_{it} + S_{i,t-1} + S_{i,t-2}, \mathrm{GSP}_{it} - \mathrm{GSP}_{i,t-3})/\mathrm{Var}(\mathrm{GSP}_{it} - \mathrm{GSP}_{i,t-3})$ ('$k=3$'). Then we perform the above cross-sectional multivariate regression where GSP_i is the average of GSP_{it} over the sample years, LTDS_{i,t_0} is the level of state government net long-term debt in 1978 (the first year of the sample), and INDEX_i is the balanced budget stringency index. By including both the debt level and the stringency index we can evaluate the marginal impact of each when the other is controlled for. Real per capita 1983 dollars. t-statistics in parentheses. Sample period: 1978–1994.

at the 5% level at the 1-year frequency and weakly significant at the 3-year frequency, while the effect of the stringency of balanced budget rules is negative (as in the univariate regressions reported in Table 10) but not statistically significant.

These results are similar to the results obtained from splitting the sample: There we found a borderline significant impact of balanced budget rules at the 1-year horizon and a strong correlation with historical long-term debt (cf. the *P*-values in Tables 10 and 11). The *t*-statistics in the multivariate regression are lower, reflecting the small sample, but the qualitative conclusions are similar, indicating that our previous univariate regressions are sound.[55]

As a final remark, our analysis is distinct from that of Bohn (1998) and Inman and Mark (1998), who are concerned with the sustainability of the debt level. Their empirical approach consists, essentially, of regressing the current surplus on the lagged level of debt. A positive coefficient reflects a tendency to reduce the debt whenever it is high which they interpret as a sustainable debt level. The extent to which the surplus is determined by output fluctuations as opposed to past debt levels remains an open empirical question.

6. The role of fiscal and political institutions

There is wide agreement regarding the role of institutions and, in particular, political institutions in shaping fiscal policy (see Poterba and von Hagen, 1999; Alesina et al., 1997; Drazen, 2000; and footnote 42). We examine whether such considerations are important for the cyclical patterns of U.S. state and local government finances.

6.1. Type of taxes more heavily used

U.S. states differ in the mix of tax instruments used by state (and local) governments.[56] We restrict attention to state personal income taxes, state general sales and gross receipts taxes, state severance taxes, and local property taxes. These components make up the bulk of state government revenue. Seventeen states do not have severance taxes.[57] Severance taxes are typically

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[55] The (simple) correlation of the balanced budget stringency index and state government long-term debt is -0.34. Since the correlation is low, the univariate panel regressions reported earlier will not be severely affected by left-out variable bias.

[56] See Feenberg and Rosen (1986) for a comprehensive study.

[57] Recall that Alaska and Hawaii are not included in our sample.

Table 13

The effect of the type of taxes more heavily used on the cyclical patterns of the total surplus[a]

Type of tax:	State						Local	
	Personal		Sales		Severance		Property	
Share in total tax revenue:	Low	High	Low	High	Low	High	Low	High
Average share: (%)	12	34	21	41	0	6	71	95
$k = 1$	2.55	3.44	4.04	2.19	3.81	2.20	0.86	0.97
	(5.03)	(6.69)	(7.33)	(4.36)	(7.41)	(4.36)	(2.92)	(3.68)
P-value:		0.22		0.01		0.03		0.80
$k = 3$	8.63	8.61	9.65	8.02	9.23	7.99	2.59	2.56
	(11.69)	(9.33)	(10.04)	(11.29)	(11.29)	(9.88)	(4.83)	(8.39)
P-value:		0.99		0.17		0.28		0.96

[a]The regressions are similar to those reported in Table 10. Real per capita 1983 dollars. *t*-statistics in parentheses. *P*-values are for the null hypothesis that there is no difference across the two groups. Groups are of equal size, and are classified according to 1978 tax shares. 'Personal': Personal Income Taxes. 'Sales': General Sales and Gross Receipts Taxes. The share of personal, sales, and severance taxes are calculated as shares of total state government tax revenue. The share of property taxes is calculated as the share in total local government tax revenue. Total Surplus includes revenue and expenditure of utilities, liquor stores, and insurance trust funds. 'Average Share' is the average (over the states in the sub-group) fraction of total (state or local) tax revenue raised by the tax source considered. Sample period: 1978–1994.

small but they are important for states with large amounts of mining or oil extraction. We leave out the state corporate income tax which is relatively small for all states.

The tax revenue of state governments that rely on certain types of taxes may be more sensitive to output fluctuations. A pertinent example is oil states that rely heavily on severance taxes. The reliance on certain types of taxes may be a consequence of a particular attitude towards the use of fiscal policy to smooth fluctuations. For example, do states such as New Hampshire, that ideologically oppose personal income taxes, also oppose 'fiscal activism' of the type we have been studying?

To address such questions, we classify states according to the share of particular types of taxes in the 1978 state or local government total tax revenue, and check whether the extent of surplus procyclicality varies systematically across groups. The results are displayed in Table 13. At the 3-year differencing frequency there are no significant differences across groups of states, but at the 1-year frequency we find that states with a higher share of state personal income

taxes exhibit more procyclical budget surpluses.[58] The opposite is true for general sales and gross receipts taxes and severance taxes. To check if our results are robust, we repeated the experiment using 1986 as the year for classifying states into groups and obtained qualitatively similar results.

A potential interpretation is that reliance on personal income taxes – which are more directly tied to income than sales taxes – provides state governments with better tools for smoothing residents' income in response to output shocks. This is consistent with the smoothing impact of the personal income tax that is often remarked upon.[59] For instance, State Budget & Tax News, March 25, 1998, states: 'Many states are revising their revenue estimates for the current fiscal year upward as tax collections continue to roll in. The upward revisions are particularly pronounced in jurisdictions with high reliance on personal income taxes ... ' It is hard to determine whether the cyclical pattern of the budget surplus is solely due to 'automatic stabilization of disposable income' or voluntary behavior on the part of governments. At the 3-year horizon, where tax collection is more likely to reflect a choice by governments rather than institutional rigidities, we do not see a significant relation between a major tax source and the cyclicality of the surplus. We further examined if states with more progressive income taxes have more procyclical surpluses, using data reported (for 1983) in Feenberg and Rosen (1986). Surprisingly, we found no significant effects and we omit the details.

Of course, the tax structure itself is also endogenous, at least in the longer run, as are many other fiscal institutions. We do not explore this intriguing issue, but we do want to mention an interesting emerging literature that explores the idea that governments use fiscal policy to stabilize not only the income of residents but also the output (GDP) of the country they govern. Indeed, Gali (1994) and Fatas and Mihov (1999) find a negative relation between the size of government and the variability of output. (The latter paper extends this finding to the U.S. states as well.) Rodrik (1998) finds a positive relation between the size of government and the openness of countries and interprets this as evidence for more government-provided insurance in countries that are more exposed to risk emanating from foreign trade, e.g., terms of trade variability.

6.2. Political institutions

Consider a state governor, in an election year that occurs in the midst of an economic expansion. Most likely he (or she) will be tempted to spend the extra

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[58] Six states, Florida, Nevada, South Dakota, Texas, Washington, and Wyoming did not have state income taxes in 1978.

[59] Table 13 displays the cyclicality of surpluses, but we verified that the different response of the surplus across states is driven by the revenue rather than the expenditure.

Table 14
Cyclical patterns of the total surplus of state government budgets in election years[a]

	All shocks	Positive shocks		Negative shocks	
Election year:	Yes	Yes	No	Yes	No
Estimate:	α_0	α_1	α_2	α_3	α_4
$k = 1$	− 10.43	− 0.40	3.80	2.89	3.00
	(− 0.91)	(− 0.28)	(5.91)	(2.73)	(5.63)
$k = 1$	—	− 1.04	3.80	3.39	3.00
	—	(− 0.84)	(5.91)	(3.75)	(5.63)

[a] The first row displays results of the regression $s_{it} = \alpha_i + \alpha_0 D_{it}^E + \alpha_1 D_{it}^E \Delta GSP_{it}^+ + \alpha_2 (1 - D_{it}^E) \Delta GSP_{it}^+ + \alpha_3 D_{it}^E \Delta GSP_{it}^- + \alpha_4 (1 - D_{it}^E) \Delta GSP_{it}^-$, where s_{it} is the total budget surplus, D_{it}^E is a dummy variable which takes the value 1 if year t is an election year in state i (0 otherwise), ΔGSP_{it}^+ is equal to ΔGSP_{it} if ΔGSP_{it} is above its own average (over time for state i), and ΔGSP_{it}^-, correspondingly, for years of below average ΔGSP_{it}. The second row is estimated with $\alpha_0 = 0$. Estimates are scaled by 100 to reflect the response of the corresponding budget surplus to a \$100 increase in per capita gross state product. Total Surplus refers to the total surplus of the state government budget including utilities, insurance trusts, and liquor stores. Real per capita 1983 dollars. t-statistics in parentheses. Sample period: 1978–1994.

funds rather than increase saving. To test for such behavior, we construct for each state a dummy variable that takes the value one in a gubernatorial election year.[60] We interact this dummy with another dummy variable that equals one if the growth of the state's GSP is above the average (for the state) in that year. The results, shown in Table 14, indicate that state governments refrain from accumulating a larger surplus in an election year that occurs in the midst of an upturn but (as we already know) do accumulate a larger surplus in expansions if there is no election. For downturns, no such asymmetry between election and non-election years is apparent.[61]

Clearly, the temptation for incumbent politicians to spend more in election years is too large to resist. The lack of asymmetry between election and non-election years during recessions suggests that, despite the temptation to do so, state government politicians do not hand out election year tax cuts or boost popular spending in economic downturns.

There is no such asymmetry for national governments.[62] We are aware of two potential explanations for this.[63] The first is that voters punish politicians at the

[60] If, for example, the election takes place in 1990, the dummy variable equals one in 1989 since *fiscal* year 1989 is defined as the period July 1st 1989 to June 30th 1990.

[61] The regressions displayed in Table 14 do not include time-fixed effects. Similar (although somewhat weaker) results are obtained with time-fixed effects.

[62] See, e.g., Alesina et al. (1997, Chapter 7).

[63] We are grateful to Allan Drazen for suggesting them.

state and local government level for running large deficits in recessions.[64] Presumably, other issues determine voting patterns in national elections. The second is that national governments can inflate their way out of deficits and thus may feel less constrained in election years even if these occur during a recession.[65]

6.2.1. Additional tests

We further divided the states according to whether they are 'conservative' or not, using the classification developed in Erikson et al. (1993). The results, displayed in Table 15, indicate that the fiscal policy of conservative governments exhibits less procyclical budget surpluses. This is consistent with our interpretation that less surplus procyclicality in states with stringent balanced budget rules may reflect a general conservative attitude.

We also studied whether the political variables 'Democrat Governor', 'United Legislature', and 'United Executive and Legislative Branches'[66] affect the procyclicality of surpluses, and found no significant results.[67] (Details not provided.)

7. Smoothing income fluctuations through state and local government fiscal policy

Asdrubali et al. (1996) estimate the fraction of idiosyncratic (state-specific) GSP fluctuations absorbed through various mechanisms: Inter-state capital markets, the federal tax-transfer and grant system, and saving. Within their framework, the budget surplus is said to provide income smoothing if the growth rate of idiosyncratic disposal income + surplus reacts more strongly to idiosyncratic GSP growth fluctuations than disposable income itself. The intuition is as follows: During an expansion, for example, if the state government had lowered taxes so as not to run a surplus, disposable income would have been higher (i.e., less smooth).

For the sake of comparison with Asdrubali et al. (1996), and to verify that the results presented here are qualitatively robust, we report estimates of income

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[64] See Peltzman (1992), and Brender (1999) for interesting evidence from Israel.

[65] See Drazen (2000) for a comprehensive discussion.

[66] 'United Legislature' refers to the number of times the bicameral (upper and lower) state legislatures were united (i.e., a majority of the same party in both). 'United Branches' refers to the number of times the executive and the two legislative branches were united. Nebraska has a uni-cameral legislature and was dropped from these political groupings.

[67] The sample period, 1978–1994, was divided into two-year periods. (Governors are elected every four years, but not all states vote in the same year, and the legislature is elected every two years.) For each period we computed the average budget surplus and the average GSP, and attributed the appropriate political dummy variable to form two groups of observations.

Table 15
The effect of ideology on the cyclical patterns of the budget surplus[a]

		Total		General	
	Degree of conservatism:	Low	High	Low	High
State	$k = 1$	4.19	2.31	2.81	1.86
		(6.95)	(5.15)	(7.26)	(5.43)
	P-value:		0.01		0.06
Local	$k = 1$	1.21	0.67	0.99	0.60
		(4.20)	(2.52)	(3.61)	(2.88)
	P-value:		0.17		0.25

[a]The regressions are similar to those reported in Table 10. Real per capita 1983 dollars. *t*-statistics in parentheses. *P*-values are for the null hypothesis that there is no difference across the two groups. Groups are of equal size. Degree of Conservatism is measured as percent conservatives minus percent liberals as self-reported. The index ranges across states from 0 to 28. The average values of the index in low and high groups are 8 and 20, respectively. Sample period: 1978–1994.

smoothing through state and local government fiscal surpluses using the method developed in that paper.[68] It was found in that paper that 23% of idiosyncratic GSP fluctuations are absorbed via total (private + state government + local government) saving at the 1-year frequency, and 7% of such fluctuations are absorbed at the 3-year frequency. The amount of income smoothing obtained through state-level government surpluses and private saving were not estimated separately.[69] We do so here.[70]

We employ the following simple methodology (see also Sørensen and Yosha, 1999). Let s_{it} denote the surplus of the government of state i in period t and let DPI_{it} denote the state's disposable personal income. (Both variables in real per capita terms.) Intuitively, if the budget surplus smoothes disposable income, then – if U.S.-wide fluctuations are controlled for – the variable DPI_{it} should be smoother than $DPI_{it} + s_{it}$. That is, in a 'good year' for state i, the government of

[68] See Arreaza et al. (1999) for a detailed discussion and application to OECD national-level fiscal policy.

[69] Such a decomposition for national OECD governments is provided in Sørensen and Yosha (1998).

[70] We abstain from evaluating the welfare gains that such income smoothing generates. In general, the welfare effect of government-provided income and consumption smoothing depends on the degree to which individuals can smooth income and consumption on their own, which is likely to depend on many variables that are not studied in this paper such as demographics, poverty levels, and so on.

the state raises more taxes (the effective tax rate is higher) and runs a larger surplus whereas in a 'bad year', the government raises less taxes and runs a smaller surplus. Therefore, if this surplus were hypothetically rebated to residents, they would have at their disposal $\text{DPI}_{it} + \text{S}_{it}$ which is more volatile (less smooth) than their actual disposable income DPI_{it}. In other words, if the surplus indeed smoothes GSP fluctuations, DPI_{it} will vary less with GSP than $\text{DPI}_{it} + \text{S}_{it}$. More precisely, for the surplus to smooth income in this metric, idiosyncratic DPI_{it} needs to display a lower elasticity with respect to idiosyncratic GSP than $\text{DPI}_{it} + \text{S}_{it}$.[71] (Income smoothing thus defined implies procyclicality of the budget surplus but not the other way around.)

The coefficient β in the following panel regression is a measure of the differential response of $\text{DPI}_{it} + \text{S}_{it}$ and DPI_{it} to idiosyncratic GSP fluctuations:

$$\Delta \log(\text{DPI}_{it} + \text{S}_{it}) - \Delta \log \text{DPI}_{it} = v_t + \beta \Delta \log \text{GSP}_{it} + u_{it}, \tag{14}$$

where the v_t parameters are time-fixed effects that control for year-specific aggregate fluctuations.[72]

The results, displayed in Table 16, indicate that state and local government fiscal policy indeed provides smoothing (which is fully consistent with the analysis in previous sections). The results at both frequencies reveal that 3.7% (3.01 + 0.73 at the 1-year frequency and 2.94 + 0.78 at the 3-year frequency) of idiosyncratic shocks to GSP are absorbed through state and local government fiscal policy. This is not a negligible number, although it is small in comparison with the amount of smoothing through the budget achieved by national OECD governments: Sørensen and Yosha (1998) find that 25–30% of GDP shocks are smoothed through government saving in OECD countries, at both the 1-year and 3-year horizons. The amount of state and local government income smoothing is also small relative to the 23% found for total smoothing via saving at the 1-year horizon in Asdrubali et al. (1996). However, the number makes up about half of the smoothing by total saving (7%) at the 3-year horizon. This may reflect that governments are better able to borrow over longer horizons, or it may reflect governmental inertia (for example, in adjusting tax-rates) – a much more detailed study will be needed to sort out these issues.[73]

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[71] Eichengreen and Bayoumi (1994) consider the reaction of the surplus/income ratio to GSP growth. This is close – but not identical – to this measure.

[72] In this regression, we do not include cross-sectional fixed effects. The estimated coefficients can then be shown to be weighted averages of the coefficients of the year-by-year cross-sectional regressions; see Asdrubali et al. (1996, footnote 5). Regressions with both time- and cross-sectional fixed effects give similar results (not shown).

[73] Our results in this section are broadly comparable with those of Eichengreen and Bayoumi (1994; see footnote 71).

Table 16
Income smoothing through state and local government fiscal policy[a]

Regression: $\Delta \log(\mathrm{DPI}_{it} + \mathrm{S}_{it}) - \Delta \log \mathrm{DPI}_{it} = v_t + \beta \Delta \log \mathrm{GSP}_{it} + u_{it}$

	$k = 1$	$k = 3$
State	3.01	2.94
	(3.74)	(4.00)
Local	0.73	0.78
	(1.66)	(2.10)

[a] Percentage of idiosyncratic shocks to gross state product absorbed by the state or local government surplus. In the '$k = 3$' column, the data are differenced using non-overlapping 3-year intervals. v_t denotes time-fixed effects. DPI_{it} is state i's real disposable income in period t and S_{it} is the total surplus of state i's state government (for the row 'State') or local governments (for the row 'Local') measured in real per capita dollars. t-statistics in parentheses. Sample period: 1978–1994.

8. Concluding remark

Our analysis provides a set of stylized facts for structural models to match. One obvious – but we believe difficult – task is to derive models for the optimal cyclical behavior of state and local government budget surpluses, for the optimal mix of expenditure and revenue, for the adjustment of wealth buffer stocks (rainy day funds), and for borrowing and lending out-of-state. A related challenging task is to model the optimal 'division of labor' among various levels of government in financing public goods and raising tax revenue. We believe that our findings in this paper can help construct such models.

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