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The tax-spending nexus: Evidence from a panel of US state–local governments

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ABSTRACT

We re-examine the tax-spending nexus using a panel of 50 US state–local government units between 1963 and 1997. We find that, unlike tax revenues, expenditures adjust to revert back to a long-term equilibrium relationship. The evidence on the short-term dynamics is also consistent with the tax-and-spend hypothesis. One implication of this finding is that the size of the government at the state–local level is not determined by expenditure demand, but rather by resource supply. This is consistent with the fact that many US state and local governments operate under constitutional or legislative limitations that seek to constrain deficits.

1. Introduction

Persistently large public sector budget deficits have to be eventually corrected through fiscal adjustments in the form of government expenditure cuts and/or tax revenue increases. In practice, however, addressing the deficit problem may be complicated by the several issues. One issue is the division of the burden of adjustment between the expenditure and revenue sides of the budget during periods of fiscal retrenchment. A related issue is the temporal causality between taxes and expenditures which is typically discussed in terms of the following four competing hypotheses in the literature.

According to the "tax-and-spend" hypothesis championed by Friedman (1978), the level of spending adjusts to the level of tax revenues available. Thus, an increase in tax will not lead to lower budget deficits. Friedman therefore, favors a reduction in taxes to force subsequent spending cuts. Buchanan and Wegner's (1977) version of this hypothesis states that tax reductions will lead to higher spending through lowering the perceived price of government provided goods and services by the public. To reduce expenditures, the authors suggest limiting the ability of the government to resort to deficit financing.

The "spend-and-tax" hypothesis maintains that the level of spending is first determined by the government and then tax policy and revenues are adjusted to accommodate the desired level of spending. In this connection, Peacock and Wiseman (1979) argue that temporary increases in expenditures due to a crisis situation are used to justify higher taxes which may then become permanent. Another version of this hypothesis is based on the work of Barro (1979). In his tax smoothing hypothesis, government spending is considered as an exogenous variable to which taxes adjust. Since changes in expenditures drive changes in taxes in this scenario, the preferred approach to fiscal deficit reduction relies on cutting expenditures.

Meltzer and Richard (1981), among others, maintain that voters' choices lead to concurrent changes in taxes and expenditures. The implication of this so-called fiscal synchronization hypothesis is that causal relationship between government revenue and spending is bidirectional.

In contrast, Wildavsky (1988) and others emphasize that separate institutions participate in the budgetary process and that the collapse of a consensus on fundamentals among them may result in an independent determination of the revenue and expenditure sides of the budget. The implication of this "institutional separation" hypothesis is that taxes and expenditures may be causally independent.

Our main objective is to re-examine this issue of causality between taxes and expenditures at the US combined state–local government level. While the direction of causality is an empirical question in the final analysis, the use of state–local data may provide prior expectations in that regard. In particular, it is well known that many states and local governments in the US operate under fiscal constraints in the form of budget requirements and debt limits. These constraints, while not strictly binding, may be effective enough

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to result in revenue-constrained spending decisions. If so, we would expect to obtain results that are consistent with the tax-and-spend hypothesis. Similarly, to the extent that such constraints create causal dependence between revenues and expenditures in either direction, we do not expect to find empirical support for the institutional separation hypothesis.[1]

The paper contributes to the existing tax-spending literature in several ways. Firstly, our empirical evidence is based on a panel of 50 combined US state and local government units, henceforth referred to as state–local governments, and covers over 35 years.[2] Secondly, our empirical model controls for federal government grants to state–local governments, non-tax revenues, gross state product, and debt stock, for these are some important factors that are likely to affect the relationship between taxes and expenditures. It is also very general in the sense that it accounts not only for the non-stationarity, but also for the panel structure of our data. Thirdly, our approach to causality relies on the fact that if taxes and expenditures are cointegrated, then their levels must be related in the long run with causality running in at least one direction. To exploit this potential channel of causality, we adopt the panel error correction approach of Westerlund (2007a). Fourthly, we use panel tests that account for both the time series and cross-sectional dependencies. This is a crucial feature given a high degree of interdependency among state–local government units. Finally, we employ alternative variable definitions to check the robustness of our results.

The rest of the paper proceeds as follows. Section 1 provides a theoretical framework. Section 2 describes the empirical methodology and the data. Section 3 presents the results. Section 4 concludes.

2. The theoretical model

We employ a theoretical framework parallel to Sargent's (1987) treatment of the tax smoothing model of Barro (1979). In that model, the government decision makers, who are assumed to have rational expectations, take the level of spending, henceforth denoted G_t, as exogenous and choose the level of tax revenue, denoted R_t, to minimize tax distortions. As noted by Hoover and Sheffrin (1992), the roles of taxes and spending can be reversed to derive a model in which the path of government spending is smoothed given the path of taxes. In view of our prior expectations noted earlier, we make this behavioral assumption in the model outlined below. More specifically, suppose the spending distortion at time t has the quadratic form $c_1G_t+\frac{1}{2}c_2G_t^2$, where c_1 and c_2 are positive constants. The government then chooses the spending path that minimizes the present expectation of discounted sum of all future distortions,

$$\min_{G_t,B_{t+1}} E_t\left(\sum_{t=0}^{\infty} r^t\left(c_1G_t+\frac{1}{2}c_2G_t^2\right)\right) \tag{1}$$

subject to the budget constraint

$$B_{t+1}=(1+i)(B_t+G_t-R_t), \tag{2}$$

where E_t is the expectation conditional upon the information available at time t, B_t is the government debt stock, i is the interest rate and r is the discount rate. Note that, as in much of the literature, i and r are assumed to be constant over time and all fiscal variables are expressed in real terms. Following the brief steps shown for parallel problems in Sargent (1987), the first-order condition requires

$$E_t(G_{t+1})=-\frac{c_1}{c_2}\left(1-\frac{i_\circ}{r}\right)+\frac{i_\circ}{r}G_t=-c+\frac{i_\circ}{r}G_t \tag{3}$$

where $c=\frac{c_1}{c_2}(1-\frac{i_\circ}{r})$ is a constant and $i_\circ=\frac{1}{1+i}$. Derivations parallel to those in Sargent (1987) yield the following first-order solution for the government spending at time t:

$$G_t=\frac{c}{i}+\phi R_t+\delta B_t+\delta\left(\sum_{s=1}^{\infty} i_\circ^s E_t(R_{t+s})\right) \tag{4}$$

where $\delta=1-\frac{i_\circ^2}{r}$ and $\phi=i_\circ\delta$. This equation suggests that spending is determined by the expected present value of all future taxes. Also, since $i_\circ^s$ converges to zero as s rises, the expected taxes in the immediate future periods have a larger impact on current spending than the expected taxes in the distant future. Following Sargent (1987) and Hoover and Sheffrin (1992), we assume that tax is characterized by the following stochastic process:

$$R_t=\overline{R}+u_t, \tag{5}$$

where $\overline{R}$ is the long-term average tax revenue and u_t is a stationary error term. Note that $E_t(R_{t+s})=R$ for all $s\geq 1$, which can be substituted into Eq. (4) to obtain

$$G_t=\frac{c}{i}+\delta\overline{R}\left(\frac{i_\circ}{1-i_\circ}\right)+\phi R_t+\delta B_t=\alpha+\phi R_t+\delta B_t. \tag{6}$$

Note that both δ and ϕ have a positive sign if $i_\circ^2<r$, a negative sign if $i_\circ^2>r$, and are equal to zero if $i_\circ$ and r are equal. However, it is typically assumed that $i_\circ^2<r$; see for example Sargent (1987, Chapter 6).

3. The empirical model

Based on Eq. (6), the empirical model that we will consider can be written as

$$G_{it}=\alpha_i+\beta_1R_{it}+\beta_2'X_{it}+\text{error}, \tag{7}$$

where the index $i=1,\ldots,N$ denote the state–local units, while t again denotes time. Thus, G_{it} is the spending of state–local government i at time t.

Although we focus on the relationship between G_{it} and R_{it}, these variables cannot be analyzed in isolation. We therefore add X_{it}, a vector of control variables, which includes federal government grants, non-tax revenues, state gross product and of course the debt stock, B_{it}.

A large body of empirical literature has found that grants not only boost the level of spending but do so by an amount which is larger than equal increases in private income.[3] On the tax side, grants may create a substitution effect when they replace tax revenues. Accordingly, omission of grants can cause misleading results, for an increase in spending due to an increase in grants may be incorrectly attributed to a change in tax revenues. Non-tax revenues, such as charges and fees, are other sources of funds to state–local governments that have been curiously ignored in much of the empirical literature.[4] They are expected to have similar qualitative effects on

[1] This expectation is buttressed by the fact that the divergence of interests, agendas, and decision-making institutions that tend to decouple spending and tax decisions at the federal level is likely to be less pronounced at the state and local levels, see Hoover and Sheffrin (1992).

[2] For a review of the studies published between 1985 and 2002, see Payne (2003). Only a small subset of these studies is based on US sub-national data. Of these, many employed aggregate US state or local government level data or a single state time series; see for example Ram (1988), Miller and Russek (1990) and Payne (1998). To the best of our knowledge, the only other study comparable to ours was conducted by Holtz-Eakin et al. (1989) who applied a panel vector autoregressive model to 171 US municipal governments over the 1972–1980 period. Controlling for federal grants, their results supported the tax-and-spend hypothesis. A later study by Joulfaian and Mookerjee (1990) applied the same panel approach to annual state level data for sixteen countries during the 1955–1986 period.

[3] See Hines and Thaler (1995) for a review of the literature.

[4] Data suggest a heavier reliance by state governments on non-tax revenues to finance spending in the past several years. This reflects, among other things, a substitution away from tax revenues, which are constrained by statutory and constitutional limits, and towards non-tax revenues, which are not bound by these limitations, see Skidmore (1999).