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Bohn's Test of Fiscal Sustainability of the American State Governments[*, †]

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Abstract

The dramatic fall in state government revenues during the "Great Recession" and the resultant large budget deficits accentuated concerns about the fiscal sustainability of state finances. We use a model-based approach proposed by Bohn (1998) to test for state fiscal sustainability. In this approach, a positive response of the primary surplus to government debt (both as a ratio of output) constitutes a *sufficient* condition for sustainability. We use the data for panel of 48 contagious states (1961-2008) and several model specifications that control for measures of cyclical variations in state output and government expenditures, presence of balanced budget requirements in state constitution or statutes, the partisan balance of the state government, and /or regional factors. We found consistent evidence in favor of state fiscal sustainability. Our results also suggested that the primary surplus ratio was higher in states with a higher degree of fiscal stringency in general and "own-revenue" and "no-deficit-carryover" anti-deficit provisions in particular. Finally, we found mixed results in relation to the effects of the partisan balance and divided state government on the primary surplus ratio.

Keywords: fiscal sustainability, fiscal rules, Bohn's test, and state and local governments.

JEL codes: E61, E62, H11, H72, H77.

* First draft. Please do not quote without the expressed written consent of the author.

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Introduction

The prolonged economic slowdown that began in the fourth quarter of 2007 presented unprecedented fiscal challenges to the state (and local) governments. This was especially the case during the "Great Recession" period (officially marked as 2007:IV-2009:II) when states experienced historically large budget gaps resulting from a sharp drop in their revenues coupled with an initial increase in their (social) expenditures. Faced with the constitutional or statutory requirements to balance their operating budgets, states had to rely on drawing on their "rainy day" funds, raising new revenues, cutting expenditures, using temporary federal fiscal relief funds (part of the American Recovery and Reinvestment Act, or ARRA), and/or borrowing to close part of their overall budget shortfalls. Since the end of the recession, revenues (and expenditures) have only partially recovered due to sluggish economic growth. At the same time, the ARRA fiscal assistance began to wind down complicating the near-term fiscal position of states (NASBO, 2011; Lav and McNichol, 2011). While a more robust economic recovery may ease concerns about the cyclical component of state budget deficits, the long-term/structural component is likely to remain a vexing problem far into the future[1]

Against this backdrop, there has been a heightened level of concern about state fiscal sustainability which prompted the emergence a variety of measures to ensure that.[2] This paper seeks to formally test for fiscal sustainability at the state government level using a model-based approach suggested by Bohn (1995 and 1998). According to this approach, a positive (and statistically significant) response of primary surplus to an increase in the (lagged) stock of debt (both as a ratio of output/income) in a "fiscal reaction function" constitutes a *sufficient* condition for fiscal sustainability. The intuition

[1] Recent simulation results by GAO (2011), for example, depict a rather gloomy outlook by predicting that state (and local) governments will face a *growing* fiscal imbalance over time. According to these results, under current set of policies, the *operating* budget balance is expected to deteriorate from 0.07 percent of GDP in 2007 to -1.6 percent in 2020 and -3.4 percent in 2060. The driving force behind this deterioration is the health-related costs (particularly Medicaid and health insurance for public-sector retirees and employees) that are projected to rise faster than GDP (GAO, 2011). To these, one can add outdated state tax systems.

[2] These measures include enacting federal legislation to allow states to declare bankruptcy, selling state assets, and abrogating or modifying public-sector employee union contracts. Some of these proposals reflect the expectations of "imminent fiscal meltdown" and default on bonds of state governments. For arguments against the validity of such expectations and adopting drastic and immediate policy measures based on lumping cyclical and structural deficits see Lav and McNichol (2011).

behind this condition is that in response to an increase in the size of outstanding debt stock policymakers adopt changes to increase revenues and/or cut expenditures to raise the surplus (net of interest payments) in order to keep the debt ratio from exploding.

This paper adds to a very small body of empirical evidence on fiscal sustainability at the U.S. sub-national level.[3] In addition to the standard economic control variables, we explicitly model measures of fiscal stringency and the partisan balance of the state government, among others, in the fiscal reaction function. Since there are significant variations in these fiscal and political institutional factors across states (Krol, 2007), one can reasonably expect that they would affect fiscal outcomes including the way the primary surplus ratio reacts to increases in the debt ratio. We employ annual observations for 48 states over the period 1961-2008. Estimations based on a panel data set exploit variations both across units and time and enable us to more precisely gauge the parameters of the fiscal reaction function. The end of our sample period roughly coincides with the onset of the recent economic slowdown. Our results, thus, may shed light on whether the pre-recession behavior of state governments was consistent with fiscal sustainability and provide an anchor for expectations regarding the state of their fiscal health in the future.

In Section I of what follows, we briefly review some theoretical issues raised by Bohn (2005) in relation to a frequently employed sustainability test based on a present value budget constraint (PVBC)/cointegration approach to motivate the use of his alternative approach. The empirical evidence associated with each approach is also briefly presented in this section. Section II is devoted to the specification of the reaction function and explanations of the variables and data sources. Section III presents and discusses the results. Section IV summarizes the results and offers some concluding remarks.

I. Testing for Fiscal Sustainability: A Review of Theory and Evidence

The notion of fiscal sustainability is often defined in terms of the ability of a government to achieve a

[3] To the best of our knowledge, there is only one study by Caleys *et al*. (2007) that estimates a simple version of Bohn's fiscal reaction function for the American states. A second study by Mahdavi and Westerlund (2011) uses a cointegration approach to test sustainability for the state-local government units. See section II for a review.

balance between revenues and expenditures *intertemporally*. As such, deficits in some periods must be offset by surpluses in other periods. In what follows, we present the outlines of a formal approach based on this definition and its implications for deriving an empirically testable condition for fiscal sustainability under both deterministic and stochastic environments drawing from Bohn (2005).

The starting point is a scaled version of a dynamic equation for debt:

$$\frac{D_t}{Y_t} = \frac{DEF_t^{\circ}}{Y_t} + \left(\frac{1+i_t}{1+\gamma_t}\right).\frac{D_{t-1}}{Y_{t-1}} \qquad (1)$$

where D is the stock of debt, DEF° is the primary (or interest-payment excluded) deficit, *i* is the nominal interest rate on debt, γ is the rate of growth of nominal GDP (or *Y*).[4] Equation (1) can be written in a more compact form:

$$d_t = (1 + r_t).d_{t-1} - s_t \qquad (2)$$

where $r_t = (1 + i_t)/(1 + \gamma_t) - 1 \cong i_t - \gamma_t$ is the appropriate version of "return" on debt and $s_t = -\frac{DEF_t^{\circ}}{Y_t}$ is the primary surplus-GDP ratio. Under several (simplifying) assumptions (including a constant value for *r*), manipulations of Equation (2) yields the following equation

$$d_t^* = \sum_{j=0}^{\infty} \frac{1}{(1+r)^j} E_t[s_{t+j}] + \lim_{n\to\infty} \frac{1}{(1+r)^n} E_t[d_{t+n}] \qquad (3)$$

where $d_t^* = (1 + r_t).d_{t-1}$ is the stock of debt-output ratio in the beginning of period *t* and $E_t[.]$ denotes the expectation operator conditional on the information available at time *t*.

Fiscal policy is said to be sustainable if the initial debt is equal to discounted expected values of primary surpluses:

[4] In a growing economy, taxes and expenditures tend to rise making it desirable to scale these variables by the size of the economy. The ratio form also obviates the need for expressing the variables in real terms. However, as Bohn (2005) shows, the relationship is scale invariant so long as the discount factor is appropriately defined.

$$d_t^* = \sum_{j=0}^{\infty} \frac{1}{(1+r)^j} E_t[s_{t+j}] . \quad (3.a)$$

This condition, known as Intertemporal Budget Constraint (IBC) is satisfied *if and only if* the discounted sum of future debt values converge to zero:

$$\lim_{n\to\infty} \frac{1}{(1+r)^n} E_t[d_{t+n}] = 0 \quad (3.b)$$

Equation (3.b), known as the Transversality Condition (TC), rules out a Ponzi scheme (whereby debt is perpetually rolled over) as the necessary condition for lenders to hold government bonds.[5]

A large number of studies attempted to test fiscal sustainability at the U.S. federal government level by testing the empirical validity of TC (Equation 3.a) or IBC (Equation 3.b). The majority of these studies focused on IBC and examined its implications regarding the integration and cointegration properties of budget deficit, debt, revenue and expenditure.[6] With some exceptions, their results supported the sustainability of fiscal policy at the federal level (see Afonso, 2005 for a summary).

The IBC-based sustainability tests at the sub-national government level, however, are quite scant. In perhaps the only study of this kind, Mahdavi and Westerlund (2011), using a testing variation suggested by Quintos (1995), examined the cointegration between with-interest expenditures and revenues and alternative fiscal balance definitions in a panel of 47 state-local government units (1960-2006). They found evidence of "strong sustainability" (based on a cointegrating coefficient that was not significantly different from unity) in relation to more broadly defined balances (i.e., those including federal grants and/or special funds) and "weak sustainability" (based on a cointegrating coefficient that was significantly less than one) in relation to more narrowly defined ones.

[5] Essentially, TC requires that debt should not grow at a rate faster than the interest rate.
[6] Hamilton and Flavin (1986) and Wilcox (1989) tested fiscal sustainability by checking the TC and over the same sample period (1960-84) and found conflicting results. Hakkio and Rush (1991), Trehan and Walsh (1991), McDonald (1992), Tanner and Liu (1994), Ahmed and Rogers (1995), Quintos (1995), Haug (1995), and Martin, (2000) are among studies that tested IBC. See Bohn (2007) for a review and critique of the latter group.

In a series of papers, however, Bohn (1995, 1998, 2005, and 2007) criticizes the deterministic framework outlined above as the basis for testing fiscal sustainability. Briefly, Bohn argues that TC (Equation (3.b)) is not a necessary condition for sustainability in a stochastic economy, for it discounts future debt at a fixed "safe rate" (typically approximated by the realized or average return on a government bond). In so doing, it ignores the probability distribution of fiscal variables and the discount factor across different states of nature. Accordingly, a policy that may be viewed as sustainable in one state of nature may not be sustainable in some other states. Empirically, sustainability tests may yield results that do not satisfy the conditions (3.a) and (3.b) in relation to apparently sustainable policies (for example, those with a stable government debt-output ratio). Conversely, policies that may pass the sustainability tests may be non-sustainable.[7]

Bohn (1995) constructs a general equilibrium stochastic model (assuming infinitely lived agents and complete financial markets) to allow for the optimizing behavior of lenders under uncertainty. He derives the following stochastic versions of TC and IBC:

$$\lim_{n\to\infty} E_t\left[u_{t,n} \,.\, d_{t+n}\right] = 0 \qquad (4.a)$$

$$d_t^* = \sum_{=0}^{n} E_t\left[u_{t,n} . s_{t+n}\right] \qquad (4.b)$$

where $u_{t,n} = (\beta^n)\left[\frac{U'(C_t)}{U'(C_{t+n})}\right]$ is the pricing kernel for discounting state-contingent claims on period $t+n$, β is the rate of time preference and $\left[\frac{U'(C_t)}{U'(C_{t+n})}\right]$ is the marginal rate of substitution of consumption (C) between period t and $t+n$ and $U'(.)$ is the marginal utility of consumption. Bohn demonstrates that conditions (3.a) and (3.b) (which he refers to as "ad hoc" TC and IBC) are in fact special cases of (4.a) and (4.b), respectively, if one assumes no uncertainty, risk neutral (instead of risk averse) lenders, and

[7] Average primary deficits may be consistent with variety of sustainable policies. For example, a situation in which debt grows at a rate faster than the interest rate violates TC, but this is a sustainable policy as long as the debt growth rate is smaller than the *output* growth rate. Bohn (1998 and 2005) shows that this was indeed the case in the United States: U.S. exploited relatively low interest rates and economic growth dividends to run primary deficits on average while maintaining a stable debt-output ratio over fairly long time periods. Also, not all non-sutainable policies are necessarily associated with an explosive debt-output ratio making a stable debt ratio not a convincing evidence of sustainability.

zero covariance of the discounting factor $u_{t,n}$ with primary surplus and with debt. An important insight is the correct discount factors depend on the distribution of primary surpluses across states of nature and are generally different from fixed $\frac{1}{(1+r)^n}$. Bohn (2005 and 2007) concludes that unit root/cointegration analysis is not informative about model-based sustainability conditions (4.a) and (4.b).

The alternative sustainability test proposed by Bohn is based on a feedback relationship from the stock of initial debt to the primary surplus. Formally, consider the following simple linear feedback rule or reaction function:

$$s_t = \rho . d_t^* + \mu_t \qquad (5)$$

where μ_t is a composite of other determinants of primary balance. Bohn shows that a stable and strictly positive feedback from d_t^* to s_t ($\rho > 0$) is consistent with conditions (4.a) and (4.b) and is a *sufficient* condition for fiscal sustainability. The intuition behind this argument is that debt-output ratio will be mean-reverting if policymakers take corrective actions by raising primary surplus-output ratio in response to an increase in the debt-output ratio. The essence of the formal proof of this proposition is that debt is reduced by a factor of $(1-\rho)^n$ after *n* period relative to a Ponzi scheme. Accordingly, $E_t\left[u_{t,n} . d_{t+n}\right] \approx (1-\rho)^n . d^* \to 0$ for any (small) $\rho > 0$ is consistent with the condition in (4.a). (Note that the μ_t part of (4.a) becomes asymptotically irrelevant).[8]

Several points are worth noting in relation to Bohn's model-based approach to testing fiscal sustainability. First, unlike tests based on the transversality condition, estimating Equation (5) has the advantage that it does not require assumptions about the discount factor (for example, the interest rate and how it compares with the economy's growth rate). This independence with respect to the discount factor is a particularly important advantage where, as in our case, the interest (and growth) rates vary not only across time but across subnational government units (Poterba and Rueben, 2001). Another advantage is the test does not require specific knowledge of fiscal and debt management policies as it focuses on

[8] See Bohn (2005, footnote 11) for a link to the formal proof.

whether the *outcomes* of those policies are consistent with fiscal sustainability. Moreover, the test is valid in an economy characterized by risk-averse lenders and uncertainty.

Second, the test provides evidence of a *sufficient* (but not necessary) condition for fiscal sustainability. As noted by Bohn (2005), any reasonable sustainability test confronts the "ergodicity problem" for one has to infer from a single realization of history given by the data set the way fiscal policy responds to various contingencies and disturbances in the future. Thus, if the feedback is seemingly unstable or missing it could mean that the data set is insufficient for identification. No feedback can also be associated with a time varying rule, or a case in which the debt is high enough to exceed a threshold (suggesting a non-linear rule). Lack of supporting evidence can also signal policy changes anticipated by participants in the debt market.

Finally, some tests of IBC are based on testing cointegration between debt and primary balance (Trehan and Walsh, 1988). If both of these variables are determined to be first-differenced stationary, as in a cointegrating relationship, then the residual of the cointegrating equation is stationary and the exclusion of μ_t from Equation (5) can be justified. However, when the variables are expressed in ratio terms one or both may turn out to be stationary. In this case, it is important to include μ_t to avoid inconsistent estimates due to the omitted variable bias in a level relationship. With this in mind, the empirical version of Equation (5) is specified as follows:

$$s_t = \beta_0 + \rho . d_t^* + \mu_t = \beta_0 + \rho . d_t^* + \delta \boldsymbol{Z}_t + \varepsilon_t \qquad (6)$$

where β_0 is a constant term, $\boldsymbol{Z}_t$ is a vector of other determinants of primary surplus, and ε_t is a zero-mean error term.

A number of studies estimated various specifications of Equation (6) to test fiscal sustainability. Bohn (1998) applied his test to the U.S. federal government data (1916-1995) using a specification that includes measures of temporary (cyclical) changes in output and public expenditures in $\boldsymbol{Z}$**.** The theoretical justification for including these variables is the tax-smoothing model of government fiscal behavior

(Barro, 1979; Roubini and Sachs, 1989). In essence, the model suggests that the government attempts to minimize tax distortions (smooth taxes) over time by running budget deficits (surplus) when expenditures are temporarily high (low). Consequently, budget deficits tend to be higher (lower) during recessions and wars (booms and peace). Bohn finds the conditional response of the primary surplus to debt (ρ) to be positive and statistically significant during in the sample period as well as in several sub-periods. He concludes that despite extended periods of primary deficits, U.S. fiscal policy has historically been sustainable. In a subsequent study, Bohn (2005) essentially confirms the findings of his previous study over a sample period spanning more than 200 years (1792-2003) using a variety of specifications. Bohn's test has also been applied by a number of other authors to international data (see, for example, Mendoza and Ostry, 2008 for a recent study).

Again, the U.S. sub-national government level studies are almost nonexistent. To the best our knowledge, Caleys *et al*. (2007) is the only study that applies Bohn's model-based test to the U.S. state-level data. The study investigates whether fiscal interaction between the federal and state governments (through grants and revenue sharing) would lead to "soft budget constraints" at the state level causing states to consolidate less than the federal government. The authors test this by specifying a version of Equation (6) in which the only variable included in $\boldsymbol{Z}$ is the rate of output growth as a proxy for economic fluctuations. They estimate this simple version using the data for the general, federal, and state level governments for the period 1963-2000 (state level data estimated both as a group and individually). They find a statistically significant and positive value of ρ in all cases but in three individual states (CT, MA, and NM). They conclude the U.S. fiscal system is characterized by fiscal sustainability and reject the soft budget constraint at the state level. The authors attribute this finding to existence of a vertical fiscal transfer arrangement that gives the federal government significant leverage over state governments.[9]

[9] These results are in sharp contrast to results reported in the same study for the German fiscal system in which there is a horizontal transfer system among regional governments (Länder).

We note, however, controlling for the cyclical components of public spending and/or output alone to conditionally estimate ρ may be problematic given the empirical and theoretical challenges that the tax-smoothing model confronted. Empirically, contrary to the predications of the model, consistently large deficits have been observed even during periods of economic growth and peace in many cases. This led to debt accumulation at levels well above what could be plausibly explained by the use of deficits to smooth taxes and consumption (Alesina and Perotti, 1995). Theoretically, the tax-smoothing model rests on the following three strong assumptions: (1) the government as the single benevolent social planner, (2) the household as the single rational agent with an infinite temporal horizon, and (3) neutrality of institutions. In view of these concerns, a class of models of public deficits and debt employing a political-economy approach emerged that relaxed one or more of these assumptions. The political-economy models emphasize the role of heterogeneity of preferences, conflict of interests among competing groups, and non-neutrality of institutions in generating deficits and adjusting their size. In what follows, we present a brief review of some of these models, drawing from Imbeau (2004) and Eslava (2011), with an eye on their implications for specifying our empirical model in the next section.

An early version of the politico-economy model is known as the "Partisan Budget Cycle Theory" (PBCT) advanced by Hibbs (1977). PBCT emerged as a result of relaxing assumptions (1) and (2) above. It suggests that politicians differ with respect to their ideology (reflecting the preferences of their political base) regarding the role of government and its size. The simplest expression of this theory is that the fiscal deficits tend to be larger when liberals/left-wing politicians are in control of the government and smaller when conservative/right-wing politicians are in control. The former group is generally perceived to favor of the role of government to stimulate the economy and the use of transfer payments to provide a social safety net and to reduce income inequality. The latter group, on the other hand, is generally perceived to prefer a smaller government and market based approaches to economic and social problems.

Relaxing assumption (3) gives rise to theories that are based on non-neutral institutions. Institutions (political and fiscal/budgetary) affect collective decisions and influence deficit bias due to

fiscal illusion of the electorate, political opportunism, or partisan ideology. The existences of competing interests within the institution of government (relaxing assumptions (1) and (3)) lead to conflicts among decision-makers and result in a noncooperative budget solution. This theory of "noncooperative budgeting" predicts that the size of the deficit and debt tend to rise under fragmented/divided or unstable governments.

Current increases in deficits and debt may be employed in a strategic fashion by the governing party that expects to be voted out of office to the detriment of its successor governments. This reflects conflict of interests between current and future decision-makers and heterogeneity of preferences regarding the composition of public spending (Alesina and Tabellini, 1990; Alt and Lassen, 2006). A strand of the "strategic use of debt theory" offers predications that run counter to those offered by PBCT: it suggests that "conservative" governments tend to raise deficits (mainly by cutting taxes) in order to force spending cuts on their "liberal" successors while liberal governments increase taxes and run surpluses to force future spending on their conservative successors (Persson and Svensson, 1989).

The conflict among competing interest groups (relaxing assumption (2)) over the distribution of fiscal burden may lead to a war of attrition and delay or gridlock in the formulation and implementation of fiscal adjustments. The predication of the "war of attrition model" is that such a delay will be longer (shorter) and corresponding increase in deficits and debt will be larger (smaller) the more fragmented (unified) is the government. Finally, divided governments, or less stringent budgetary rules can encourage deficit spending and higher debt due to the "*tragedy of the commons*" or the "*common pool*" phenomenon whereby each interest group tries to maximize its benefits at the expense of the general taxpayers (Weingast *et al.*1981; Baron and Ferejohn, 1989; Velasco, 1995 and 1999).[10]

[10] See Imbeau (2004) for a review of the empirical evidence on the political economy theories of fiscal deficits.

In sum, these models suggest that one needs to account for factors such as fiscal institutions/stringency, partisan balance, and divided/fragmented government in explaining the size of fiscal deficits and the speed of adjustment in restoring fiscal balance.[11]

II. Empirical Model

To put the specification of our empirical model in perspective, we briefly discuss some of the fiscal and political aspects that define the environment in which state governments operate. These aspects vary across states and are hypothesized to affect the primary surplus reaction to debt in view of the implications of the political-economy theories.

We begin by highlighting several factual aspects of the debt variable.[12] As a group, state (and local) governments have a much lower debt outstanding (both in absolute terms and as a ratio of output) than the federal government. This reflects a number of factors including limits on issuing debt in several states, federal grants, and/or special federal fiscal relief during periods of unusual economic distress. State (and local) governments, however, do borrow a significant amount. The composition of the sub-national government debt favors local debt over state debt, long-term debt over short-term debt, and "specific-revenue secured" debt over "general obligation" or "full-faith-and-credit" (FFC) debt (Maquire, 2011). Long-term debt (accounting for almost all of the total debt) is incurred in relation to "capital budget" (that is, for financing infrastructure and other investment projects) while borrowing to support the "operating budget" (that is, to pay for current operating expenditures) are rare as they are restricted by fiscal rules. To bypass these rules, states often rely on issuing nonguaranteed (NG) debt through state agencies or "special purpose authority" debt. Other methods include shifting expenditures from the operating budget to the capital budget and increasing reliance on debt financing of capital projects which used to be supported by the general fund revenues (Maquire, 2011).

[11] Neck and Getzner (2001) apply Bohn's test to the Austrian data based on a model that includes politico-economic determinants. No comparable model, however, exists for the U.S. federal or sub-national governments.
[12] See, for example, Kioko (2008, Ch.5), Lucas (2011) and Maquire (2011) for detailed discussions.

Importantly, unlike the federal government, most state (and local) governments operate under formal fiscal rules/provisions in the form of constitutional or statuary balanced budget requirements (BBRs). Hou and Smith (2006, p.27) note that "BBRs are systems that are best categorized in a framework of interrelated rules of a political and/or technical nature governing the executive preparation, legislative review, and implementation phase of the budget cycle." Based on their in-depth survey of state constitutions and statutes the authors identify nine fiscal rules and taxonomized them along a "political–technical" continuum. Political rules govern the budgetary procedure and are "ex ante" or "prospective" in nature. Technical rules, on the other hand, are more relevant to the substance of the budget process and are mostly of "ex post" or "retrospective" type. Moreover, compared with technical rules, political rules are relatively easier to circumvent and manipulate and are more ambiguous. For these reasons, political rules must be substantiated by technical rules to be effective in sealing any possible leakage. A large number of early studies (see, for example, Poterba, 1994 and 1995; Bohn and Inman, 1996) provided statistical evidence suggesting that budgetary institutions in the form BBRs affect state deficits. Specifically, fiscal adjustments in the form of tax increases and/or spending cuts tend to be larger or quicker and debt measures lower in states with relatively *stringent* anti-deficit rules; especially where a no-deficit-carryover rule is accompanied by debt limit. More recently, Hou and Smith (2010) presented evidence indicating that relatively straightforward and rigid "technical provisions" were more effective in curbing state spending and deficits than "political provisions."

State government fiscal behavior in general and its fiscal balances in particular are not independent of their complex set of intertwined fiscal relationships (characterized by both conflict and cooperation) with local governments. These include revenue and expenditure sharing and the ability of the state government to limit the taxing power of and shift spending to local governments. During periods of fiscal retrenchment, in particular, state governments may try to balance their budget by, for example, reducing a substantial part of their general fund budgets that is allocated to local governments in the form of direct financial assistance (intergovernmental aid). Additional channels include shifting state-

level expenditures to local governments and schools by mandating underfunded additional services, and cutting some state government programs (Reschovsky, 2003; Jimenez, 2009). The extent to which a state government can shift its deficits to lower levels of government depends on, among other things, on the scope of state government fiscal responsibility, or its relative importance in the state-local sector. Where state government expenditures account for a much larger share of the combined state-local government expenditures, the opportunities for the shifting down of the state deficit is expected to be larger.

States also differ significantly in terms of the partisan balance (party affiliations) of the state government. The latter is often represented in terms of partisan control of the state legislatures (the upper and lower houses) and the executive (the governorship).[13] In the context of the American states, PBCT implies that when the makeup of the state government favors the Democrats, the state government may pursue a more activist agenda leading to increases in public expenditures and larger deficits (if unaccompanied by equal revenue increase) than when the makeup favors the presumably more "fiscally prudent" Republicans. The empirical evidence on this popular conventional wisdom, however, is rather weak (Imbeau, 2004; Garand and Kapeluck, 2004; Eslava, 2011). As noted in the previous section, the speed with which budgetary adjustments are made may be affected by whether the government is politically cohesive. Thus, the control of the state legislature by one party may matter less in relation to fiscal decisions if the executive branch is headed by a member of the rival party. In fact there is some state-level evidence supporting the hypothesis that states are able to better adjust to fiscal crises and revenue shocks and the resultant unexpected deficits under a unified government (when one party is in control of both the legislative and the executive branches of the government) than when the state government is divided between the two parties (Poterba, 1994; Alt and Lowry, 1994).

Finally, we note that fiscal outcomes in one state may be affected by those of neighboring or surrounding states. The literature suggests that this fiscal interdependence results from expenditure spillovers, tax competition/mimicking, and "yardstick competition" (whereby voters in one state use the

[13] See Klarner (2003) for literature review and improved measures of partisan balance.

actions of politicians in other states as a yardstick to judge the actions of their own politicians). Such interdependence tends to be stronger among neighboring states leading to tax and expenditure settings in one state being affected by those in its neighboring states (see, for example, Besley and Case, 1995; Biacker, 2005; Case et al., 1993; Revelli, 2002 and 2006). In addition, reflecting the principle law in geography, neighboring states may have similar characteristics in relation to political culture, voter preferences, and/or fiscal traditions.

Based on the above discussions, our equation for estimating the response of primary deficit of the *ith* state government in year *t* to debt, in its most general and inclusive form, is specified as follows: [14]

$$s_{it} = \beta_0 + \beta_1.(d)_{it-1} + \beta_2.(sslexr)_{it} + \delta \boldsymbol{Z}_{it} + \Omega \boldsymbol{B}_{it} + \Psi \boldsymbol{P}_{it} + \Phi \boldsymbol{R}_{it} + \upsilon_{it} \qquad (7)$$

A brief discussion of the variables of Equation (7) including variable definitions is presented below:

- s_{it} is the ratio of state primary surplus (defined as total revenues minus total expenditures net of interest payments) to state personal income (percent).[15]
- d_{it-1} the ratio of state *total* outstanding debt to state personal income (percent) lagged one period (to represent the theoretical "beginning of the period debt" variable or d^*). The debt measure is both broad and inclusive as it comprises "all interest-bearing short-term credit obligations and all long-term credit obligations incurred in the name of the government and all its dependent agencies. This definition includes all debt, whether backed by the government's full faith and credit or nonguaranteed."
- $sslexr_{it}$ is the ratio of total state government expenditures to total state and local government expenditures (percent). It is proxy for the relative size of the state government in a state's public sector.

[14] The source of data for all fiscal variables is the *Census Bureau (State Government Finances)*. For other variables, the source is indicated in the text.

[15] The choice of personal income for normalizing reflects the fact that state level GDP are not available on a consistent basis for the entire sample period due to a change in the industry classification standards employed by the *Bureau of Economic Analysis* after 1996.

- **Z** is a vector that consists of two variables CYEX and CYPI that represent cyclical deviations in government spending and output (again, proxied by personal income) from their corresponding trend values, respectively. For each state, the detrended series has been obtained by subtracting from the actual value of each variable its long-term trend value. The latter was estimated using the Hodrick-Prescott Filter (Hodrick and Prescott, 1997) with a smoothing parameter equal to100. While a temporary increase in outlays (CYEX >0) is expected to dampen primary surplus a similar increase in output (CYPI>0) is expected to boost it.
- **B** is vector that includes measures of fiscal stringency. A frequently employed measure constructed by the ACIR (1987) is based on five categories of BBRs and which are assigned points depending on the perceived degree of fiscal stringency as follows: the governor has to submit a balanced budget (1 point); the legislature has to pass a balanced budget (2 points); the state may carry over a deficit but must correct it in the subsequent budget period (4 points); the state may not carry over a deficit into the next budget period (6 points); the state may not carry over a deficit into the next fiscal year (8 points). For each state, the ACIR fiscal stringency index (ACIR-FSI) is equal to the state's point(s) from its highest ranked category plus one point if the budget requirement is statutory, or two points if it is constitutional. The maximum value for the index is 10 and its minimum value is 0. The advantage of this index is that it provides a useful summary indicator. Its disadvantage is that equal increments in the index value do not have the same interpretation in terms of the change in the degree of fiscal stringency.

Alternatively, a set of dummy variables that represent both the political and technical provisions of state system of BBRs is employed. These variables take on value 1 if a particular balance budget requirement is present and zero, otherwise. Hou and Smith (2006) identify the following nine BBRs based on their extensive review of each state's statues and constitution (see Appendix Table 1):

BBR1 = governor must submit a balanced budget (political);

BBR2 = own-source revenue must match (meet or exceed) expenditure (technical);

BBR3 = own-source revenue and general obligation (or unspecified) debt (or debt in anticipation of revenue) must match (meet or exceed) expenditures (technical);

BBR4 = legislature must pass a balance budget (political);

BBR5 = a limit is in place on the amount of debt that may be assumed for purpose of deficit reduction (technical);

BBR6 = governor must sign a balanced budget (political);

BBR7 = controls are in place for supplementary appropriations (technical);

BBR8 = within fiscal-year controls are in place to avoid deficit (technical);

BBR9 = no deficit may be carried over to the next fiscal year or biennium (technical).[16]

(Source: Hou and Smith, 2006, Table 2; Mahdavi and Westerlund, 2011, Table1):

· **P** is a vector of variables that reflect the partisan makeup of the state government and whether the government is divided. The following three variables represent the partisan balance as coded by Klarner (2003). (Source: http://www.unl.edu/SPPQ/).

UPCONT represents the party in control of the upper house. It assumes the following values: Democrats=1, Republicans=0, and split control=0.5.

LOWCONT represents the party in control of the lower house. It assumes the following values: Democrats=1, Republicans=0, and split control=0.5.

GOVPARTY represents the party affiliation of the state governor. It assumes the following values: Democrat=1, Republican=0, and non-major party governor =0.5.

Based on these three original variables we define a new binary variable to test the effect of a divided (unified) government on primary budget surplus:

DIVIDED=1 if 0<UPCONT+LOWCONT+GOVPARTY<3 and 0 otherwise,

[16] It should be noted that there are several differences between the system of BBRs identified by ACIR (1987) and that by Hou and Smith (2006).

As defined, the binary variable DIVIDED takes on value 1 if the state government is under a split control and value 0 if the government is unified under either Democrats *or* Republicans.

- **R** is a vector that includes the following binary variables defined based on a regional classifications of states (Source: *Bureau of Economic Analysis, BEA*):

  New England (CT, MA, ME, NH, RI, VT), Mideast (DE, MD, NJ, NY, PA), Great Lakes (IL, IN, MI, OH, and WI), Plains (IA, KS, MN, MO, ND, NE, and SD), Southeast (AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, and WV), Southwest (AZ, NM, OK, and TX), Rocky Mountain (CO, ID, MT, and UT), and Far West (CA, NV, OR, and WA).[17]

  According to BEA, these regional classifications "are based on the homogeneity of the states in terms of economic characteristics, such as the industrial composition of the labor force, and in terms of demographic, social, and cultural characteristics."

- Finally, $\upsilon_{it} = \mu_t + \psi_i + \epsilon_{it}$ where μ_t and ψ_i are fixed- time and cross-section (state) effect variables, respectively, and ϵ_{it} is a white noise error term.

The data for these variables are collected for 48 contiguous states over the period 1961-2008. Given that the debt variable is included with a one year lag, the size of the sample is NxT=48x47=2256 in most cases.[18]

III. Empirical Results

We begin by testing the integration properties of fiscal variables. As noted before, if all the variables of the primary surplus model are I(1), then the residual is I(0) and the model can be estimated as a cointegrating relationship. Otherwise, the cointegration approach would not be appropriate. Our panel

[17] Note that both Alaska and Hawaii are excluded from the Far West region as fiscal outliers.
[18] Nebraska has a unicameral legislature. This reduces the number of states to 47 in models where the political make of the state legislature is included.

unit root test results summarized in Table 1 suggests that among the variables of Equation (7) that are suspected to have a unit root, we can reject the null hypothesis of a "common unit root process" as well as an "individual unit root process" for *s* and *sslexr*, but not for the debt variable. Accordingly, we proceed estimating the response of the primary surplus ratio to the debt ratio using a number of models nested within Equation (7).

Table 2A-C present the results of our estimates.[19] In Table 2A, Models 1 and 2 have a specification similar to the standard model employed by Bohn (1998) and others. However, they differ with respect to the fixed-effects specification. Models 3-4 augment Models 1-2 by adding the variable *sslexr* that is a measure of the relative size of the state government. Model 5 further augments Model 3 by including a measure of state fiscal stringency (ACIR-FSI). Model 6 adds the three variables representing the political make up of the state government to Model 5. Models 7 and 8 differ from Model 6 in that they replaces the three variables by a dummy variable (DIVIDEDGOV) indicating whether the state government is unified or split. Models 7 and 8 differ from each other with respect to the fixed-effects specification. Note that, with a few exceptions, the models were estimated with a period fixed-effects variable only to make estimation possible.[20] However, the models that include two-way fixed effects (Models 2, 4, and 7) perform relatively better based on the goodness of fit criteria.

Focusing on the coefficients of each variable across the models of Table 2A, we note the conditional response of the primary surplus ratio to debt ratio (in bold) is consistently positive and statistically significant. The results suggest that for the entire panel the primary surplus ratio increased, depending on model specification, by 0.42-0.75 percent following a ten percent increase in the debt ratio. Note that the result is robust to a variety of specifications in which economic, fiscal institution, political variables as well as fixed cross-section and/or period effect(s) are controlled for. We thus have fairly strong evidence supporting the hypothesis that state fiscal adjustment meets a sufficient condition for fiscal sustainability.

[19] All the equations are estimated using the White estimator of the coefficient covariance. The estimator is robust cross-equation (contemporaneous) correlation as well as different error variances in each cross-section.
[20] The presence of ACIR-FSI, a non-time varying variable, precludes the inclusion of cross-section fixed effects.

Turning to other variables, temporary increases in government spending (CYEX, measured in millions of dollars) has a negative and significant impact on the primary surplus as expected. The coefficients of the deviation of output from its trend value (CYPI, measured in millions of dollars), on the other hand, are positive but statistically insignificant throughout. One intriguing implication of this result is that controlling for fluctuations in governments spending, temporary deviations in output do not exert an independent effect on the primary surplus ratio.

The sign of the variable *sslexr* fluctuates across Models 3-9. Its coefficient passes the significance test, but is quantitatively small in all cases. Recall that a positive coefficient of this variable is consistent with the argument that states with a higher share of total (state and local) spending have more opportunities and perhaps justification to improve their fiscal balance partly at the expense of local governments through the shifting of spending and other channels.

The coefficients of the ACIR fiscal stringency index (ACIR-FSI) have the expected positive sign and significantly different from zero in Models 5-6. Accordingly, states with a higher degree of fiscal stringency have larger primary surplus ratio consistent with expectations and evidence from earlier studies. Caution must be exercised in more specifically interpreting these coefficients given that, as noted in Section I, equal increments in the index do not imply equal changes in the degree if fiscal stringency.

The coefficients of UPCONT and LOWCONT in Model 6 are negative and significant. Moreover, the absolute magnitude of the coefficient of LOWCONT is more than twice as large as that of UPCONT. These results suggest that the primary surplus ratio is lower when Democrats control the state legislature, especially its lower house. Interestingly enough, the primary surplus ratio is higher when the state governor is a Democrat. Thus, the popular conventional wisdom that fiscal position tends to deteriorate under a Democrat-controlled government receives only partial support from our results. Apparently, Democratic state governors, as heads of the executive branch, can use their power to counter the negative impacts on fiscal balance of their fellow Democrats' when the latter have majority in both houses of the

legislative branch. Such power includes the "line-item veto" and the "item-reduction veto." (See Krol, 2007 for a review of the evidence).

The variable DIVDEDGOV appears in Models 7 and 8 which differ with respect to the inclusion of the cross-section fixed effect variable. As can be seen, the presence of a divided government exerts a negative and statistically significant effect on the primary surplus ratio in Model 7. This is result consistent with the hypothesis that fiscal performance suffers due to the gridlock associated with a divided government. However, the coefficient of this variable displays a positive sign in Model 8, but it is statistically insignificant.

Table 2B presents the results of three additional models (Models 9-11). These models correspond to Models 5, 6, and 8, respectively, and are similar to them in all respects except that they replace the summary measure of fiscal stringency (ACIR-FSI) with the dummy variables BBR1-9. The latter represent a system of interrelated specific anti-deficit fiscal rules. Their inclusion as a group in the estimating equations allows us to assess the marginal impact of a particular BBR while controlling for the remaining ones. Again, in all the three models, the primary surplus ratio is a positive function of the debt ratio and the coefficients are highly significant. Moving to the coefficients of BBRs, it can been seen that among all the BBRs, only three are consistently associated with the primary surplus ratio: BBR2 (a requirement that own-source revenue must meet or exceed expenditure), BBR4 (a requirement that the legislature must pass a balanced budget) and BBR9 (a requirement that no deficit be carried over to the next fiscal year or biennium). Of these three, BBR2 and BBR9 are "technical" rules and BBR4 is a "political" one. These results are robust to controlling for the political makeup of the state government, or whether the government is divided. Quantitatively, the largest impact on the primary surplus ratio is associated with BBR2. According to our estimates, the presence of the "own-source revenue" requirement is associated with roughly 0.25-0.28 percent in the primary surplus ratio. Note that the only other BBR variable with a statistically significant and *positive* coefficient is BBR5 (a technical requirement imposing debt limit), but this result is not consistent. These results suggest that some, but not all, BBRs can boost

the primary surplus ratio and that the technical requirements are relatively more effective in achieving so. Our findings are consistent with the importance of technical rule (Hou and Smith, 2010) and no-deficit - carryover rule (Bohn and Inman, 1996) and evidence supporting fiscal sustainability based on cointegration approach (Mahdavi and Westerlund, 2011).

Table 2C summarizes the estimation results based on specifications that emphasize the role of regional factors. We replace the fiscal and political control variables with the regional dummy variables. The implicit assumption here is that these variables capture various similarities among neighboring states. These include the citizen ideology that gets translated into fiscal rules and the political makeup of the state government. To the extent that regional dummies are correlated with citizens' fiscal and political preferences, the specifications in Table 2C are not only justified but also preferable. This is based on the argument that both fiscal outcomes and fiscal institutions/rules may be both driven by such preferences. If so, then the correlations between fiscal outcomes and fiscal and/or political institutions may be spurious (Potorba,1996).

We specify two versions of the models with the regional dummy variables. First, we include all the dummy variables except one to avoid perfect collinearity (Model 12). Second, we include the regional dummies on at a time (Models 13-20). In the first specification, the regional coefficients are interpreted relative to the same excluded region (here, the Southwest region). In the second specification, the coefficient of the included dummy variable is interpreted relative to the "other regions" whose composition changes.

Model 12 suggests a negative regional effect on the primary surplus ratio for the New England, Mideast, Great Lakes, Plain, and Southeast regions. Relative to the excluded Southwest region, these five regions have a smaller intercept terms. The negative (and statistically significant) regional effect is the largest for the New England region that consists of the following states: CT, MA, ME, NH, RI, and VT. These states have relatively more liberal politics and lax anti-deficit fiscal constraints based on the ACIR

score (regional ACRI-FSI average=4.8). On the other hand, the only region with a positive and significant effect is the Rocky Mountain. The states in this region are CO, ID, MT, and UT. Their politics is relatively more conservative and they have a higher degree of fiscal stringency (regional ACRI-FSI average=10). Broadly similar results are obtained based on Models 13-20. The coefficients of the regional dummy variable for the New England and Southeast regions are negative and significant. The regions of Southwest, Rocky Mountain, and Far West have coefficients that are both positive and significant. Again, New England and Rocky Mountain regional dummy variables exert the largest negative and positive effects, respectively, on the primary surplus ratio. Accordingly, there is some support for the hypothesis that regional factors affect fiscal outcomes.

IV. Concluding Remarks

The central question addressed in this paper was whether state government fiscal balance was sustainable. We employed a test suggested by Bohn, according to which a *sufficient* condition for sustainability is satisfied if primary surplus ratio is an increasing function of the debt ratio, to investigate this question.

We used the data for 48 contiguous states over the period 1961-2008 and a variety of specifications of the primary surplus reaction function that included temporary deviations in spending and output from their trend levels, the political composition of the legislative and executive branches state government, indicators of fiscal stringency, and/or regional dummy variables. Our main finding was the existence of consistent statistical evidence in favor of sustainability. Other findings pointed to the significant positive effects on the primary surplus ratio of some fiscal constraints especially reliance on "own-source revenue" and "no-deficit-carryover" provisions. That state policymakers apparently responded to past debt ratio increases by raising the primary surplus in the pre "Great Recession" period is rather reassuring especially in view of some of the alarmist views regarding state fiscal health and radical solutions proposed to improve it.

However, the implication of this result for the future fiscal health of states depends on the extent to which debt will rise and further adjustments in state fiscal balances will be feasible. On the debt side of this equation, as noted earlier, states are barred from borrowing to cover their operating budget deficits and, almost exclusively, resort to long-term bonds to finance their infrastructure projects. Importantly, despite an increase in the stock of outstanding state (and local) debt in the past decade or so, the *debt ratio* has remained within its historical range so far (Wassmer and Fisher, 2011 and Maquire, 2011). On the other hand, the reliance on debt to finance operating deficits may increase in the future (especially if revenues continue to remain depressed) albeit indirectly through allocation of less of state general funds to capital projects and instead borrowing more for those purposes. Other potential sources of concern that have raised the specter of bankruptcy are unfunded (underfunded) liabilities in relation to state pension funds and state retiree health benefits. State unfunded liabilities have mainly increased in the last decade due to two recessions and declines in stock prices that diminished the value of pension funds. The estimate of the present value of these liabilities varies significantly depending on the "discount rate" used (Lav and McNichol, 2011). Regardless, the estimates are quite large requiring a reevaluation of the actual size of state debt.

On the primary balance side, the interest payments and debt have remained a relatively small and declining part of state current expenditures since the early 1990s. This means that the size of the primary surplus ratio benefited from a low-interest-rate environment (Wassmer and Fisher, 2011). Higher state future borrowing costs, reflecting states' deteriorating fiscal health and/or changes in the credit market conditions, can lower the size of primary surplus, all else being equal. Furthermore, contributions to the pension funds for future retirees while currently small (both relative to payments made to those already retired out of the retirement trust funds and relative to total expenditures, Maquire, 2011) are likely to cause further deterioration in the structural deficit in the future. The same applies to state contributions to current employee and retiree health insurance that have been rising substantially over time due to increases in health care costs (GOA, 2011). Thus, sensible revisions in pension and health insurance

eligibilities and benefits for future retirees may become indispensible parts of addressing the structural deficit problem. On the revenue side, heavier reliance on own-source revenue may also become a critical part of maintaining fiscal sustainability in view of future uncertainties regarding the size and conditions of federal grants. This in turn requires instituting or better enforcing a fiscal rule to that effect and reforming state out-of-date tax systems.

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Table 1: Panel Unit Root Test Results

Variable	Level		First Difference	
A. Primary surplus ratio (*s*)				
Method	Statistic	Prob	Statistic	Prob
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-13.0363	0	-7.25769	0
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-15.9986	0	-38.214	0
ADF - Fisher Chi-square	468.848	0	1281.41	0
PP - Fisher Chi-square	496.983	0	1466.08	0
B. Debt ratio (*d*)	Level		First Difference	
Method	Statistic	Prob	Statistic	Prob
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	2.14355	0.984	-31.3239	0
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	3.47195	0.9997	-31.8261	0
ADF - Fisher Chi-square	66.9459	0.9895	1011.52	0
PP - Fisher Chi-square	62.4109	0.9969	1091.4	0
C. State expenditure-total expenditure ratio (*sslexr*)	Level		First Difference	
Method	Statistic	Prob	Statistic	Prob
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-7.3562	0	-53.626	0
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-5.03364	0	-50.0274	0
ADF - Fisher Chi-square	173.802	0	1579.14	0
PP - Fisher Chi-square	203.59	0	1685.99	0

Notes:
Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

All tests are conducted using individual effects and Schwarz criterion for maximum lag selection.

Table 2A. Models of Primary Surplus Ratio Response to Debt Ratio: State Government Panel Data (1962-2008)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
C	0.8642	0.9955	0.6767	3.1057	0.3954	0.5514	3.2426	0.4709
	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01
d(-1)	**0.0671**	**0.0462**	**0.0421**	**0.0758**	**0.0541**	**0.0544**	**0.0749**	**0.0552**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CYEX	-9.74E-08	-9.63E-08	-9.85E-08	-8.29E-08	-9.82E-08	-9.77E-08	-8.31E-08	-9.52E-08
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CYPI	7.14E-10	9.33E-11	-1.26E-10	1.57E-09	3.17E-10	-3.82E-10	1.07E-09	9.12E-11
	0.92	0.99	0.99	0.81	0.97	0.96	0.88	0.99
sslexr			0.0055	-0.0367	0.0035	0.0041	-0.0378	0.0016
			0.01	0.00	0.08	0.09	0.00	0.47
ACIR-FSI					0.0407	0.0402		0.0436
					0.00	0.00		0.00
UPCONT						-0.1179		
						0.02		
LOWCONT						-0.2601		
						0.00		
GOVRPARTY						0.0920		
						0.02		
DIVIDEDGOV							-0.0830	0.0429
							0.05	0.39
FE-cross section	yes	no	no	yes	no	no	yes	No
FE- period	yes	yes	yes	yes	yes	yes	yes	Yes
Adj. R^2	0.587	0.435	0.436	0.600	0.440	0.451	0.600	0.439
Schwarz criterion	2.958	3.137	3.139	2.934	3.134	3.139	2.951	3.155
F-statistic	35.08	36.50	35.87	35.89	35.80	34.56	35.19	34.23
Prob(F-statistic)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes:

p-values are reported under the estimated coefficients.

White (heteroscedasticity robust) cross-section standard errors & covariance (d.f. corrected)

Table 2B. Models of Primary Surplus Response to Debt: State Government Panel Data (1962-2008)

	Model 9	Model 10	Model 11
C	1.5620	1.5638	1.4831
	0.00	0.00	0.00
d(-1)	**0.0553**	**0.0561**	**0.0556**
	0.00	0.00	0.00
CYEXS	-9.60E-08	-9.58E-08	-9.34E-08
	0.00	0.00	0.00
CYPI	5.11E-10	6.73E-11	2.45E-10
	0.95	0.99	0.98
Sslexr	-0.0017	-0.0007	-0.0011
	0.44	0.78	0.67
BBR1	-0.3459	-0.2891	-0.3436
	0.00	0.00	0.00
BBR2	**0.2783**	**0.2537**	**0.2854**
	0.00	0.00	0.00
BBR3	-0.3614	-0.3718	-0.3685
	0.00	0.00	0.00
BBR4	**0.2509**	**0.2340**	**0.2615**
	0.00	0.00	0.00
BBR5	0.0567	**0.0920**	0.0589
	0.22	0.05	0.21
BBR6	-0.3258	-0.2362	-0.3282
	0.00	0.00	0.00
BBR7	-0.4040	-0.3950	-0.4086
	0.00	0.00	0.00
BBR8	-0.1903	-0.2055	-0.1908
	0.00	0.00	0.00
BBR9	**0.1495**	**0.1665**	**0.1523**
	0.00	0.00	0.00
UPCONT		0.0425	
		0.40	
LOWCONT		-0.2529	
		0.000	
GOVPARTY		0.0534	
		0.197	
DIVIDEDGOV			0.0654
			0.13
FE-cross section	no	no	no
FE- period	yes	yes	yes
Adj. R^2	0.481	0.484	0.480
Schwarz criterion	3.082	3.102	3.103
F-statistic	36.45	34.37	34.93
Prob(F-statistic)	0	0	0

Notes:

p-values are reported under the estimated coefficients.

White (heteroscedasticity robust) cross-section standard errors & covariance (d.f. corrected)

Table 2C. Models of Primary Surplus Response to Debt: State Government Panel Data (1962-2008)

	Model 12	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18	Model 19	Model 20
C	0.6014	0.4708	0.7164	0.6497	0.6695	0.5690	0.6773	0.7301	0.4852
	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d(-1)	**0.0784**	**0.0639**	**0.0461**	**0.0427**	**0.0422**	**0.0371**	**0.0457**	**0.0510**	**0.0396**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CYEX	-1.01E-07	-9.99E-08	-9.84E-08	-9.85E-08	-9.86E-08	-9.97E-08	-9.84E-08	-9.78E-08	-9.97E-08
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CYPI	9.07E-10	4.91E-10	1.95E-11	-1.20E-10	-1.23E-10	-3.83E-10	4.65E-11	1.93E-10	-2.82E-10
	0.91	0.95	1.00	0.99	0.99	0.96	1.00	0.98	0.97
sslexr	0.0087	0.0083	0.0047	0.0057	0.0056	0.0089	0.0047	0.0023	0.0082
	0.00	0.00	0.02	0.01	0.01	0.00	0.03	0.30	0.00
New England	-1.1456	-0.8424							
	0.00	0.00							
Mideast	-0.6015		-0.1463						
	0.00		0.01						
Great Lakes	-0.217			0.0893					
	0.01			0.13					
Plains	-0.2543				0.0110				
	0.00				0.83				
Southeast	-0.5628					-0.3075			
	0.00					0.00			
Southwest							**0.3206**		
							0.00		
Rocky Mountain	**0.464**							**0.8851**	
	0.00							0.00	
Far West	0.0531								**0.4507**
	0.58								0.00
FE-cross section	no	no	no	no	no	no	no	no	no
FE- period	yes	yes	yes	yes	yes	yes	yes	yes	yes
Adj. R^2	0.518	0.470	0.437	0.436	0.436	0.440	0.444	0.471	0.443
Schwarz criterion	3.00	3.08	3.14	3.14	3.14	3.14	3.13	3.08	3.13
F-statistic	43.53	40.14	35.27	35.20	35.15	35.68	36.34	40.45	36.21
Prob(F-statistic)	0	0	0	0	0	0	0	0	0

Notes:

p-values are reported under the estimated coefficients.

White (heteroscedasticity robust) cross-section standard errors & covariance (d.f. corrected)

Appendix Table 1. State Balance Budget Requirement (BBR) Systems

State	BBR1	BBR2	BBR3	BBR4	BBR5	BBR6	BBR7	BBR8	BBR9	ACIR-FSI
Alabama	1	0	1	1	1	0	0	1	1	10
Arizona	1	0	1	1	1	0	1	1	1	10
Arkansas	1	0	0	1	0	0	0	1	0	9
California	1	0	0	1	0	1	0	1	0	6
Colorado	1	1	1	1	1	0	0	1	0	10
Connecticut	1	0	1	1	0	0	1	1	0	5
Delaware	0	0	1	1	0	0	1	0	0	10
Florida	1	0	0	1	0	0	0	1	0	10
Georgia	1	1	1	1	1	0	1	0	0	10
Idaho	1	1	1	1	0	0	0	1	0	10
Illinois	1	0	1	1	1	0	1	0	0	4
Indiana	0	0	1	0	0	0	0	0	0	10
Iowa	1	0	1	0	1	0	0	0	0	10
Kansas	0	0	1	1	1	0	0	1	0	10
Kentucky	1	1	1	1	1	0	1	1	0	10
Louisiana	1	0	0	1	0	0	0	1	0	4
Maine	1	0	1	0	0	0	0	0	0	9
Maryland	1	0	0	1	0	0	1	0	0	6
Massachusetts	1	0	1	1	0	1	1	1	0	3
Michigan	1	0	1	1	1	0	1	1	0	6
Minnesota	1	0	1	0	0	0	0	1	0	8
Mississippi	1	0	1	1	1	0	0	1	1	9
Missouri	1	0	1	0	1	0	0	1	0	10
Montana	1	1	0	1	0	0	1	1	1	10
Nebraska	1	0	1	0	1	0	0	1	0	10
Nevada	1	0	1	1	1	0	1	0	0	4
New Hampshire	1	0	0	1	0	0	1	1	0	2
New Jersey	1	0	0	1	0	0	1	1	0	10
New Mexico	1	1	0	0	1	0	0	0	0	10
New York	1	1	1	1	0	0	0	0	0	3
North Carolina	1	0	1	1	0	0	0	1	1	10
North Dakota	0	0	0	0	0	0	0	0	0	8
Ohio	1	0	1	1	1	0	0	1	0	10
Oklahoma	1	0	0	1	0	0	1	1	0	10
Oregon	1	0	1	1	0	0	0	1	0	8
Pennsylvania	1	0	0	1	0	0	0	0	0	6
Rhode Island	1	0	1	1	1	0	1	1	0	10
South Carolina	1	0	1	1	1	0	0	1	1	10
South Dakota	1	1	1	1	0	0	0	1	0	10
Tennessee	0	0	1	0	1	0	0	1	0	10
Texas	0	1	1	1	1	0	0	1	1	8
Utah	1	1	1	1	1	0	0	1	0	10
Vermont	0	0	1	0	0	0	0	0	0	0
Virginia	1	0	1	0	0	0	0	0	0	8
Washington	0	0	1	1	0	0	1	0	0	10
West Virginia	1	0	0	0	0	0	0	1	0	8
Wisconsin	0	0	1	1	1	0	1	1	1	6
Total	38	10	34	35	21	2	17	32	8	

*Notes:*A BBR's value equals one if associated provision is in place and zero otherwise. Values have been assigned by Mahdavi and Westerlund (2011) based on the information in Hou and Smith (2006, Table 2).