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# Essays on State Fiscal Institutions

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To the Graduate Council:

I am submitting herewith a dissertation written by Todd Richard Yarbrough entitled "Essays on State Fiscal Institutions." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Economics.

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# Essays on State Fiscal Institutions

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Abstract

The following three essays investigate the effect various fiscal institutions have on state budgeting decisions. In the first essay, the impact of stringent balanced budget rules on a non-general fund expenditure category, environmental expenditure, is investigated. The essay finds that states with especially stringent balanced budget rules have lower average environmental expenditure than states absent stringent rules. Using a Fixed-Effects panel estimation, the paper finds that stringent balanced budget rules are associated with 1.55% lower per capita environmental expenditure than weak rules. Further, the presence of political interest groups in a state significantly mitigates this reduction, causing environmental expenditure to fall by less than 0.36% in stringent rule states who fall in the top ten of the nation with respect to green interest group presence. In the second essay, the impact of rainy day fund usage (the depositing and withdrawing of funds) on state budgeting decisions is analyzed. The essay concludes that when states use their rainy day funds to prevent future fiscal angst, they alter their fiscal mix to do so. A Fixed-Effects panel estimation is utilized to test for the impact of fund usage on specific categories, and finds that rainy day fund usage is significantly correlated with changes to states' fiscal mixes. States with significant RDF balances are correlated with rises in the shares of social assistance and capital projects of 2.58% and 2.69% respectively. The third essay seeks to understand whether existing fiscal restraints, such as balanced budget rules, tax and expenditure limits, and debt limits effect a state's ability to accumulate sizable rainy day fund balances. A Fixed-Effects panel estimation indicates that revenue limits and stringent balanced budget rules appear significantly correlated with rainy day fund share of total general fund expenditure. Revenue limiting laws reduce the share by 1.96 percentage points. Stringent balanced budget rules reduce the effect of revenue surpluses on the share, with stringent rule states having lower rainy day fund shares by about 9 basis points for every $100 million in surplus revenue.

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# Introduction

Over the course of American governance a systematic decentralization, by design, has occurred. Tax and expenditure decisions, across a very broad swath of policy areas, have moved from the domain of the federal government to the states. As such, states have many more financial obligations today than they did some one hundred years ago. In an effort to absorb these new found obligations, states have enacted and adopted several fiscal institutions to alleviate fiscal stress. These include, balanced budget rules, rainy day funds, tax and expenditure limits, and debt limits. The three essays contained herein investigate the potential for these rules to alter the budgeting decisions of U.S. states. Essay One, entitled, "The Political Economy of Balanced Budget Rules: Evidence from U.S. State Environmental Expenditure, 1975—2011", investigates whether states with especially rigid balanced budget requirements also have lower environmental expenditure. The purpose of this study is to shed light on the effect of fiscal rules on non-general fund spending categories. Essay Two, entitled, "Rainy Day Funds and the Fiscal Mix: The Impact of Rainy Day Fund Adoption and Spending on U.S. State Budgeting, 1975—2011", analyzes the effect of rainy day fund usage on the shares of various general fund expenditure categories, including education, infrastructure, social assistance, healthcare, and capital projects. The study serves to inform the public finance literature that the rise of rainy day fund usage among U.S. states may have unintended consequences across several spending categories. Essay Three, entitled, "Where is the Rain? The Effect of Fiscal Restraints on RDF Balances Among U.S. States, 1975—2011", seeks to understand how existing fiscal restraints, such as balanced budget rules and debt limits, affect a state's ability to accumulate sizable rainy day fund balances. This essay is an important addition to the fiscal institution literature as it shows that existing fiscal restraints may limit a state's ability to have significant rainy day fund balances.

# Essay 1. The Political Economy of Balance Budget Requirements:

# Evidence from U.S. State Environmental Expenditure, 1975—2011

## Abstract

Currently, forty-nine states have explicit balanced budget rules, and most have additional rules on deficits and debt. Previous studies find that balanced budget rules assist states in having fiscal discipline by eliminating or reducing deficit spending. However, binding constraints on deficit spending reduce a state's fiscal flexibility. A lack of fiscal flexibility may lead to reduced levels of non-general expenditures, specifically environmental expenditure. This paper investigates the effect of stringent balanced budget rules on U.S. state environmental expenditure over the period 1975-2011. Using a Fixed-Effects panel estimation, the paper finds that stringent balanced budget rules are associated with 1.55% lower per capita environmental expenditure than weak rules. Further, the presence of political interest groups in a state significantly mitigates this reduction, causing environmental expenditure to fall by less than 0.36% in stringent rule states who fall in the top ten of the nation with respect to green interest group presence. However, political party mismatch between the governor and the majority in a state's legislature within stringent rule states is correlated with an additional 3.36% reduction in environmental expenditure. In an alternative specification, the paper finds that stringent rule states appear less affected by green interest group presence, and more so by political party mismatch. These findings suggest that stringent balanced budget rules may lead to lower environmental expenditure, that green interest group presence may limit this reduction, while political party mismatch exacerbates the reduction.

## 1 Introduction

One of the defining features of U.S. state fiscal policy is the use of balanced budget rules. Most governors and/or state legislators face a statutorily or constitutionally enforceable constraint to balance their state's budget. These constraints have the potential to induce fiscal discipline by making it difficult or impossible for states to experience budget deficits. Balanced budget rules are among the most popular fiscal institutions, favored by both politicians and voters.[1] Currently, forty-nine states have explicit balanced budget rules, and most have additional rules on deficits and debt. Despite this, the last two decades have seen state general fund expenditures rise and tax rates fall, leading many to experience increased fiscal stress, deficits, and debt. Additionally, balanced budget rules can reduce fiscal flexibility, which may lead to cuts in expenditure categories not part of the general expenditure of state budgets.[2]

Conventional wisdom suggests that a balanced budget rule (BBR) induces fiscal discipline by requiring a state's expenditure be less than or equal to incoming tax revenues. States hope to avoid politically unpopular and fiscally stressful expenditure deficits, by mandating their elected officials create and/or run balanced budgets. While the term "balanced budget rule" implies a complete balancing of a state's entire budget, in practice, BBRs are typically restrictions on deficit and debt stemming from their general fund. General expenditures typically concern money spent on education, police and fire protection, infrastructure, healthcare, and some social assistance. Such categories represent over 70% of a state's total budget on average. Therefore, BBRs are a limit on the allowable deficit size accruing from the general fund. Stringent rules require states to abstain completely from deficit spending, either in the

[1] Bohn and Inman (1996) discuss how the early 1990s were notable for the push both voters and politicians had for instituting a federal balanced budget rule. The rule never materialized.

[2] Bayoumi and Eichengreen (1995) assert that while balanced budget rules do reduce deficits during weak economic periods, they do so by applying considerable fiscal stress to states. Especially stringent rules reduce the fiscal flexibility and choke off potential responses, such as deficit financing.

current fiscal year or by the end of the next fiscal year. Such stringent rules require expenditure decreases or revenue increases in order to eliminate deficits. Less stringent, or weak rules allow states to run deficits from their general fund, but have some restrictions on the size of the allowed deficit and debt. Weak rules offer states more flexibility in reducing deficits, both in time and approach.

BBRs reflect the political and social cost of fiscal deficits. Deficits are costly to states and politicians, requiring expenditure reduction, revenue augmentation, and/or debt financing. Signaling a possible lack of fiscal discipline, state deficit spending is politically unpopular. To this point, Wagner (2006) finds that state deficit spending, brought on by economic contractions in the 1970s and 1980s, led to rising state debt and increased political turnover. How have BBRs performed in inducing fiscal discipline? Previous literature finds that *stringent* BBRs are associated with lower deficits, less debt, and less political manipulation of state budgets (Rose, 2008). This implies that states can induce fiscal discipline by having BBRs, but that rules should be substantially stringent. Weak rules are found to have little effect on deficit reduction and lead to higher levels of state debt. It is also important to note that the majority of deficit reduction carried out by states, regardless of the type of BBR, has been in the form of expenditure reduction. From 2008 to 2010, only 12 states sought revenue increases as a means to reduce their deficits.[3]

Nonetheless, stringent BBRs may increase a state's fiscal volatility, leading to significant variation across years in expenditure levels and tax rates (Alesina and Bayoumi, 1996). Fiscal volatility adds to economic uncertainty for both businesses and citizens, and can stunt economic growth by making the state unattractive to potential investment. Volatility occurs when a state

[3] Inman (2010) discusses how states began abandoning deficit financing shortly after the Great Recession, when national political atmosphere had grown hostile to incurring debt.

must alter its budget, typically during an economic contraction, to ensure it remains balanced. Further, these rules can reduce a state's ability to respond to economic contractions by restricting or disallowing the use of deficit spending (Levinson, 1998). When economic contractions occur, tax revenues fall and expenditures rise, adding fiscal stress to state budgets. Deficit spending can relieve some of this stress, at the cost of incurring some debt. In short, previous studies have shown BBRs assist states in having fiscal discipline by eliminating or reducing deficit spending, but binding constraints on deficit spending may also lead to volatile state budgets and an inability to react to economic contractions.[4]

This paper adds to the literature on fiscal institutions by investigating the effect of BBRs on a non-general expenditure category, specifically U.S. state environmental expenditure. State environmental expenditure is defined as total spending in three separate categories, forest and park, fish and game, and natural resource management. The paper uses environmental expenditure to focus on specific determinants, which may vary across spending categories, such as interest group influence. The literature on BBRs is somewhat mixed as to their role in state budgets and this study extends the discussion in order to better inform policy, rule design, and state fiscal discipline. Over the past two decades, average state general fund expenditures have risen while average tax rates have fallen, leading many states to experience fiscal stress (Rose, 2010). This stress may lead to lower levels of environmental expenditure, which may or may not be a reflection of the vote functions generated by voters and interest groups. Stringent BBRs may exacerbate this effect by reducing fiscal flexibility and further constraining state budgets. The paper sets out to answer the following questions: 1) what effect do stringent BBRs have on a non-general expenditure category, specifically environmental expenditure? 2) do BBRs interact

[4] The cyclical volatility of state budgets has increased as states have begun to shoulder more of the fiscal burden due to continued fiscal fractionalization (Inman, 2010). Further, welfare reforms of 1996, Medicaid expansions, and court rulings on local school funding have increased the load states have to carry.

with politics, leading to a possible political business cycle in environmental expenditures? 3) does this political business cycle appear influenced by the presence of environmental interest groups?

The paper finds that BBRs appear to have a significant effect on state environmental expenditure. Stringent BBR states are associated with 1.55% less environmental expenditure than weak rule states when the governor is a Republican. Further, the paper finds that the presence of interest groups does have a significantly positive effect on environmental expenditure in stringent rule states. Using membership data for nationally popular environmental activist groups, Greenpeace, the Sierra Club, and the National Wildlife Foundation, the paper finds that states with stringent rules and a substantial activist presence only see their environmental expenditures fall by about 0.36% when the governor is a Republican. Finally, political atmosphere appears to interact with BBRs as well. When the state governor's party does not match that of the majority in the state senate, stringent BBRs are associated with 3.36% less environmental expenditure when the governor is a Republican. This suggests that political-mismatch exacerbates the effect of a stringent BBR. An alternative specification in which the estimation is split into stringent and weak rule states, finds that weak rule states are more impacted by the presence of interest groups. The rest of the paper is organized as follows: Section 2 discusses previous literature, while section 3 describes state BBRs and defines rule stringency. Section 4 discusses the data, empirical approach, and empirical results. Lastly, section 5 concludes the paper by summarizing the results and offering avenues for future research.

## 2 Literature Review

Most research on BBRs has relied on empirical approaches based loosely on a median-voter framework, wherein the electorate puts forth a budget that ultimately reflects the preferences of the average voter subject to a budget constraint. Conceptually, BBRs are built into the budget constraint, establishing an upper bound on general fund expenditure. This upper bound is the level of available tax revenue. However, these upper bounds can be non-binding if the specific BBR rules are weak. To this point, much of the research assumes an electorate that faces either a stringent or weak BBR, but that the BBR itself does not change the ability of the electorate to provide the preferred level of public expenditure.[5]

In an early empirical study of BBRs, the ACIR (1987) created an index of stringency for BBRs, and used cross-section data from 1984 to find that stringent BBRs are associated with lower state deficits. On the other hand, von Hagen (1991), using a panel of data from 1975-1985, tested the same relationship and found no statistically significant impact of BBRs on deficits, but did find that stringent BBRs are associated with lower capital debt. In a panel of 48 states from 1965-1992, Alesina and Byaoumi (1996) find that stringent BBRs are associated with larger average budget surpluses. Further, they find that moving from no rule to the most stringent rule reduces cyclical variance of fiscal balance by about 40 percent.

Hou and Smith (2006) created an alternative index to the one mentioned above. They distinguish political rules – such as those requiring a governor to prepare a balanced budget – from technical rules – including no-carry-over rules and within year deficit controls, among others. In a study of the 50 states between 1950-2004, Hou and Smith (2010) find technical rules are more effective than political rules in reducing deficits. Using cross-section data from the 50

[5] Crain and Miller (1990) discuss how BBRs are effectively backstops against elected officials attempting to grow the government beyond the public's preferred level of support.

states between 1979-1986, Crain and Miller (1990) find that constitutional BBRs are associated with 1 percent lower spending growth, while statutory rules have no significant affect. They establish that constitutional rules are rather stringent and statutory rules relatively weak. The proper categorization of BBRs is an ongoing debate within the literature. In general, it is acceptable to think of BBRs as being either stringent or weak.

Additional research on BBRs finds that stringent rules may lead to a reduction in fiscal flexibility. Bayoumi and Eichengreen (1995) find that states with stringent BBRs undertook less fiscal stabilization than those states with weaker rules. This indicates that BBRs may limit the ways in which a state can respond to fiscal crisis. It may be in the best interest of a state to carry a deficit over into the next year, but stringent BBRs limit this flexibility. Levinson (1998), analyzing the period 1969—1995, finds that states with stringent BBRs experience greater cyclical variability and are more prone to fiscal stress over the business cycle.

All the studies mentioned previously investigated the causal relationship between BBRs and general expenditure categories. The literature on the relationship between fiscal institutions and non-general categories is thin. List and Sturm (2004), using a panel of 48 states during the period 1960—2000, find that politics play a significant role in the level of environmental expenditure set by states. In their analysis, the composition of the electorate greatly influences environmental expenditure outcomes during elections when the governor is unable to be reelected. Economic conditions have also shown to impact environmental policy. Jacobsen (2012), utilizing data on U.S. Congressperson's League of Conservation Voters score, finds that state unemployment rates significantly affect environmental policy within the legislative branch. Both studies provide evidence that politics and economics play a significant role in the level of environmental policy at the state level.

Also crucially important is the recent work in the public finance literature to establish models that better reflect the true nature of voter and electorate preferences. Tullock (2004) suggests that the median-voter model is lacking in its ability to include more complex, possibly multi-peaked, voter preferences. Similarly, Winer (1999) postulated that each voter's welfare was tied to their vote's ability to alter their own welfare. In other words, citizens gain higher utility by casting votes for platforms that are most likely to impact their welfare. Winer and Hettich (2004) formalized this framework into what they called *vote functions*. Each voter or group of voters has a vote function based on their own welfare. Here the potential electorate views these functions and creates party platforms based on optimal strategies to be elected. Building on this model to include interest groups, Miller and Schofield (2003) suggest that interest groups have the capacity to significantly impact party platforms, and thus budget decisions. In fact, it is likely that given substantial political power, interest groups will skew party platforms away from the average voter. The key takeaway from this framework is that the assumptions of the median voter model are too restrictive, given both the existence and apparent political power of interest groups and party platforms to alter budget decisions.

## 3 Budget Decisions and Balanced Budget Rules

All previous studies have investigated the effect of BBRs on general fund expenditures, such as education, healthcare, and infrastructure. These studies find that stringent BBRs are reasonably good tools for enforcing fiscal discipline through binding constraints on deficit spending. As discussed above however, such constraints may reduce state fiscal flexibility. Even so, this is unlikely to cause significant changes in general fund expenditures (Poterba, 1995). General

general fund expenditures are less discretionary, typically formulae-based, and less likely politically manipulated (List and Strum, 2006). In fact, in some states it is constitutionally or statutorily mandated that the proportion of incoming revenue dedicated to particular general fund expenditures remain unchanged, such as education, regardless of fiscal stress.[6]

While general fund expenditures make up the majority of any state's budget, there are "non-general" expenditures, which are smaller and perceived to be politically less important. Further, non-general expenditures are significantly more discretionary, volatile, and prone to political manipulation. To this point, List and Sturm (2004) find that non-general expenditure categories are manipulated for political gain, especially when the governor faces reelection. Their analysis concludes that political constraints, specifically gubernatorial term limits, may incentivize politically-opportunistic behavior in non-general policy categories. Examples of non-general expenditure categories may include environmental spending, higher education spending, and some forms of in-state aid.

### 3.1 Budget Creation Framework

In order to investigate the potential for BBRs to significantly affect non-general expenditures, this paper focuses on state environmental expenditure. Environmental expenditure is chosen because, while it is considered a non-general expenditure category, voter preferences for state environmental expenditure are politically broad (Jacobsen, 2012). Environmental expenditure is used for state parks and recreation areas, fish and wildlife management, and natural resource management. In aggregate, environmental expenditure is purposed for maintaining and enriching the aesthetic and recreational value of the state. By maintaining numerous recreation areas,

[6] For example, Tennessee's Basic Education Program (BEP) establishes a legally binding formula to determine the most appropriate level of K-12 education funding. The appropriations comes mostly from collected property taxes at the local level which is then distributed to school districts.

controlling fish and wildlife populations, and ensuring that vital natural resources are extracted in an environmentally friendly manner, states use their environmental expenditure to provide resources for both public and private use. As List and Sturm (2006) point out however, these expenditures are viewed as a non-general expenditure category by both legislators and voters, less important than core budget categories such as education, infrastructure, and public safety. While the specific reason for this view is not clear, volatility in expenditure levels and a relatively low share of the state's budget indicate, at least anecdotally, that these expenditures are indeed viewed as non-general. Further, recent trends show movement towards a decentralized national environmental policy, wherein states take over the role of environmental stewards, suggesting that states will need to increase their own environmental budgets to maintain current standards, or resort to reducing environmental resources.[7] Moreover, the debate over environmental expenditure is politically contentious. The debate contrasts the potential reduction in economic growth of heightened environmental regulation and expenditure, with the potential for reduced aesthetic value stemming from relatively low environmental expenditures.[8]

With respect to the decision making process of budget creation, a few important issues require discussion. First is the question of who is creating the budget, and who ultimately decides the level of environmental expenditures. Budget creation at the state level is quite arduous and complicated, but the basic idea is common across states. Governors and/or state legislatures propose a fiscal year budget, and then the proposed budget is altered and approved by some majority rule. The question then becomes who decides the total level of public expenditure, and

[7]Considering the immense fiscal stress states have found themselves in over the past several decades, the notion of state control over environmental policy become tricky. Regardless, if environmental policy is shifted to the states, then environmental policy will interact with any existing or adopted fiscal institution employed by the state.

[8] While this is a very simplified statement of a broader national debate occurring about environmental protection, it does get to the heart of the central issue of environmental spending. How and to what extent should environmental spending be based on economic efficiency or environmental quality, even if those to issues are not mutually exclusive (List and Sturm, 2006).

the specific levels of non-general expenditure? While it is theoretically beneficial to assume that preferences are uni-dimensional, allowing the use of the Median-voter framework, the reality is that issues have become increasingly complex (Tullock, 2004). Expenditures are seen as being in competition with other expenditures, linking budget issues. As Hettich and Winer (1999) conclude, the simple median-voter model is likely to fall short of addressing some of the nuances of budgeting, especially for categories outside of the core budget. The growing influence of interest groups at the state level suggest that budget decisions are increasingly being made based on some party platform, rather than average population preferences (Hettich and Winer, 2004). Therefore, it is prudent that this paper address the need for an updated framework. Recent advancements in public policy equilibrium analysis have generated several frameworks that do address the added complexity of budget decisions, specifically the probabilistic spatial voting model. Here, two or more parties compete for votes by maximizing expected electoral support, while voters vote based on the influence of proposed policies to their welfare. This framework creates "expected vote functions" which parties then use to generate optimal strategies for party platforms. As mentioned above, the presence of interest groups is likely to affect budget decisions, which cause party platforms to diverge from the average voter (Schofield, 2003). Interest group and/or activist activity is heavily weighted within expected vote functions, as these groups appear to have considerable political influence. Additionally, non-general expenditure categories are especially problematic for a narrow median-voter model, as the ability of interest groups to affect those categories is likely pronounced.

While no formal theoretical model is being proposed, the basis for the decision rule is framed by a spatial voting rule, wherein voters and interest groups create vote functions based on their own welfare, while politicians seek optimal strategies relative to these vote functions. The

use of this framework within the context of environmental expenditure decisions seems justified. The broad nature of environmental expenditure and the possibility for interest group influence require a more complex framework than the median-voter model (Hayes and Dijkstra, 2002). Furthermore, the existence and impact of state BBRs, coupled with voter and interest group influence, would seem to add additional complexity. If this framework is consistent, the expectation would be that BBRs would exacerbate party platforms, reflecting the influence of vote functions on budget creators, leading to divergent levels of environmental expenditure among states with differences in interest group influence and stringency of their BBRs.

### 3.2 Balanced Budget Rules

As previously discussed, the relative stringency of a BBR affects state budgets. States with stringent rules save more and have lower deficits and debt, but less fiscal flexibility. States with weak rules have less volatile fiscal mixes, greater fiscal flexibility, but higher deficits and debt. How these rules are categorized is important to the analysis. For simplicity, we will categorize BBRs into two categories:1) stringent and 2) weak. Table 1.1 reports the breakdown among states.[9]

Nearly all states require their governor and/or state legislature submit and /or sign a balanced budget. Referred to as ex ante BBRs, these rules are *weak* on their own and in some cases accompanied with additional limits on deficits and debt. In addition, ex ante BBRs require only that the *proposed* budget be balanced, meaning that budget balancing is heavily reliant on accurate forecasting of both expenditures and revenues.

[9] While this does reduce the empirical breadth of the study, grouping BBRs into stringent and weak groups in common in the literature (Nice, 1991; von Hagen, 1991; Alt and Lowry, 1994). More recent studies, such as Poterba and Reuben (2001) attempt to utilize a more intricate BBR index, but the results were sensitive to empirical approach and not statistically different from the weak/stringent framework employed here.

Table 1.1 State Balanced Budget Rules

| |
|---|
| States with stringent balanced budget rules (25):<br>AL, AZ, CO, DE, FL, GA, IA, ID, IN, KS, KY, MS, MT, NE, NM, NC, OH, OK RI, SC, SD, TN, UT, WV, WY |
| States with weak balanced budget rules (22):<br>AR, CA,[10] CT, IL, LA, MD, ME, MA, MI, MN, MO, NV, NH, NJ, NY, ND, OR, PA, TX, VA, WA, WI |
| State without a balanced budget rule (1):<br>VT |

Note: Data collected from the National Conference of State Legislatures and the National Association of State Budget Officers, 1975—2011.

These forecasts can be significantly different from realized expenditure and revenues, which may lead to state deficits. States with weak rules have, on average, higher deficits and debt, especially debt on capital. This is likely due to optimistic forecasting and the need to maintain capital investments regardless of a budget deficit. Further, ex ante BBRs do not prevent a state from carrying over a fiscal deficit across years. Because of this, some weak BBRs are also accompanied with additional rules on deficits and debt, though it appears most of these states do not set binding limits.[11] It is sometimes stated in the literature that weak BBRs are equivalent to having no BBRs at all, though this is somewhat misleading given the additional rules on deficits and debt. In practice, weak rules offer greater fiscal flexibility, but generally lead to higher amounts of state debt due to the allowance of deficit carry-over. For example, the state of Massachusetts has a statutory rule that requires the governor to propose

[10] California recently voted, via voter referendum, to establish a stringent BBR in 2008, which went into effect in 2012.

[11] National Association of State Budget Officers, *Fiscal Survey of the States (Washington, D.C.*: National Association of State Budget Officers, 2011)

a balanced budget and that the legislature sign a balanced budget, while allowing deficit carry-over in the event of over-optimistic forecasting or sudden economic contractions. As a result, Massachusetts has substantial accumulated debt per capita of more than $4,000 and has experienced budget deficits for the past several years. These BBRs are characterized by what Hou and Smith (2006) called *political* rules. Such rules constitute political pressure to propose and sign balanced budgets, but do not use formulas or other technical rules to prohibit deficit carry-over. For the purposes of this paper, weak rules are defined as rules that do permit deficit carry over. Currently, 22 states allow for deficit carry over, indicating weak BBRs.[12]

In addition to ex ante BBRs, more than half of all states have *stringent* rules that prohibit deficit carry-over, either in the current fiscal year or by the next fiscal year. Ex post BBRs specifically mandate that a state must ultimately run a balanced budget, not just propose one. Stringent BBRs force states to react to changing economic conditions during the current year to ensure that the budget is balanced by the end of the year, or that deficits are eliminated by the next fiscal year. In other words, the state may be required to reduce expenditures or revenues to keep the budget balanced in the current fiscal year, or at the beginning of the next fiscal year. In the latter case, the next fiscal year budget is required to reflect the need to eliminate the deficit from the year prior. In practice, stringent rules reduce fiscal flexibility, especially during economic contractions, but lead to lower state debt by mandating strict fiscal discipline. An example of a state with stringent rules is Nebraska, where the presence of a deficit mandates specific budget balancing measures, such as a formula to reduce discretionary spending. As a result, Nebraska has relatively low

[12] National Association of State Budget Officers, *Budget Processes in the States (Washington, D.C.:* National Association of State Budget Officers. 2012*)*

accumulated debt per capita of $15.00. Hou and Duncombe (2008) referred to these as *technical* rules, often requiring specific formula approaches to deficit elimination. These rules constitute binding quantitative measures above and beyond the political pressure associated with weak rules. Currently, 25 states have binding constraints on deficit carry-over, indicating stringent rules.[13]

## 4 Data and Empirics

To test for the effect of BBRs on a non-general expenditure, the empirical approach will involve comparing environmental expenditure among states with stringent and weak BBRs over the period of 1975-2011, controlling for interest group presence and political hostility. The analysis spans multiple periods of both economic expansion and contraction, as well as various periods of state fiscal stress. Utilizing the spatial voting framework requires the ability to control for party platforms. To do this, the paper distinguishes states by the party affiliation of the governor, who is assumed to follow the platform under which he or she were elected. To test for the effect of party platforms, the paper compares states with political party match between the governor and legislature with politically mismatched states. Another important feature of the spatial voting framework is the inclusion of interest groups, which may move budget decisions away from the average voter preferences. To test for this, data on national environmental membership by state is used to generate state specific interest group activity. The analysis tests not only the effect of BBRs on state environmental expenditure,

[13] National Association of State Budget Officers, *Budget Processes in the States (Washington, D.C.:* National Association of State Budget Officers. 2012*)*

but also how party platforms and interest group activity interact with BBRs to affect such expenditure.

### 4.1 Data

Table 1.2 has the means, standard deviations and definitions of the variables used. To analyze the questions discussed above, we will use data on environmental expenditures by U.S. states during the period 1975-2011.[14] There are three categories for environmental expenditure reported in the annual census of states. They are expenditures on "fish and game," "forest and parks," and "other natural resources." The paper aggregates "fish and game" and "forest and parks" as these two sub-categories are very similar in nature. Expenditure on "other natural resources" is significantly different, encompassing administrative expenses required for resource management and extraction.

The regressor of interest will be a dichotomous BBR variable, which equals 1 if the state has a stringent rule, and 0 otherwise. To control for political platforms, data on party affiliation for each state governor is collected, as well as the majority party of each state legislature over the same period. The party affiliation data are broken down into Republican or Democrat.[15] For the purposes of the paper, the variable *party* equals 1 if the governor is a republican, and 0 otherwise. To acknowledge the potential influence of interest groups, data on environmental group membership by state was collected.[16] Data on Greenpeace, the Sierra

[14] This is an updated version of the data used in List and Sturm (2004), who kindly made their data available.

[15] While a third category (Independent) exists, less than 15 instances of Independent governors show up across more than 1700 data points.

[16] Institute for Southern Studies, *Green Index* (Washington, DC: Island Press, 2005)

Club, and the National Wildlife foundation are used to generate the percent of total state population that is a member of any of these, which is then ranked across all states.[17]

Table 1.2 Means, Standard Deviations and Variable Definitions

| variable | mean (std. dev.) | definition |
|---|---|---|
| totenvexp | 30.27 (17.21) | per capita total state environmental expenditure and the sum of parks, forest, game, and natural resources |
| forest_game | 14.21 (8.53) | per capita state expenditure on parks, forest, and game |
| natural_resource | 16.06 (7.21) | per capita state expenditure on natural resources |
| bbr | 0.52 (0.19) | =1 if state has stringent bbr, 0 otherwise |
| green | 0.21 (0.11) | =1 if state is within the top ten states based on percentage of the population that is a member of at least one environmental interest group, 0 otherwise |
| party | 0.42 (0.21) | =1 if the governor is a republican, 0 otherwise |
| hostile | 0.31 (0.17 | =1 if the governor and state legislature are a party mismatch, 0 otherwise |
| med_income | 0.03 (0.04) | median income (millions) |
| population | 4.99 (5.12) | total state population (millions) |
| kids | 20.81 (2.94) | percentage of the population between ages 5 and 17 |
| aged | 11.82 (2.02) | percentage of the population above age of 65 |

Note: Expenditures and state income are deflated to 2000—2001 dollars.

From this, a dummy variable, *green*, is created equaling 1 if the state is in the top ten among states with respect to green interest group presence, and 0 otherwise.[18] Lastly, to account of political hostility, data on the party in majority rule of each state senate is collected, with the

[17] The percentage varies across states with a high of 4.6% in Oregon and a low of 0.9% in Arkansas.

[18] Ranking each state and then setting an arbitrary cutoff for inclusion may lead to selection bias. To test for this, sensitivity tests were run for different cut-offs, top five, top twenty, etc… Increasing the inclusion rate significantly reduced the model's explanatory power, indicating that while arbitrary, the top ten appears statistically satisfactory as a cut off.

variable *hostile* equaling 1 if the state has a mismatch between the governor and state legislator, and 0 otherwise.

State spending data is collected from the U.S. Census Bureau's Annual Survey of State Government Finances, 1975—2011. Data on Balanced Budget Rules are collected from the National Association of State Budget Officers (NASBO) and the National Conference of State Legislatures (NCSL). While RDF adoption and budget rule data are an updated version of data used previously in much of the literature.[19]

### 4.2 Empirical Approach I

The model of choice is a Fixed-Effects panel Estimation. The FE estimator controls for unobserved individual random effects ($\delta_i$), which in this case would be state-level effects. It does so by mean-differencing data, which causes difficulty relative to time-invariant BBRs. The reason this difficulty arises is that the FE estimator performs an OLS on mean-differenced data. This means that mean-differencing on time-invariant data results in observations, and parameter estimates, equal to zero. Because the paper is interested in estimating the effects of time-invariant BBRs on environmental expenditure, simply including them in the model would be unproductive (Cameron & Trivedi, 2010). A useful alternative might be a Random-Effects estimation, in which the time-invariant BBR could be placed into the model. However, given the use of state level data and the propensity for individual state effects to persist over time, the RE is troublesome due to a likely violation of the *unrelated effects* assumption (Wooldridge, 2002).[20] To assist in the decision over which estimator fits best, a Hausman Test is run to compare the estimates across the FE and RE estimators. The Hausman test produces a significant p-value (chi2( 1) = 207.38 and prob>chi2 =

[19] Wagner (2004) kindly made his data available.

[20] The *unrelated effects* assumes that the state-specific effect is uncorrelated with the explanatory variables of all past, current and future time periods of the same state.

0.0000), which indicates that the FE estimator is superior to the RE estimator for the purposes of this paper.

The dichotomous nature of the BBR variable may appear to oversimplify reality. However, the most important factor regarding BBR design is whether a state has binding constraints on deficit carry over (Hou and Duncombe, 2008). The National Association of State Budget Offices (NASBO) surveyed states regarding their BBR design and categorized each state as having a stringent or weak balanced budget rule based on whether they had binding constraints on deficit carry over. This standard rating can be found in Table A.1 of Appendix A, which also lists whether a state has a constitutional or statutory BBR. While it may cause some interpretation issues, there is little reason to believe that such a dichotomous variable would bias results.

Therefore, the paper proceeds by utilizing a FE estimator and relying on interaction terms to allow inclusion of the time-invariant BBR variable. Relying on interaction terms creates some additional econometric issues. First, since the effect of stringent BBRs cannot be isolated, their impact must be interpreted as functions of other variables (here political party of the governor). Therefore, the paper can only isolate effects in states with a governor from a particular party. Second, since this method cannot estimate the impact of BBRs in states with either political party, the estimated impacts will be the difference in effects of BBRs across states with governors from different parties (Wooldridge, 2002). Third, in order to overcome some of the two issues just mentioned, the model also includes full interactions of all other indicator variables to account for the lack of model detail.

Initially, a preliminary model is utilized to estimate the effect of politics and interest group influence on environmental expenditure. To do so, the paper estimates a fixed effects panel estimation similar to Besley and Case (1995) and List and Sturm (2006), which include

demographic and socioeconomic control variables, as well as time and state fixed effects. The model is fully interacted among the three indicator variables, *party*, *green,* and *hostile,* which creates:

$$lntotenvexp_{it} = \alpha + \gamma_1 party_{it} + \gamma_2 green_{it} + \gamma_3 hostile_{it} + \gamma_4(party_{it} * green_{it}) + \gamma_5(party_{it} * hostile_{it}) + \gamma_6(green_{it} * hostile_{it}) + \gamma_7(party_{it} * green_{it} * hostile_{it}) + \beta X_{it} + \delta_i + \varphi_t + t_i + \varepsilon_{it} \quad (1)$$

where $lntotenvexp_{it}$ is the natural log of environmental expenditure in state $i$ at time $t$. Here we log the dependent variable for analysis purposes, as is commonly done in the literature (Besley and Case, 2003) for ease of interpretation. The variables *party*, *green*, and *hostile* are dummy variables indicating governors' party affiliation, whether the state is in the top ten with respect to green interest group presence, and years in which the governor and legislature are a party mismatch respectively. Additionally, state fixed effects $\delta_i$ , time fixed effects $\varphi_t$, and state specific time trends $t_i$ are included in the specification. The variable $X_{it}$ is a vector containing state demographic and income data. These include total state population, the percentage of the population between 5 and 17, the percentage of the population above 65, and median income. Lastly, $\varepsilon_{it}$ is a contemporaneous error term.

To analyze the impact of stringent BBRs, the preliminary specification (1) is extended by interacting the variable $party$ with the variable $bbr$. The variable $bbr$ has a value of 1 if the state has a stringent BBR and 0 otherwise. Adding the interactions to (1) creates:

$$lntotenvexp_{it} = \alpha + \gamma_1 party_{it} + \gamma_2 green_{it} + \gamma_3 hostile_{it} + \gamma_4(party_{it} * green_{it}) + \gamma_5(party_{it} * hostile_{it}) + \gamma_6(green_{it} * hostile_{it}) + \gamma_7(party_{it} * green_{it} * hostile_{it}) + \gamma_8(party_{it} * bbr_i) + \beta X_{it} + \delta_i + \varphi_t + t_i + \varepsilon_{it} \quad (2)$$

Lastly, to test for the effect of interest groups and political hostility on environmental expenditures, specification (2) is extended by interacting *bbr* with *green*, and then *bbr* with *hostile*. Placing these full interactions into the model creates:

$$lntotenvexp_{it} = \alpha + \gamma_1 party_{it} + \gamma_2 green_{it} + \gamma_3 hostile_{it} + \gamma_4(party_{it} * green_{it}) + \gamma_5(party_{it} * hostile_{it}) + \gamma_6(green_{it} * hostile_{it}) + \gamma_7(party_{it} * green_{it} * hostile_{it}) + \gamma_8(party_{it} * bbr_i) + \gamma_9(bbr_i * green_{it}) + \gamma_{10}(party_{it} * bbr_i * green_{it}) + \beta X_{it} + \delta_i + \varphi_t + t_i + \varepsilon_{it} \quad (3)$$

$$lntotenvexp_{it} = \alpha + \gamma_1 party_{it} + \gamma_2 green_{it} + \gamma_3 hostile_{it} + \gamma_4(party_{it} * green_{it}) + \gamma_5(party_{it} * hostile_{it}) + \gamma_6(green_{it} * hostile_{it}) + \gamma_7(party_{it} * green_{it} * hostile_{it}) + \gamma_8(party_{it} * bbr_i) + \gamma_9(bbr_i * hostile_{it}) + \gamma_{10}(party_{it} * bbr_i * hostile_{it}) + \beta X_{it} + \delta_i + \varphi_t + t_i + \varepsilon_{it} \quad (4)$$

### 4.3 Empirical Approach II

Given the concern over using the FE estimator with a time-invariant BBR variable, a second estimation is implemented to get around some of this issue. Instead of including BBR by interacting with another time-variant variable, as is done above, the alternative specification relies on splitting the data into two groups, stringent and weak rule states. Then, specification

(1) is run for both states with stringent rules and states with weak rules. To test for significance across models, a "seemingly unrelated estimators test" is conducted for each explanatory variable, which produces a p-value. Interpretation of this p-value allows for determination of significant differences across stringent and weak rule states.

### 4.4 Results I

Table 1.3 reports a summary of estimation results when a Republican is governor. Column 1 of Table 1.3 reports the results from the fully interacted preliminary specification (1). States with higher concentrations of "green" populations (ranked in the top ten nationally) have 1.78% higher per capita environmental expenditure than non-green states. States with political mismatch between the governor and state legislature have nearly 1.17% lower per capita environmental expenditure than states with political harmony among the governor and state legislature. The interaction of hostile and green yields a significantly positive result (0.35%), suggesting that the greenness of the population overcomes the lack of political match. Lastly, the full interaction of *party*, *green*, and *hostile* is significantly positive, suggesting that regardless of political affiliation of the governor or the lack of match between the governor and legislature, greenness still has a positive effect (0.14%) on per capita environmental expenditure.

Table 1.3 The Political Economy of BBRs: Fixed Effects Panel Estimation

| | lntotenvexp (1) | lntotenvexp (2) | lntotenvexp (3) | lntotenvexp (4) |
|---|---|---|---|---|
| party | -0.0077 | -0.0073 | -0.0075 | -0.0073 |
| | (0.78) | (0.79) | (0.91) | (0.88) |
| green | 0.0096 | 0.0083 | 0.0083 | 0.0075 |
| | (1.97)* | (1.87)* | (1.85)* | (1.93)* |
| hostile | -0.0068 | -0.0087 | -0.0065 | -0.0061 |
| | (2.44)** | (2.39)** | (2.29)** | (2.22)** |
| party*green | 0.0033 | 0.0029 | 0.0028 | 0.0038 |
| | (1.77)* | (1.78)* | (1.75)* | (1.72)* |
| party*hostile | -0.0072 | -0.0067 | -0.0066 | -0.0062 |
| | (1.35) | (1.03) | (1.11) | (1.04) |
| green*hostile | 0.0035 | 0.0037 | 0.0038 | 0.0031 |
| | (2.35)** | (2.48)** | (2.28)** | (2.45)** |
| party*green*hostile | 0.0014 | 0.0012 | 0.0015 | 0.0011 |
| | (1.76)* | (1.93)* | (1.83)* | (1.84)* |
| party*bbr | | -0.0196 | -0.0182 | -0.0186 |
| | | (1.73)* | (2.13)** | (1.72)* |
| bbr*green | | | 0.0032 | |
| | | | (4.21)*** | |
| party*bbr*green | | | 0.0114 | |
| | | | (2.62)** | |
| bbr*hostile | | | | -0.0067 |
| | | | | (2.38)** |
| party*bbr*hostile | | | | -0.0083 |
| | | | | (2.47)** |
| med_income | -0.0664 | -0.0534 | -0.0552 | -0.0530 |
| | (1.65)* | (1.81)* | (1.69)* | (1.74)* |
| population | 0.1082 | 0.0982 | 0.0998 | 0.0862 |
| | (1.84)* | (1.93)* | (2.03)* | (1.43) |
| kids | -0.0163 | -0.0265 | -0.0172 | -0.0162 |
| | (1.25) | (1.13) | (0.89) | (1.03) |
| aged | 0.0438 | 0.0562 | 0.0548 | 0.0478 |
| | (1.88)* | (1.94)* | (1.15) | (1.07) |
| _cons | 3.7721 | 3.5452 | 3.4432 | 3.8282 |
| | (2.85)*** | (2.99)*** | (3.07)*** | (2.78)*** |
| $R^2$ | 0.58 | 0.59 | 0.61 | 0.64 |
| *N* | 1,776 | 1,776 | 1,776 | 1,776 |

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

party=1 if governor is republican

Column 2 of Table 1.3 reports the second estimation (2), which includes the interaction of the variable $bbr$ with $party$. The estimation on this interaction suggests that per capita environmental expenditure is 1.55% lower when a Republican governor faces a stringent BBR.

Column 3 of Table 1.3 reports specification (3), which further augments the interaction by fully interacting the variables *bbr* and *green*. This interaction finds that the greenness of a state mitigates the negative effect of stringent BBRs on per capita environmental expenditure, with stringent and green states only having 0.36% lower environmental expenditure when the governor is a Republican.

Column 4 of Table 1.3 reports the fourth estimation, which fully interacts the variables *bbr* and *hostile*. This interaction finds that political mismatch exacerbates the negative effect of BBRs on per capita environmental expenditure, with stringent and hostile states having about 3.36% lower environmental expenditure when the governor is a Republican.

Table 1.4 reports the effects on the two environmental expenditure sub-categories, forest and game, and natural resources. In stringent rule states, forest and game spending falls on average 0.57%, while natural resource management spending falls on average 1.21%. The effects of greenness and political hostility appear to impact the two sub-categories effectively equally, and in the same direction as our initial estimation.

Table 1.4 The Political Economy of BBRs: Fixed Effects Panel Estimation for Sub-categories

| | lnforest | lnnatural | lnforest | lnnatural |
|---|---|---|---|---|
| party | -0.0058 | -0.0080 | -0.0044 | -0.0091 |
| | (0.91) | (1.99)* | (0.66) | (2.29)** |
| green | 0.0064 | 0.0088 | 0.0074 | 0.0068 |
| | (2.23)** | (1.63)* | (2.83)*** | (1.33) |
| hostile | -0.0037 | -0.0088 | -0.0033 | -0.0091 |
| | (1.25) | (2.94)*** | (1.11) | (2.89)*** |
| party*green | 0.0013 | 0.0036 | 0.0010 | 0.0037 |
| | (1.77)* | (0.78) | (1.05) | (0.55) |
| party*hostile | -0.0056 | -0.0077 | -0.0049 | -0.0082 |
| | (1.35) | (1.69)* | (1.22) | (2.59)** |
| green*hostile | 0.0068 | 0.0058 | 0.0064 | 0.0055 |
| | (2.35)** | (2.21)** | (2.31)** | (3.11)*** |
| party*green*hostile | 0.0019 | 0.0025 | 0.0018 | 0.0028 |
| | (1.61)* | (1.03) | (1.73)* | (1.31) |
| party*bbr | -0.0053 | -0.0130 | -0.0061 | -0.0112 |
| | (1.94)* | (1.77)* | (2.04)** | (1.57) |
| bbr*green | 0.0033 | 0.0022 | | |
| | (1.08) | (1.36) | | |
| party*bbr*green | 0.0035 | 0.0083 | | |
| | (2.03)** | (2.45)** | | |
| bbr*hostile | | | -0.0026 | -0.0063 |
| | | | (1.21) | (1.27) |
| party*bbr*hostile | | | -0.0089 | -0.0173 |
| | | | (1.77)* | (2.44)** |
| med_income | 0.0051 | -0.1720 | 0.0062 | -0.1730 |
| | (1.89)* | (0.89) | (1.65)* | (1.02) |
| population | 0.1992 | 0.1125 | 0.1002 | 0.1064 |
| | (2.43)** | (1.87)* | (1.65)* | (1.34) |
| kids | -0.0246 | -0.0203 | -0.0187 | -0.0192 |
| | (1.98)* | (1.14) | (1.82)* | (0.83) |
| aged | 0.0239 | 0.0560 | 0.0303 | 0.0473 |
| | (2.44)* | (1.85)* | (2.38)** | (1.38) |
| _cons | 2.6538 | 4.8731 | 2.3132 | 4.6212 |
| | (3.02)*** | (3.38)*** | (2.83)*** | (3.55)*** |
| $R^2$ | 0.53 | 0.58 | 0.49 | 0.59 |
| *N* | 1,776 | 1,776 | 1,776 | 1,776 |

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

party=1 if governor is republican

## 4.5 Results II

In order to address some of the statistical issues stemming from the initial empirical approach, an alternative specification is utilized. Results from this alternative specification, wherein the data are split between stringent and weak states, are reported in Table 1.5.

Table 1.5 The Political Economy of BBRs: Fixed Effects Panel Estimation for Alternative Specification

| | lntotenvexp (bbr = 1) | lntotenvexp (bbr = 0) | test across models |
|---|---|---|---|
| party | -0.0101 | -0.0060 | chi2 ( 1) = 4.02 |
| | (0.99) | (0.79) | Prob>chi2 = 0.2366 |
| green | 0.0059 | 0.0088 | chi2 ( 1) = 27.25 |
| | (1.97)* | (1.91)* | Prob>chi2 = 0.0041 |
| hostile | -0.0077 | -0.0057 | chi2 ( 1) = 7.02 |
| | (2.44)** | (2.39)** | Prob>chi2 = 0.1312 |
| party*green | 0.0018 | 0.0061 | chi2 ( 1) = 6.77 |
| | (1.77)* | (1.78)* | Prob>chi2 = 0.1576 |
| party*hostile | -0.0086 | -0.0051 | chi2 ( 1) = 6.59 |
| | (1.00) | (0.89) | Prob>chi2 = 0.1731 |
| green*hostile | 0.0020 | 0.0073 | chi2 ( 1) = 25.09 |
| | (1.89)* | (2.21)** | Prob>chi2 = 0.0073 |
| party*green*hostile | 0.0018 | 0.0037 | chi2 ( 1) = 22.89 |
| | (1.21) | (2.29)** | Prob>chi2 = 0.0098 |
| med_income | 0.0771 | -0.0690 | |
| | (1.76)* | (1.23) | |
| population | 0.1057 | 0.1011 | |
| | (2.21)** | (1.73)* | |
| kids | -0.0217 | -0.0273 | |
| | (0.88) | (1.11) | |
| aged | 0.0399 | 0.0441 | |
| | (1.99)* | (2.21)** | |
| _cons | 3.9381 | 3.0134 | |
| | (4.01)*** | (2.65)** | |
| $R^2$ | 0.64 | 0.69 | |
| *N* | 925 | 851 | |

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

party=1 if governor is republican

There are three statistically different coefficients across the two estimations, suggesting that stringent and weak rules states vary across those variables. The coefficients on *green*, the interaction of *green* and *hostile*, and the interaction between *party*, *green*, and *hostile* are all positive and significantly different across the two types of states. The impact of greenness across these three variables results in 1.98% higher per capita environmental expenditure in weak rule states, and 0.97% higher environmental expenditure in stringent rule states.

In summary, there is evidence that BBRs significantly affect the level of environmental expenditure budgeted by states. Stringent BBRs are associated with 1.55% less per capita environmental expenditure when the governor is a Republican. The greenness of a state mitigates the negative effect of stringent BBRs on per capita environmental expenditure, with stringent and green states only having 0.36% lower environmental expenditure when the governor is a Republican. Political mismatch appears to exacerbate the effect, with stringent and hostile states having about 3.36% lower environmental expenditure when the governor is a Republican. Results from the alternative specification indicate that weak rule states are more affected by green interest group presence, with greenness correlated with 1.98% higher per capita environmental expenditure in weak rule states, and 0.97% higher environmental expenditure in stringent rule states.

### 4.6 Discussion of Results

Given the empirical approach the paper cannot isolate the independent effect of BBRs. Nevertheless, utilizing a fully interacted specification, the investigation above finds evidence

that stringent BBRs significantly and negatively affect state per capita environmental expenditure . This is an unsurprising result for a couple of reasons. First, general fund expenditures have been rising consistently over the past several decades. Meanwhile, states have focused their fiscal discipline on the expenditure side, largely due to the tax revolt era of the 1970s and 1980s (Wagner, 2004). This combination of fiscal policies has led many states to experience substantial fiscal stress. Stringent BBRs add to this fiscal stress and further constrain budgets. Secondly, general fund expenditures are more difficult to cut, regardless of fiscal stress. Expenditures on education, infrastructure, and healthcare are typically formula-based and make up the majority of state budgets. Alternatively, non-general expenditure categories likely offer states a way to relieve fiscal pressure.

Also investigated was the potential interaction between politics and BBRs. Given the inherent political nature of the budget creation process and the use of political platforms to carry out fiscal agendas, the political atmosphere of a state is likely to interact with a stringent BBRs. Politicians from both parties are likely to jockey for expenditure in the categories they favor, those expenditures that will most likely get them reelected. In this way, the effects on environmental expenditure would appear to simply be a reflection of the average voter preferences, something akin to the median-voter model. However, as several recent studies have indicated, the median-voter model may lack the necessary explanatory power to distinguish between platforms created for the average voter, and those which are skewed by the presence of interest groups. Therefore, this paper controls for political platforms by including a variable that indicates when the state senate platform is hostile to the governor's platform. When the atmosphere is hostile, the ability of the governor to work with the state senate may be reduced, and the political nature of the budget process is likely

exacerbated. Here, the paper finds evidence that a mismatch between the parties of the governor and state senate lead to a further reduction in state environmental expenditure.

Lastly, in an effort to introduce interest group influence the paper includes membership in the three largest environmental groups. The purpose of this inclusion is to investigate the effect of interest groups on political platforms. If such groups are real political influence, the presence in a state should significantly affect state environmental expenditure. Further, environmental expenditure was chosen precisely because of its potential politically influenced outcome. Utilizing a spatial voting framework, wherein political platforms are generated based on both voter preferences and interest group influence, it would seem likely that such interest group presence would skew political platforms. To this point, the paper finds a result that falls in line with earlier hypothesis on the potential impact of interest groups.

In addition to the specifications discussed above, and to account for some of the econometric issues of utilizing the time-invariant BBR variable, a robustness check is instituted to test for the impact of realized balanced budgets on environmental expenditure. The results from this robustness check can be found in Table B.1 of Appendix B, which show that in years when states had a balanced budget, environmental expenditure was 1.30% lower when the governor was a Republican. Greenness appears significant, increasing per capita environmental expenditure by 2.55%, while political hostility is also significant, decreasing environmental expenditure by 1.27%.

## 5 Conclusion

Using panel data on U.S. state environmental expenditures from 1975-2005, the analysis finds evidence that stringent balanced budget rules may lead to lower levels of non-general expenditure, specifically environmental expenditure. Per capita Environmental expenditure is 1.55% lower when the state faces a stringent BBR and has a Republican Governor. The presence of environmental interest groups does appear to have significant effects on state environmental expenditure, with stringent states in the top ten nationally in green interest group presence only having 0.36% lower per capita environmental expenditure when the governor is a Republican. Additionally, politics appear to interact with BBRs, with per capita environmental expenditure 3.36% lower in stringent states with political mismatch and a Republican governor. Results from the alternative specification indicate that weak rule states are more affected by green interest group presence, with greenness correlated with 1.98% higher per capita environmental expenditure in weak rule states, and 0.97% higher environmental expenditure in stringent rule states.

The findings in this paper point to the inherent political nature of budget creation. When faced with the task of balancing a budget, politicians are likely politically influenced, and incentivized to choose levels of non-general expenditure categories that are in line with the platforms that resulted in their election. Platforms are created from vote function taking into consideration both the median voter and interest groups. Non-general expenditure is more discretionary and are politically more important to specific interest groups than the median voter. Therefore, the presence of interest groups should skew the expenditure outcomes away platforms favoring the average voter. Compounding this issue are state balanced budget rules. These rules further constrain state budgets and exacerbate the political

influence of non-general expenditure categories. Furthermore, with the historic trend of higher general fund expenditure and lower tax revenues, states are likely to find themselves with fiscal stress for the time being. Perhaps a reexamination of state balanced budget rules is in order after consideration of recent trends. Otherwise, general expenditures are going to continue to rise, potentially choking off non-general expenditures, unless significant concentrations of interest groups overcome this effect.

Given the popularity of state balanced budget rules and the evolution of state budgets over the past several decades, additional research is necessary to fully understand the impact of these rules. One avenue of research would be to create an index of balanced budget rule stringency, similar to Hou and Duncombe (2008), but more reflective of the political pressure to balance budgets. For example, no BBR index accounts for the presence of other fiscal institutions, such as Rain Day Funds and Tax and Expenditure Limits. Additionally, the interaction of balanced budget rules and gubernatorial term limits may lead to various outcomes for different types and levels of state expenditure. Lastly, no study as analyzed the regional economic impacts of clusters of states whose BBRs are relatively stringent.

## Appendix A

| Table A.1 BBRs among US states as of FY2012 | | | |
|---|---|---|---|
| | BBRs (Type) | | |
| Alabama | Constitutional (Stringent) | Nebraska | Constitutional (Stringent) |
| Arizona | Constitutional (Stringent) | Nevada | Statute (Weak) |
| Arkansas | Statute (Weak) | New Hampshire | Statute (Weak) |
| California | Constitutional (Stringent)[21] | New Jersey | Constitutional (Weak) |
| Colorado | Constitutional (Stringent) | New Mexico | Constitutional (Stringent) |
| Connecticut | Statute (Weak) | New York | Constitutional (Weak) |
| Delaware | Constitutional (Stringent) | North Carolina | Constitutional (Stringent) |
| Florida | Constitutional (Stringent) | North Dakota | Constitutional (Weak) |
| Georgia | Constitutional (Stringent) | Ohio | Constitutional (Stringent) |
| Idaho | Constitutional (Stringent) | Oklahoma | Statute (Stringent) |
| Illinois | Constitutional (Weak) | Oregon | Constitutional (Weak) |
| Indiana | Statute (Stringent) | Pennsylvania | Constitutional (Weak) |
| Iowa | Constitutional (Stringent) | Rhode Island | Constitutional (Stringent) |
| Kansas | Constitutional (Stringent) | South Carolina | Constitutional (Stringent) |
| Kentucky | Constitutional (Stringent) | South Dakota | Constitutional (Stringent) |
| Louisiana | Constitutional (Weak) | Tennessee | Constitutional (Stringent) |
| Maine | Constitutional (Weak) | Texas | Constitutional (Weak) |
| Maryland | Constitutional (Weak) | Utah | Constitutional (Stringent) |
| Massachusetts | Constitutional (Weak) | Vermont | |
| Michigan | Constitutional (Weak) | Virginia | Non-Constitutional (Weak) |
| Minnesota | Constitutional (Weak) | Washington | Statute (Weak) |
| Mississippi | Statute (Stringent) | West Virginia | Constitutional (Stringent) |
| Missouri | Constitutional (Weak) | Wisconsin | Constitutional (Weak) |
| Montana | Statute (Stringent) | Wyoming | Non-Constitutional (Stringent) |

[21] California voters recently voted in a stringent balanced budget requirement, after decades of the state having a weak balanced budget rule.

**Appendix B**

Table B.1 The Political Economy of BBRs: Fixed Effects Panel Estimation Robustness Check

| | lntotenvexp | lntotenvexp | lntotenvexp | lntotenvexp |
|---|---|---|---|---|
| party | -0.0077 | -0.0103 | -0.0100 | -0.0087 |
| | (1.18) | (0.99) | (1.08) | (1.04) |
| balanced | | -0.0043 | -0.0027 | -0.0029 |
| | | (2.27)** | (1.83)* | (1.68)* |
| party*balanced | | -0.0087 | -0.0092 | -0.0076 |
| | | (2.89)*** | (2.33)** | (2.15)** |
| green | | | 0.0073 | |
| | | | (2.09)** | |
| party*green | | | 0.0022 | |
| | | | (1.39) | |
| balanced*green | | | 0.0073 | |
| | | | (1.94)* | |
| party*balanced*green | | | 0.0107 | |
| | | | (2.39)** | |
| hostile | | | | -0.0034 |
| | | | | (2.32)** |
| party*hostile | | | | -0.0023 |
| | | | | (1.73)* |
| balanced*hostile | | | | -0.0014 |
| | | | | (2.54)** |
| party*balanced*hostile | | | | -0.0056 |
| | | | | (2.22)** |
| med_income | -0.0734 | -0.0717 | -0.0701 | -0.0730 |
| | (1.89)* | (1.75)* | (1.77)* | (1.69)* |
| population | 0.1023 | 0.1033 | 0.1002 | 0.0914 |
| | (1.92)* | (1.87)* | (1.68)* | (1.65)* |
| kids | -0.0163 | -0.0265 | -0.0172 | -0.0195 |
| | (0.98) | (1.13) | (0.99) | (1.03) |
| aged | 0.0371 | 0.0397 | 0.0403 | 0.0425 |
| | (1.92)* | (1.76)* | (1.18) | (1.07) |
| _cons | 3.1065 | 3.1732 | 3.0132 | 3.4282 |
| | (2.65)*** | (2.74)*** | (3.02)*** | (3.33)*** |
| $R^2$ | 0.44 | 0.42 | 0.53 | 0.62 |
| *N* | 1,776 | 1,776 | 1,776 | 1,776 |

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

party=1 if governor is republican

# Essay 2. Rainy Day Funds and the Fiscal Mix: The Impact of Rainy Day Fund Adoption and Spending on U.S. State Budgeting, 1975—2011

## Abstract

After a decade of extreme fiscal stress following the 1974—1975 and 1980—1981 recessions, states sought fiscal discipline through the use of rainy day funds. Also known as budget stabilization funds, 49 states currently utilize such funds to mitigate expenditure reductions during weak economic periods by saving money during strong economic periods. Previous studies find that rainy day funds assist states in smoothing expenditure over the business cycle and reduce fiscal stress during weak economic periods. Nevertheless, as rainy day funds increase in use, the effect these funds have on specific spending categories is unknown. This paper investigates the effect of fiscal stress on rainy day fund adoption and the impact of rainy day fund usage on specific spending categories. A random effects probit estimation of panel data covering the 48 contiguous U.S. states from 1975—2011 finds that adoption was correlated with state specific fiscal stress, with states experiencing fiscal deficits about 32% more likely to adopt funds in the subsequent year. A Fixed-Effects panel estimation is utilized to test for the impact of fund usage on specific categories, and finds that rainy day fund usage is significantly correlated with changes to states' fiscal mixes. States with significant RDF balances are correlated with rises in the shares of social assistance and capital projects of 2.58% and 2.69% respectively. Fund usage is negatively correlated with education and infrastructure spending shares, with both falling about 1%.

## 1 Introduction

Over the past several decades, rainy day funds have quickly become a staple of U.S. state budgets. Sometimes referred to as budget stabilization funds, rainy day funds are one of several fiscal institutions, along with tax and expenditure limits and balanced budget rules, which states employ to facilitate fiscal discipline. Prior to1975, less than five states had adopted rainy day funds (RDFs), but as of 2013, forty-nine states and Puerto Rico have adopted funds.[1] Over this same time-period, total RDF balance as a percentage of total general fund expenditure (TGFE) grew from less than 1% in 1975 to over 11% in 2011. The basic idea of a RDF is that a state can accumulate surplus funds during strong economic periods, and expend these funds during weak economic periods to overcome fiscal stress brought on by reduced revenues and increased social assistance spending. This may allow a state to *smooth* their expenditure over the business cycle or reduce expenditure cuts or tax increases during weak economic periods. Weak economic periods produce anemic revenues, increased expenditure on services, and the potential for deficits.[2,3]

All previous studies on state RDFs have focused on the budget as a whole, relating the effect of fiscal stress on the adoption and usage of RDFs. Early RDF studies (Gold, 1983; Pollock and Suyderhoud, 1986) contend that adoption came about in response to the severe fiscal stress experienced by states in the late 1970s and early 1980s. Existing fiscal institutions, such as surplus funds and tax and expenditure limits, did little to curtail fiscal stress during this period, and states found themselves cutting expenditure in an attempt to maintain fiscal

[1] Arkansas, the only state currently without a dedicated RDF, recently voted in affirmation to amend the state constitution to include adoption of a RDF in the year 2014.

[2] Services may include cash assistance (TANF), healthcare (direct assistance and emergency cash), and/or job-finding services.

[3] Nearly all states have balanced budget rules that make running deficits difficult, either politically or structurally.

balance.[4] To this point, several studies (Sobel and Holcombe, 1996; Douglas and Gaddie, 2002; Hou and Duncombe, 2008) have focused on the impact RDFs have on easing fiscal stress. Analyzing the 1990—1991 and 2001—2002 recessions, they find evidence that states with sizable RDFs save more surplus revenue during strong economic periods, and are better prepared for weak economic periods than are states that do not have a RDF or have been reluctant to deposit sizable balance levels. Also at the center of this RDF proliferation has been a significant change in spending dynamics at the state level. Several studies (Poterba, 1996; Baicker, 2001; Archibald and Feldman, 2006) find evidence that shifting demographics, increased state fiscal responsibility, and trends in state tax policy have significantly affected state budget decisions across specific expenditure categories, such as education, healthcare, infrastructure, and social assistance.[5]

No study in the RDF or state budgeting literatures has considered the impact of RDFs on specific expenditure categories. This paper seeks to disentangle the observed broad effects of RDFs into specific effects on categories within state budgets, controlling for changes in spending dynamics. Of primary concern is how the fiscal mix, for example categorical spending shares of TGFE or spending as a share of personal income, has been affected by RDF usage. In other words, has RDF usage altered specific sizes of the budget pie? Given the historical trend of fiscal decentralization with respect to public expenditure, and subsequent changes to expenditure mandates for education, healthcare, and social assistance, states have found

[4] Besley and Case (2003) find that states have favored expenditure cuts over tax increases when trying to maintain fiscal balance. More recently, and after the Great Recession, some states have found it difficult to maintain balance without raising some taxes. Nevertheless, the Center for Budget Policy Priorities (2012) finds that states relied on tax increases to reduce only about 5% of total state deficits in 2011, while expenditure cuts accounted for nearly 70% of this reduction. The remaining reduction was covered by modest withdrawal from RDFs and federal grants-in-aid.

[5] For example, Poterba (1995) finds demographics have likely played a significant role in public education spending at the state level. States and localities with relatively high elderly populations have considerably lower public education per pupil spending than younger populations. As populations continue to age public support for education may also fall as a result.

themselves in fiscally lean situations for which RDFs are likely to play an increasingly important role (Inman, 2010). This paper asks the following questions. First, was RDF adoption indeed an outgrowth of state-specific fiscal stress or a simple policy trend? Second, has RDF usage (depositing and withdrawing of funds) significantly affected specific spending categories equally, or are some categories more affected than others? Third, has RDF accumulation crowded out spending among any specific categories? Given the evolving and increasingly important role U.S. state fiscal policy plays in the national economy, a better understanding of how existing state fiscal institutions, such as RDFs, interact with the budget creation process will inform both literature and policy.

Results from a random effects probit estimation of a panel spanning the years 1975—2011 indicates that a state's probability of RDF adoption in any given year is inversely correlated with that state's relative fiscal health in the years preceding adoption. The year after a state experienced a general fund deficit, they were over 32% more likely to adopt a fund in that year than states with balanced or surplus general funds. Next, a fixed effects panel estimation is carried out for several spending categories, including education, social assistance, healthcare, infrastructure, and capital projects. Using a panel from 1975—2011, there is evidence that the use of RDFs is significantly correlated with changes to states' fiscal mix. The estimations find evidence that states with relatively high RDF balances alter their fiscal mix when depositing or withdrawing funds. In states with average RDF balance levels at least 5% of TGFE, RDF usage is positively correlated with social assistance and capital projects spending, with their shares increasing by 2.58% and 2.69%. Conversely, education and infrastructure shares appear inversely correlated with RDF usage, both falling approximately 1%. These results suggest that states use their RDFs primarily to maintain social assistance spending and capital projects

during weak economic periods. In addition, the paper finds weak evidence that RDFs may crowd out education and infrastructure spending during strong economic periods. Healthcare spending appears uncorrelated with RDF usage. The findings are robust to alternative measures of fiscal mix, including spending as a percentage of state personal income.

The rest of the paper is organized as follows. Section 2 covers relevant RDF and state budgeting literature, while sections 3 and 4 provide anecdotal and statistical motivation for the empirical questions at hand. Section 5 begins by describing the data and empirical approaches, and then presents the paper's statistical findings, concluding with a discussion of the empirical results. Section 6 concludes the paper and offers suggestions for future research.

## 2 Literature Review

The literature on fiscal institutions is replete with evidence that RDFs create incentives and obligations that alter the fiscal decisions of states. An important question within the literature has been why states adopted RDFs in the first place. Empirically, Gold (1983) and Douglas and Gaddie (2001) find evidence that adoption was primarily an outgrowth of the 1980—1982 recession, suggesting that states did indeed adopt RDFs as a means to avoid future fiscal stress. Their analysis finds that periods of severe fiscal stress in the late 1970s and early 1980s were followed by high rates of RDF adoption in the late 1980s nationwide. While their study does not analyze individual state decisions, it does point to a national shift in state fiscal policy, where many states began adopting RDFs to avoid future fiscal stress. Bond rating agencies have also strongly encouraged all U.S. states to fund and maintain sizable RDFs (Wagner, 2003).

Conventional wisdom holds that states adopt and use RDFs to assist in avoiding fiscal stress experienced during weak economic periods. Several studies have investigated the ability of RDF to ease fiscal stress. Sobel and Holcombe (1996) and Douglas and Gaddie (2002), both studyingthe1990—1991 recession, found that expenditures in states with RDFs fell by less than states without funds, suggesting that RDFs have helped states *smooth* expenditures. In addition, Knight and Levinson (1999) find that adoption of a fund induces states to save dollar for dollar surplus revenue generated during strong economic periods, meaning that RDFs appear to induce savings beyond general fund surpluses. However, Wagner (2003), using more advanced time-series methods, finds that revenues saved are most likely displaced general fund surpluses. Even though he arrives at a smaller estimate for the impact on savings, one dollar deposited into a RDF contributes 50 cents to total state saving on top of any general fund surpluses. The author concludes that RDFs do induce significant fiscal discipline with respect to surplus revenue. A more recent study, Hou and Duncombe (2008), finds that adopting a RDF increases total state savings between 2-3 percentage points, a modest but significant amount.

In order to investigate how RDFs may have played a role in the evolving budget decisions made by state elected officials, a broad context of recent budgeting history is crucial. A reasonable jumping off point is to consider the legacy that the Tax Revolt era of the 1970s has had on budgeting decisions. An important consequence of this era is that states began relying on less on property taxes and more on higher/new consumption taxes (sales taxes, wheel taxes, fees, lotteries, etc…) to generate revenue.[6] The creation of Tax and

[6] O'Sullivan et al. (1995) describes how states reacted to new limitations on property taxes, such as California's Proposition 13 and Massachusetts Proposition 2 ½ . California residents saw increases in utility fees, parks and recreation fees, and building fees from 1977-1978. In Massachusetts, fees increased by $90 per capita from 1984-1989.

Expenditure Limits (TELs) in the 1970s did well to temper the overall tax burden of the electorate, but did very little to curtail spending in any meaningful way.[7] Lohmann and Weiss (2002) show theoretically that self-interested elected officials will favor reducing highly visible taxes, such as property taxes, while raising less visible taxes, such as user-fees and consumption taxes. Archibald and Feldman (2006) suggest that this reliance on lower taxes helped to propel much of the fiscal stress experienced by states in the 1980s and early 1990s, and likely impacted spending decisions long after. Poterba (1995) finds that states primarily relied on debt financing and some RDF balances to reduce fiscal stress in the early 1990s. While Inman (2010) shows that the 2000-2001 recession was handled with similar debt financing and increased RDF usage, the Great Recession of 2007 caused many states to pursue deep expenditure cuts and only modest use of RDFs. This spending behavior allowed states to largely maintain state budgets and respond to economic shocks up until 2009, where for the first time in decades total state spending in the U.S. fell. The 2009 federal fiscal stimulus, the American Recovery and Reinvestment Act (ARRA), injected about $244 billion into state coffers, reducing about 23% of all budget shortfalls between 2009 and 2011.[8] Delaney and Doyle (2011) show that total state spending on education and infrastructure, as a share of total state expenditure, remained stable throughout the 1990s up to 2009, when both spending categories saw their share fall.[9]

Other issues that may have contributed to changes in state spending behavior are demographic shifts and changes to federal grant-in-aid transfers to the states. Poterba (1995),

[7] A unique feature of this time-period was the establishment of direct democracy for state fiscal policy. Direct democracy allowed voters to propose and vote on ballot initiatives that ultimately led to the establishment of Tax and Expenditure Limits.

[8] The ARRA was legislation enacting 3 years of fiscal assistance divided about evenly among education, healthcare, social assistance, and projects intended to stimulate the economy. Inman (2010) suggests that states spent this stimulus along congressional political lines in order to "enact a spending and tax relief plan as quickly as possible."

[9] For U.S. states, the average share of education plus infrastructure spending within TGFE is over 35%.

analyzing state budgeting behavior, finds that shifting demographics, such as the average age of a state's population or percentage of the population which is an ethnic minority may have significant impacts on the budgeting decisions made by elected officials. He shows that education spending tends to suffer in states with aging populations, leading to lower per pupil education spending in states with relatively large elderly populations. Several studies (Baicker, 2001; Besley and Case, 2003; Archibald and Feldman, 2006) point out how changes to federal aid to states, such as Title I and the 1996 Federal Welfare Reforms (Personal Responsibility and Work Opportunity Reconciliation Act, 1996), may also have affected the spending behavior of states.[10] Boyd et al (2001) found that overall state social assistance spending rose by 7% as a result of the PRWOR. Additionally, two federally mandated Medicaid eligibility expansions, one in 1989 and another in 1990, were thought to have increased considerably state healthcare spending, but Card and Sheppard (2004) conclude that expansions only modestly increased coverage. The authors conclude that increased healthcare spending by states was driven primarily by aging populations and healthcare cost inflation, which itself was driven by advances in medical technology. Considering the time span of this paper, 1975—2011, it will be important to account for demographic shifts and policy changes that likely affect specific spending categories.

In summary, RDFs show evidence of assisting states in dealing with fiscal stress, by inducing greater savings of surplus revenue and providing a backstop against expenditure reductions during weak economic periods. Evidence suggests that depositing one dollar in a

[10] The 1996 federal social assistance reform shifted nearly all the spending obligations to the state, whereas prior the federal government served as coordinator and chief overseer of spending decisions. Federal social assistance aid to states was shifted to a block-grant system, and federal contributions fell as states began designing and utilizing their own social assistance programs. The federal government maintains institutional regulatory control and enforces quality control measures to ensure states are funding their social assistance programs adequately and efficiently.

RDF increases surplus saving by fifty cents to a dollar, and that states with sizable RDF balance levels are better prepared to weather weak economic periods. Throughout this time-period, states have increased their usage of RDFs considerably to reduce debt financing, expenditure reductions, or tax increases. State spending has been impacted by past policy decisions, weak economic periods, changes to federal grants-in-aid programs, and ever-shifting demographics. On average, healthcare and social assistance spending have increased over the time-period, but education, capital projects, and infrastructure have slightly fallen, while RDF balances have risen considerably over the same time.[11]

## 3 RDF Adoption

The growth of state expenditures during the 1950s, 1960s and 1970s, and the subsequent 1974—1975 and 1980—1982 recessions resulted in severe fiscal stress for most U.S. states were unable to maintain expenditures following the recession and relied on expenditure cuts when faced with faltering tax revenues. The resultant fiscal crises led to increased political turnover and a reevaluation of state fiscal policy.[12] States also began adopting RDFs en masse. From 1981 to1989, twenty-six states adopted RDFs and eight more would adopt such funds by1995.

The correlation between increased political turnover and subsequent RDF adoption points to the inherent political nature of budget creation. The electorate expects a certain level of fiscal discipline and RDFs, in theory, should facilitate such behavior. Therefore,

[11] From 1975—2011 average state spending on healthcare rose nearly 10% and social assistance increased 6%, while average state spending on education fell 2%, capital projects fell 3%, and infrastructure feel 2%. The Center for Budget Policy Priorities (2013).

[12] Wagner and Sobel, 2006

one could think of observed RDF adoption as falling in line with median voter frameworks (Bergstrom and Goodman, 1973; Winer, 1983), wherein the electorate applies pressure to budget creators to make fiscal policy choices in line with their median preferences. Indeed, the 1990s saw less political turnover, and on average, states were able to maintain fiscal health much better than in previous decades, while accumulating significant RDF balance levels. RDF adoption continued throughout the 1990s and into the 2000s, where all but three states had adopted funds by 2005.[13]

## 4 Recent Trends in RDFs and State Spending Behavior

Over the past three decades, states have increasingly adopted and utilized RDFs. Figure 2.1 shows the behavior of RDF balances as a percentage of total general fund expenditure (TGFE) from 1975—2011 for the 48 contiguous U.S. states. This buildup of funds reflects both the increased adoption of funds among states in the 1980s (Douglass and Gaddie, 2001), as well as the attempt of many states to better prepare for weak economic periods (Sobel and Holcombe, 1996). From 1994—2000, states accumulated over $40 billion into their RDFs, amounting to over 11% of TGFE. From 2001—2003, in the immediate aftermath of the 2001 recession, states drew down their RDFs to about $9 billion, less than 4% of TGFE.[14,15]As Inman (2010) points out, states were able to handle the fiscal stress following the 2001—2002 recession quite well, relying on RDFs and debt financing, states were able to largely avoid

[13] Figure A.2 in Appendix A lists all states with their year of adoption, average balance level in FY2006, and deposit/withdrawal rule.

[14] NationalAssociationofStateBudgetOfficers,2012

[15] All dollar amounts here and for the rest of the paper are deflated to 2000—2001 $U.S., and all calculations here and for the rest of the paper exclude Alaska and Hawaii.

deep expenditure cuts and by 2004 were already accumulating RDF balances.[16] Despite being able to accumulate sizable fund balances between 2004 and 2007, most states opted for debt-financing and then deep expenditure cuts to reduce fiscal stress in response to the Great Recession of 2007—2009. During the most recent recession, states were much slower to drawn down their funds, and by 2009 had already begun depositing significant money despite continued fiscal stress (Inman, 2010).[17] The cyclical nature of RDF usage reflects the major recessionary periods faced by U.S. states in 1990—1991, 2001—2002, and 2007—2009.

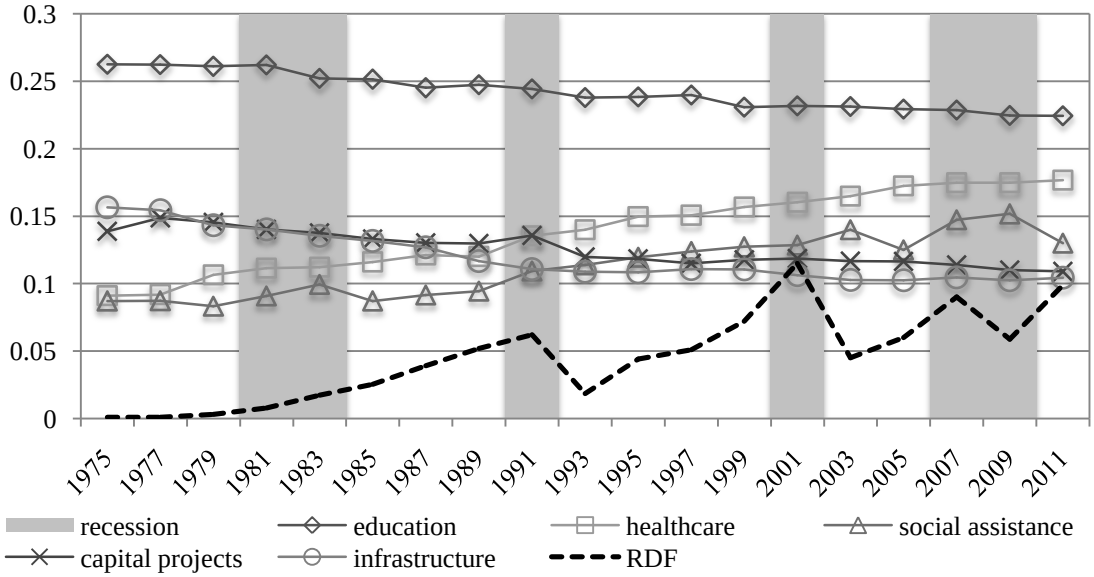


Figure 2.1 Total RDF Balances and State Spending Shares as % of Total General Fund Expenditure, US States 1975-2011

Source: US Census Bureau Annual Fiscal Survey of the States, 1975-2011.

[16] Hou and Duncombe (2008) find that states with RDFs began using them at much higher rates in the late 1990s and early 2000s. This accounts for the dramatic upturn in balance levels during the strong economic period leading up to 2000, and equally dramatic downturn after.

[17] For example, the 2011 Texas state budget cut education and healthcare spending, despite having the single largest RDF in the country at $9.6 billion. The 2011 Texas State Legislature, "The 2011 State of Texas Fiscal Year Budget" 231-234

Spending behavior among the states has evolved considerably over time. To get an idea of how RDFs might affect specific spending categories, this paper focuses on changes to a state's fiscal mix. Figures 2.1 and 2.2 presents the average behavior of spending categories as shares of state fiscal mix, using two different definitions of fiscal mix. Figure 2.1 treats the fiscal mix as each spending category as a share of TGFE, while Figure 2.2 presents each spending category as a percentage of total state personal income. The first gives an idea of how pure spending shares have behaved over time, while the latter relates support for public expenditure with state economic capacity.

With respect to Figure 2.1, we see that average spending on education and healthcare make up more than 40% of TGFE by states. Average spending on social assistance (total cash, food, housing, and job assistance), capital projects (total non-health, non-road capital outlays), and infrastructure (total direct spending on roads, bridges, and sewage) totals over 30%. It is important to note that these are averages, and specific state spending levels can vary considerably.[18] With the exception of social assistance and healthcare, each category share falls in the early part of the 1990s and then stabilizes at a lower level through the end of 2011. This stabilization at lower share levels coincides with a rapid increase in RDF adoption in the 1980s, and usage in the 1990s and 2000s. As is stated numerous times in the literature (Wagner, 2003) and hinted at in Figure 2.1, state general budgets have become somewhat volatile over time, specifically with respect to education, infrastructure, and capital projects as shares of TGFE.

Figure 2.2 gives an idea of how spending shares relate to state economic ability to pay as measured by personal income. By dividing each spending category total by state personal

[18] For example, Massachusetts' education spending as share of TGFE averages over 25% from 1975—2011, while Arkansas averages just below 18%. Tennessee's infrastructure spending as a share of TGFE averages over 15%, while Idaho averages below 7%. As Inman (2010) points out, such differences are not statistically correlated with political or economic indicators, but largely a result of population and demographic differences.

income, we get an idea of public support relative to economic health. Similar to the previous figure, both healthcare and social assistance spending have risen as a percentage of state personal income, while infrastructure falls. The behavior of education spending is quite intriguing, as it illustrates the formulaic approach most states use for education funding. During strong economic periods, education spending as a share of state personal income falls, while during weak economic periods it rises. This is indicative of states mandating certain levels of education spending regardless of relative economic health.[19] Nevertheless, it does appear as if education spending as share of state personal income falls over the time-period, supporting the findings of several papers (Poterba, 1995; Archibald and Feldman, 2006).

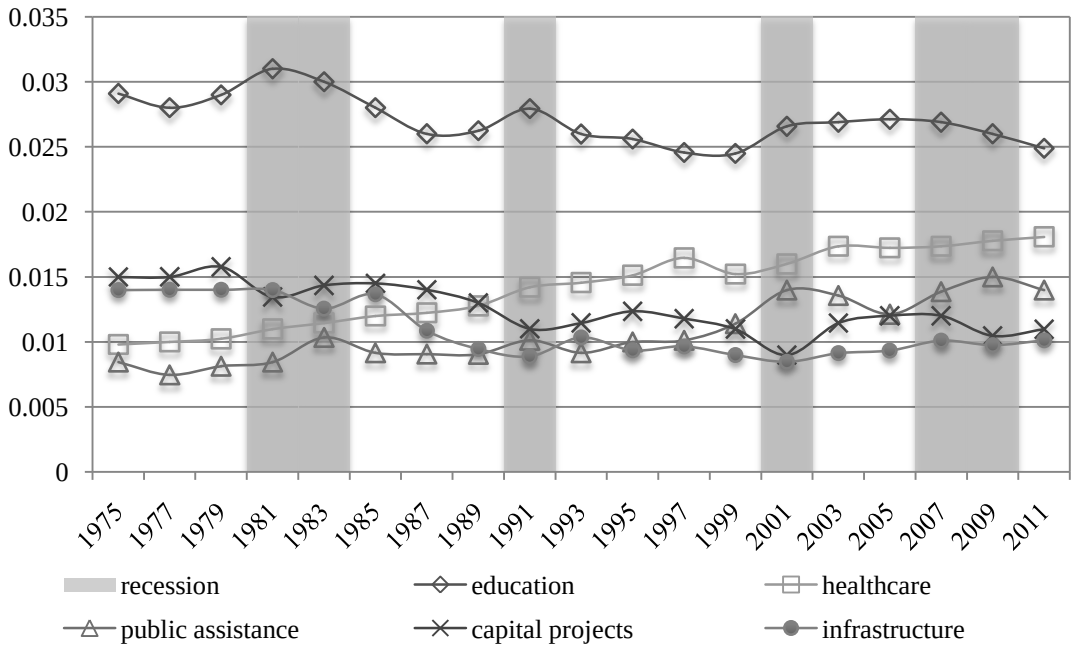


Figure 2.1 Average Spending as % of State Personal Income, US States 1975-2011

Source: US Census Buearu Annual Fiscal Survey, 1975-2011.

[19] Most states base education funding on a formula or certain percentage of some tax revenue, such as property tax revenue or total state revenue. Lawsuits challenging local adequate funding have placed heightened central authority on states to allocate K-12 spending among localities. In many states, K-12 education spending is mandated to be a certain percentage of tax revenue. Higher education spending in most states is much more discretionary.

What is most striking about the two figures are the behaviors of healthcare and social assistance spending. As predicted by numerous papers, states have substantially increased public support for both healthcare and social assistance over the time-period. As discussed earlier, increases in healthcare spending are largely due to an aging of the population and medical-care cost inflation caused by advances in medical technology. While it is difficult to know if the two Medicaid expansions had a part in this increase, the fact remains that states are spending a greater portion of their total expenditure and total economic capacity on healthcare. The large rise in social assistance spending by states does coincide with the 1996 Federal Welfare Reforms, which shifted much of the planning and spending obligations related to assisting poor, young, elderly, and/or disabled persons to the states. While social assistance had been growing prior to such reforms, the rate of increase rose quickly after 1996 and continues throughout the time-period.

### 4.1 A Framework for RDFs

While RDF adoption may have been spurred on by electorate pressure for enhanced fiscal discipline, the fact remains that state governments have consistently grown in size and scope over the time-period, while also accumulating sizable RDF balances. What is unclear is role the electorate has on RDF accumulation. In theory, RDF balance accumulation is either a reduction in total public spending capacity (when depositing surplus revenues), or at least some reduction in current consumption (when depositing non-surplus revenue). This *cost* of RDFs to the electorate is assumed negligible to the overall potential for reduced fiscal stress associated with RDF usage.

What do Figures 1 and 2 say about the impact of RDFs on fiscal stress? At the very least, it suggests that RDFs *can* assist states in reducing some fiscal stress by mitigating

some debt financing and expenditure reductions. Nevertheless, the degree to which RDFs can help states relies upon two crucial things. First, the accumulation of significant balance levels is important for obvious reasons. Second, funds should be managed effectively, meaning that money should be deposited and withdrawn in a manner that reduces fiscal stress. Assuming the electorate prefers reducing fiscal stress, there will be pressure for elected officials to use funds for that purpose. Again, this lends itself to a Median Voter framework, wherein the underlying assumption for RDF usage is that it represents political pressure from the electorate to seek fiscal discipline. If the framework holds, then one would expect RDF balances to rise during strong economic periods and then be drawn down to reduce fiscal stress during weak economic periods. This behavior is captured clearly in Figure 2.1.

If states were able to deposit the equivalent of 11% of all general fund expenditures into their RDFs twice in the last 15 years (1999 and 2011), where did the funds come from? Hou and Duncombe (2008) find evidence that RDFs have induced significant state savings, much higher than existing general fund surpluses, suggesting that money deposited into a RDF might be diverted from general fund expenditures. Prior to RDF adoption, most states had existing policies or funds for any general fund surpluses that may arise from healthy revenues.[20] However, these surplus funds did little to assist states during weak economic periods in the late 1970s and early 1980s. The key difference between these surplus funds and explicit RDFs is that surplus funds simply receive any revenues above TGFE. RDFs are targeted, often during the budgeting process, as explicit funds whose balance levels are determined by elected officials or in some cases a formula. Given that RDFs have performed much better than previous surplus funds at helping states manage economic downturns, what

[20] As Hou and Duncombe (2008) point out, by 1980, 46 states had existing funds for general fund surpluses.

is it about RDFs that make them more effective than simple surplus funds?

Hou and Duncombe (2008) suggest that the rules governing RDF usage go a long way in setting them apart from general surplus funds. With respect to the specific rules governing RDF deposit and withdrawal, there are two distinct types. In some states, RDF balances are generated and spent by the use of a formula, typically as a function of general fund surpluses. States with such rules have codified these formulas into their constitutions or statutes, making RDF deposit and withdrawal a legally binding fiscal activity.[21] Such formula states are completely reliant on general fund surpluses in order to generate sizable fund balances. Therefore, RDF balances in these states will come from underestimating revenues or overestimating expenditures, or by way of intended structural surpluses.[22] So, while the intention of formula rules are to avoid political manipulation of funds, the generation of RDF balances still relies crucially on budgeting decisions. Currently, only seven states exclusively use formula rules for RDF deposit, and four of those use formula rules for withdrawal. The other type of deposit and withdrawal rule, employed by most states, is one in which elected officials have significant to complete discretion over the amount deposited and withdrawn. An important feature of discretion states is an elected official can create a budget with money already set aside for their RDF, regardless of any possible budget surplus or deficit.[23] Instead of relying on revenue surpluses after the fact, states can proactively deposit portions of incoming revenues into their RDFs. Currently, 41 states allow their elected officials

[21] Of the 49 states with rainy day funds, only six are constitutional, yet there is no link in the literature between RDF efficacy and whether funds are constitutional or statutory. Wisconsin, for example, constitutionally mandates that 50% of any general fund surplus must be deposited into the RDF, yet averages one of the lowest RDF balances in the country.

[22] As Rose (2010) points out, the existence of state Balanced Budget Rules likely create incentives for state budgets to set planned expenditure as close to planned revenue as possible.

[23] For example, the fiscal year 2012 Tennessee state budget *proposal* called for a $50 million deposit into the RDF. The State of Tennessee, 2011, "The Fiscal Year 2012 Tennessee State Budget"

discretion over RDF balances.[24]

### 4.2 RDF Usage and the Fiscal Mix

Nearly all states allow their elected officials discretion over the deposit and withdrawal of RDFs. Additionally, money placed into a RDF is considered revenue, rather than expenditure (Wagner and Sobel, 2006). This gives elected officials considerable autonomy in deciding rainy day fund usage. Nevertheless, the paper supposes that electorate pressure will compel elected officials to have sizable RDF balances, while still providing the desired level of public support for other spending categories. Given concerns that states are relying on lower taxes and alternative revenue generators, the decision to place money into a RDF is complicated. On one hand, less robust tax revenue makes RDFs crucial during weak economic periods in order to avoid severe fiscal stress. On the other hand, less robust tax revenue makes accumulating RDF balances difficult. Echoing concerns in the RDF literature (Wagner, 2006; Rose, 2008), this may lead elected officials to alter their state's fiscal mix in order to generate significant fund balances, either by expenditure cuts or tax increases. Further, issues of fiscal illusion (Buchanan and Wagner, 1977) may lead to preferences for both high expenditure and large RDFs, a situation that many elected officials would find difficult without altering their fiscal mix.

When a state deposits into or withdraws from a RDF, there are two potential outcomes as to the impacts on the budget. The effect is spread somewhat evenly among all expenditure categories, leaving the fiscal mix unchanged, or alternatively, some expenditure categories are

[24] Some states have caps on the allowable size of their RDF relative to general fund expenditures, though nearly all of these states have balance levels considerably less than their caps, suggesting caps are non-binding. Hou and Duncombe (2008) find that formula states tend to save more of their general fund surpluses than do states with discretion rules, but RDF balance levels do not appear significantly correlated with deposit rule type. They have been found to be correlated with some withdrawal rules.

more affected than others, altering the fiscal mix. Given the nature of certain categories, it is likely that RDFs have a disproportionate effect. As Knight and Levinson (1999) posit, if RDFs were used for their intended purpose, one would expect the effect to fall most heavily on spending categories for which the electorate has cyclical preferences. During weak economic periods, some spending categories are likely to see increased support among the electorate, such as social assistance and healthcare. As spending rises in these categories, states can use their RDFs to help cover this increase. During strong economic periods, these same categories will see a reduction in support as well, and this savings combined with healthy revenues can allow states to accumulate money into their funds. Other spending categories, such as education, infrastructure, and capital projects experience more stable electorate preferences, and therefore should experience more stable expenditure. These categories should, in theory, benefit from RDF usage by seeing their spending levels remain stable during weak economic periods, instead of being cut to cover increased social assistance and healthcare spending. Therefore, one expects electorate pressure to compel states to focus their RDF usage on cyclically volatile categories, and that such usage should allow states to avoid cuts in other categories if they have sizable RDF balances.

Given their cyclical nature, preferences for social assistance and healthcare spending will rise during weak economic periods and fall during strong economic periods. Unemployment will rise, leaving a portion of the electorate in need of financial and healthcare coverage assistance. Therefore, political pressure should exist for elected officials to provide the desired level of public support relative to economic health. During weak economic periods, states will see their social assistance and healthcare obligations rise, as their revenues fall, suggesting that states will need to cut spending from another category, either assume a fiscal deficit, increase

taxes, or use RDFs to cover these obligations. As mentioned previously, states are also covering larger portions of social assistance and healthcare than in the past, largely due to the Federal Welfare Reforms of 1996, Medicaid expansions, and an aging population. Figure 2.1 shows that social assistance and healthcare spending have grown considerably as a share of TGFE, rising from 17.8% in 1975 to 30.1% in 2011.

Recall from Figure 2.1, that while falling some, education's share of TGFE is reasonably stable over time. Therefore, electorate preferences for education, unlike social assistance, are less affected by economic health, and are relatively stable over time.[25] Demographic characteristics play a large role in determining preferences for education spending, meaning that the age, income, and ethnicity of the median voter, more than relative economic health, distinguishes public support for education spending over time. While electorate support for education may be stable, funding for education spending primarily comes from revenues generated by property tax collection at the local level. Property tax revenue is generally stable, though large recessionary periods can cause property values to fall making revenue generation difficult.[26] Changes to federal aid for education, such as Title I, have increased the role states have in funding their education spending. Figure 2.1 indicates that education spending has been relatively stable over the time-period as a share of TGFE, falling from 26.3% in 1975 to 23.2% in 2011.

Similar to education, electorate support for infrastructure and capital projects spending should be relatively stable, and largely reflect the demographic characteristics of the state. Most states raise infrastructure funding through various consumption and user fees, as well as from dedicated portions of general revenues. In most states, consumption fuel taxes directly fund

[25] Education spending defined as total direct expenditure on public K-12 and public higher education. This excludes federal aid.

[26] Dadayan (2012)

roads, bridges, and other travel infrastructure, as do registration fees and toll fees. Funding for sewage and other waste infrastructure is generally funded through utility user fees and utility taxes. Such mandates likely shield infrastructure spending from some reductions due to weak economic periods, as such taxes and fees are relatively non-cyclical. While gas tax revenue can be somewhat cyclical, perhaps a more pressing issue has been the rise in use of more fuel-efficient vehicles, which generate lower gas tax revenue.[27] Non-road and non-healthcare capital outlays reflect electorate support for public projects such as investments in technology and replacing depreciated public equipment. Capital projects are funded directly out of state general revenues, and are undertaken to increase economic capacity or make existing public entities more efficient. Relatively more discretionary than education and infrastructure, capital projects spending is less mandated than these categories, but politically important. Figure 2.2 shows that combined infrastructure and capital projects spending shares have been somewhat stable, falling from 29.8% in 1975 to 23.2% in 2011.

While not presenting any technical theory, this paper relies on a median voter framework to motivate both the above assumptions and the empirical approach in subsequent sections. By assuming that the electorate prefers fiscal discipline, we further assume that elected officials feel pressure to use RDFs. Previous literature (Gold, 1983; Douglass and Gaddie, 2001) supports these assumptions, but leaves unanswered the question of how this pressure relates to specific budgeting decisions. Figure 2.3 presents average shares for each category among states with average RDFs less than 5% of TGFE, and Figure 2.4 presents shares for states with average RDFs greater than or equal to 5% of TGFE.[28]

[27] Cambridge Systematics, Inc., 2007. "Accounting for Fuel Efficiency in Texas Fuel Tax Revenue Estimations. Final Report" Prepared for the Texas Department of Transportation

[28] Joyce (2001) suggests that the RDF balances of at least 5% of TGFE would allow states to overcome substantial fiscal stress during weak economic periods.

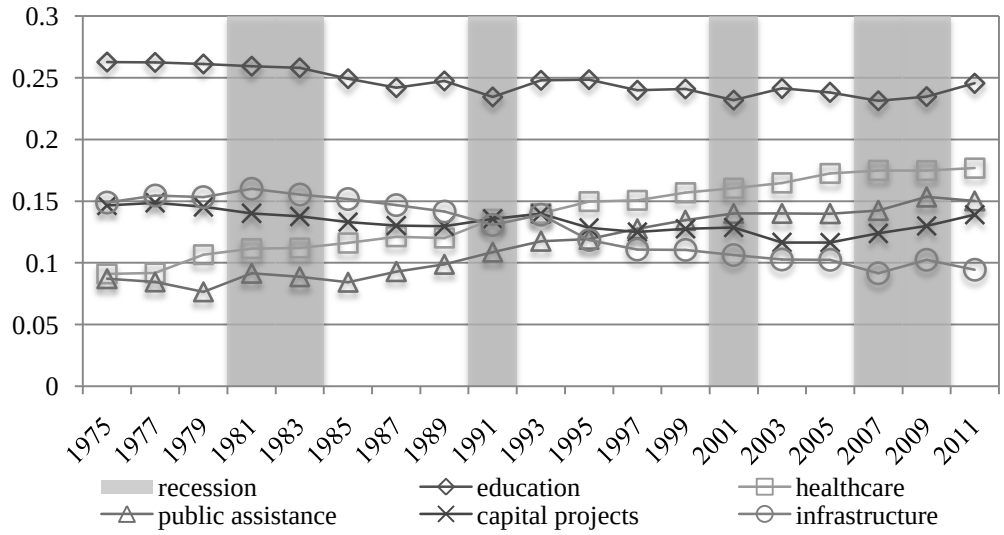


Figure 2.3 Average Spending as Shares of TGFE (RDF<5% of TGFE), U.S. States 1975-2011

Source: US Census Bureau Annual Fiscal Survey, 1975-2011.

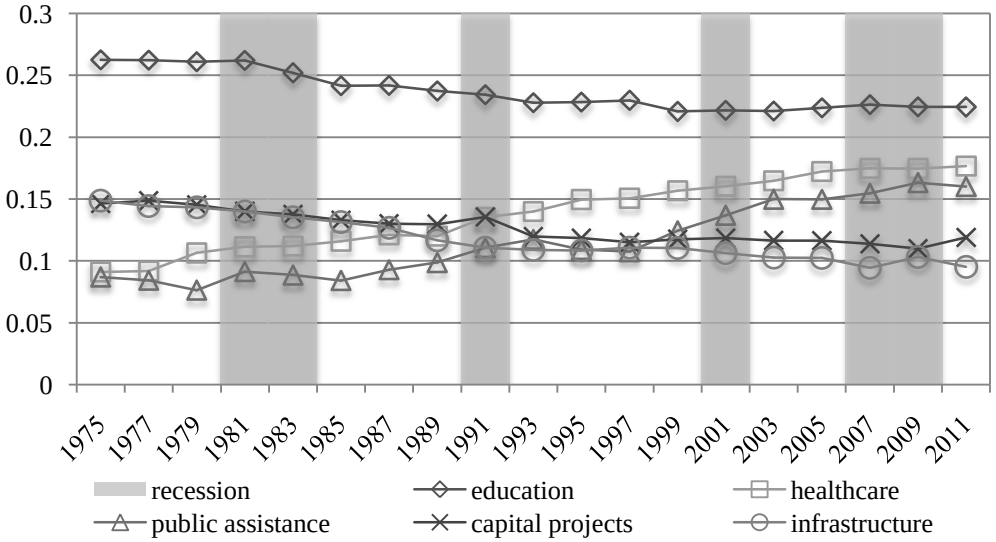


Figure 4. Average Spending as Shares of TGFE (RDF>5% of TGFE), U.S. States1975-2011

Source: US Census Bureau Annual Fiscal Survey, 1975-2011.

As expected, states with low RDF balance levels appear to have more volatile spending behavior, especially since the end of the 1980s. Education appears the most volatile, with

infrastructure and capital projects somewhat volatile. Both healthcare and social assistance behave similarly across the two figures. To capture this difference in volatility, coefficients of variation are calculated for each spending share across both types of states. Figure C.2 located in Appendix C shows these calculations. In all cases except healthcare, the coefficients of variation are higher among low balance states. While the differences are quite small, it does point to the slightly more volatile positions states find themselves in without significant RDF balances.

## 5 Data and Empirics

Table 2.1 provides the definitions, means, standard deviations, and labels of the data. In order to investigate RDF adoption and the specific impact of RDFs on states' fiscal mix, the paper will use a panel dataset covering1975-2011 for the 48 geographic contiguous U.S. States.[29] For adoption analysis, data on total expenditure, total revenue, total debt, as well as rules governing balanced budgets, debt, taxes, and expenditure are collected. For spending analysis, data on specific spending categories, demographics, RDF balances, and RDF rules for each state are collected. Spending categories include education, social assistance, infrastructure, healthcare, and capital outlays.[30]

In order to help control for the fact that both education and infrastructure typically have mandated funding formulae, two variables are created to represent this fact. The variable *funding* is defined as the percentage of total revenue mandated for that particular spending category. The models estimating effects on education and infrastructure shares will include

[29] It is common in the literature to drop both Alaska and Hawaii.
[30] Figure B.2 in Appendix B provides technical and complete definitions of each spending category.

these variables.

Table 2.1 Means, Standard Deviations and Variable Definitions

| names | means (Std. Deviation) | definitions |
|---|---|---|
| totexp | 37,389.28 (32,100.64) | Total State Expenditure |
| totrev | 40,732.23 (41,003.78) | Total State Revenue |
| genexp | 30,211.98 (29,087.45) | Total General Expenditure |
| balance | 3,162.03 (5,732.15) | =Total General Revenues – Total General Expenditure |
| debt | 22,087.26 (24,437) | Total State Debt |
| totinc | 238,782.91 (271,652.77) | Total State Income |
| education | 5,399.34 (2,887.65) | =Direct K-12 + Direct Higher Education |
| infrastructure | 3,056.04 (1,626.86) | =Direct Highway and Bridges + Direct Sewage + Other Water Infrastructure |
| healthcare | 4,341.42 (2,841.73) | =Direct Healthcare + Direct Hospital + Other Medical Services |
| capital | 3,289.43 (1,768.87) | Direct Capital Outlays |
| social assistance | 3,053.16 (3,876.67) | = Direct Cash Assistance + Direct Food Assistance + Direct Housing Assistance |
| rdfbal | 656.71 (602.19) | Total RDF Balance |
| rdfadopt | 0.79 (0.41) | =1 if state has RDF, =0 otherwise |
| rdfchange | 50.67 (68.89) | = The difference in RDF balance between the beginning and end of the current fiscal year |
| five | 0.27 (0.14) | =1 if state has average RDF balances at least 5% of TGFE |
| funding (educ) | 0.23 (0.15) | = Total mandated school funding as a percentage of total revenue |
| funding (infrastructure) | 0.091 (0.04) | = Total mandated infrastructure funding as a percentage of total revenue |
| telexp | 0.89 (0.67) | =1 if state has an expenditure limit law, =0 otherwise |
| telrev | 0.09 (0.44) | =1 if state has a revenue limit law, =0 otherwise |
| dlimit | 0.88 (0.51) | =1 if state has a debt limit law, =0 otherwise |
| bbr | 0.54 (0.23) | =1 if state has a stringent BBR, =0 otherwise |
| deficit | (0.12) (0.12) | =1 if total revenue – total expenditure < 0, =0 otherwise |
| pop | 4.99 (5.1) | Total Population (millions) |
| medinc | 0.035 (0.011) | Median Income |
| aged | 11.82 (2.0) | Percentage of the Population over 65 years of age |
| kids | 20.81 (2.1) | Percentage of the Population under 18 years of age |
| minority | 19.22 (13.21) | Percentage of the Population that is an Ethnic Minority |

Sources: U.S. Census Bureau, NCSL, and the NASBO, 1975—2011.

Demographic data, such as median income, total population, percent of population elderly, percent of the population under eighteen years of age, and percent of the population that is an ethnic minority is collected from the U.S. Census Bureau and is an updated version of data used in much of the state public finance literature.[31] Lastly, state specific rules governing education and infrastructure funding is collected from NASBO State Budget Processes Report, as well as state constitutions.

State spending data are collected from the U.S. Census Bureau's Annual Survey of State Government Finances, 1975—2011. Data on RDFs, TELs, Debt Limits, and Balanced Budget Rules was collected from the National Association of State Budget Officers (NASBO) and the National Conference of State Legislatures (NCSL). Demographics, RDF adoption year, and budget rule data are an updated version of data used previously in much of the literature.[32]

### 5.1 Empirics

As discussed earlier, this paper employs a Median Voter framework to motivate the empirical approach. The paper assumes that when a state experiences fiscal stress, the median voter reacts by applying pressure to elected officials to have fiscal discipline. This may help to explain the large increase in RDF adoptions among states in the 1980s and 1990s. At the same time, weak economic conditions may induce the median voter to demand higher levels of social assistance and healthcare spending, inducing states to use their RDFs to mitigate cuts to other expenditure categories, such as education, infrastructure, and capital projects. Therefore, it is

[31] Besley and Case (2003) kindly made their data available.
[32] Wagner (2003) kindly made his data available.

likely that RDF usage induces some states to alter their fiscal mix to reduce fiscal stress. Recall that states with RDFs were better able to handle fiscal stress caused by the 1990—1991 and 2001—2002 recessions. Finally, with states experiencing greater fiscal decentralization, the need for sizable RDF balances may lead states to crowd out some spending when depositing into their funds. The following sections will test these notions.

### 5.1.1 RDF Adoption

In order to test for the specific characteristics that led to RDF adoption, the paper will utilize a Random-Effects (RE) probit approach to estimate the propensity for fund adoption based on several budgetary and fiscal stress variables, controlling for existing fiscal institutions. Historically, probit estimation has suffered from difficulty in being able to interpret the marginal effects of a treatment when the dependent variable is complex. However, given the simplistic nature of the dichotomous dependent variable, equaling one in adoption years and zero otherwise, it is much easier to directly interpret the coefficients estimated. Further, a Fixed-Effects estimator for binary data is widely known for its bias caused by the incidental parameters problem (Greene, 2004), making the RE estimator the preferred choice given the data.

There exist concerns about estimating RE probit using statistical software. In order to ensure that our estimates are not sensitive to the estimation's quadrature points, sensitivity tests were implemented using Stata's *quadchk* command. This command returns coefficient differences across probit estimations using different numbers of quadrature points. Since no coefficients differed across estimations by more than 0.01%, it is safe to interpret the coefficients generated by the RE probit (Mourouga, 2008).

The following equation will test the notion that adoption was primarily due to state specific fiscal stress.

$$RDFAdopt_{i,t} = \beta_0 + \beta_1 debt_{i,t} + \beta_2 totrev_{i,t} + \beta_3 totexp_{i,t} + \beta_4 deficit_{i,t} + \beta_5 deficit_{i,t-1} + \gamma \boldsymbol{X}_{i,t} + u_{i,t} \quad (1)$$

The dependent variable, *RDFAdopt*, is dichotomous and takes a value of 1 if a state has adopted a RDF, and 0 otherwise. Independent variables, *debt*, *totrev*, and *totexp*, provide measures of relative fiscal stress, such as total debt, total revenue, and total expenditure. The variable $\boldsymbol{X}$ is a vector representing non-RDF fiscal institutions states may use to induce fiscal discipline, including tax and expenditure limits, stringent balanced budget rules, and debt limits. Each is dichotomous, equaling 1 if the state does have these institutions, and 0 otherwise. The error term, *u*, comprises a state specific error term plus a random error term.[33] In addition to the initial estimation, two others are also implemented. One including an indicator variable, *deficit*, which equals 1 if the state experienced a fiscal deficit, and 0 otherwise. The other including a lag of the variable *deficit*. These indicator variables are included to measure the direct effect of fiscal stress on RDF adoption.

Table 2.2 column 1 presents the estimation results of the initial RE probit regression. RDF adoption appears significantly and positively correlated with total revenues, while negatively correlated with existence of revenue limits and debt limits. The existence of revenue limits reduces RDF adoption by over 20%, while debt limits reduce adoption by over 27%.

In order to measure the direct effect of fiscal stress, additional indicator variables are

[33] The error term takes the form: $u_{i,t} = \alpha_i + \eta_{i,t}$

added to the model. Columns 2 and 3 of Table 2.2 present these estimates.

Table 2.2 RDF Adoption and State Fiscal Stress: Random Effects Probit Estimation

| | rdfadopt | rdfadopt | rdfadopt |
|---|---|---|---|
| debt | 0.0203 | 0.0192 | 0.0193 |
| | (1.23) | (1.14) | (1.14) |
| totalrev | 0.0618 | 0.0423 | 0.0385 |
| | (3.21)*** | (1.94)* | (1.74)* |
| totalexp | -0.0323 | 0.0649 | 0.0067 |
| | (1.35) | (0.44) | (0.56) |
| deficit | | -0.1330 | -0.1450 |
| | | (1.54)* | (1.53)* |
| deficitlag | | | 0.3217 |
| | | | (2.79)*** |
| bbr | 0.0275 | 0.0261 | 0.0359 |
| | (0.33) | (0.31) | (0.43) |
| telexp | 0.1251 | 0.1282 | 0.1288 |
| | (1.48) | (1.50) | (1.51) |
| telrev | -0.2129 | -0.2545 | -0.2723 |
| | (1.88)* | (2.18)** | (2.33)** |
| debtlim | -0.2772 | -0.2720 | -0.2673 |
| | (8.26)*** | (8.04)*** | (7.88)*** |
| _cons | -0.2675 | -0.1842 | -0.1474 |
| | (1.22) | (0.82) | (0.65) |
| lnsig2u _cons | 0.5543 | 0.6008 | 0.6309 |
| | (2.14)** | (2.32)** | (2.44)** |
| *N* | 1,776 | 1,776 | 1,775 |

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

coefficients on debt, totrev, and totexp are scaled to millions

The coefficient on *deficit* indicates that states experiencing a fiscal deficit were over 13% *less* likely to adopt a RDF in that year. The coefficient on *deficitlag* indicates that the year immediately following a fiscal deficit a state was over 32% *more* likely to adopt a RDF. Importantly, the presence of a current year fiscal deficit is still statistically significant, and

reduces the likelihood of adoption by 14% even if this was the second deficit in as many years.

### 5.1.2 RDFs and the Fiscal Mix

In order to estimate the effect RDF usage may have on specific spending categories, a Fixed-Effects (FE) panel estimation is utilized. This follows a long tradition within the public finance literature (Besley and Case, 1995; Baicker, 2001). Under this model, demographic and, to some extent, socioeconomic conditions can be handled statistically, dealing with some potential endogeneity. Additionally, state-specific and time-specific trends can easily be placed in the model to remove some state and time effects from the estimated coefficients. Education's share of TGFE for example falls in nearly every year of the sample, though the time coefficients are relatively small.[34] In all, education, infrastructure, and capital projects shares fall over the time span, while social assistance and healthcare shares rise.

Equally important is the inclusion of demographic controls, as previous literature finds variables such as population and percent of the population that is under 18 years of age as having significant effects on specific spending categories (Inman 1995, Besley and Case, 1995). Further, since the question at hand deals with the effect of RDF usage on category-specific spending shares, the means differenced approach of the FE should be an effective specification for capturing any movement away from the average fiscal mix caused by RDF usage.

While statistically preferred given the empirical question, it is important to note that the reliance on mean differences within the FE approach generates coefficients that are themselves average effects (Wooldridge, 2002). Therefore, it can be difficult to interpret the results as behavioral effects caused by RDF usage, or as statistical happenstance. The inclusion of various

[34] For example, the year 1997 is correlated with a single basis point reduction in education's average share of TGFE.

demographic controls, as well as using spending shares as dependent variables, should allow some isolation of the direct effects of RDF usage. To account for the possibility of autocorrelation, state specific time trends are included in all specifications (Bertrand, 2004).

To ensure that the FE estimator is preferred over the RE estimator, a Hausman test is run to compare the coefficients across the two estimators. The test produced a significant p-value (chi2( 1) = 165.22 and prob>chi2 = 0.0007), indicating that the FE estimator is preferred over the RE with this data. This is not surprising given the nature of the data, and the relatively unlikely event that the independent effects are uncorrelated with independent variables. For example, the state specific impact of RDF usage on education spending is likely correlated with the percentage of the population that is under the age of 18.

The analysis will focus on the five largest spending categories within state general fund expenditure, including education, infrastructure, social assistance, healthcare, and capital projects. The following equation represents the empirical approach:

$$\frac{Exp_{j,i,t}}{totgenexp_{it}} = \delta_0 + \delta_1 rdfchangeneg_{it} + \delta_2 rdfchangepos_{it} + \theta \mathbf{Z}_{it} + \delta_i + \varphi_t + t_i + \varepsilon_{it} \quad (2)$$

Where *Exp* is the level of spending for category *j*, in state *i* at time *t*, while *totgenexp* is total general fund expenditure (TGFE). Each share will be scaled from 0 to 100, making the interpretation of the coefficients easier. The key independent variable is *rdfchange*. Using a linear spline, *rdfchange* is conditioned into *rdfchangeneg*, which equals the change in RDF balance when that change is negative (a withdrawal), and *rdfchangepos*, which equals the change in RDF balance when that change is positive or zero (a deposit).[35] The vector **Z**

[35] While the use of a linear spline may oversimplify the true nature of the directional effects, the generated coefficients are more easily interpreted and should not be biased (Royston and Sauerbrei, 2007).

includes demographic control variables along with a funding control variable. Demographic variables include median income, population, percent of the population who are 65 years or older, percent of the population who are 18 years or younger, and the percent of the population that is an ethnic minority. The funding control variable enters the regressions for education and infrastructure shares.[36] Additionally, state fixed effects $\delta_i$, time fixed effects $\varphi_t$, and state specific time trends $t_i$ are included. Lastly, $\varepsilon_{it}$ is a contemporaneous error term.

Table 2.4 reports the results from the FE specification. On average, changes to RDF

Table 2.3 RDF Usage and The Fiscal Mix: Fixed Effects Panel Estimation

| | educshare | infshare | socialshare | healthshare | capshare |
|---|---|---|---|---|---|
| rdfchangeneg | 0.641 | -0.969 | -0.323 | 2.130 | 0.092 |
| | (1.57)* | (1.12) | (0.89) | (1.04) | (1.70)* |
| rdfchangepos | -1.514 | -0.622 | 1.349 | 1.625 | 0.134 |
| | (2.64)** | (1.97)* | (2.39)** | (0.56) | (1.10) |
| funding | 2.014 | 0.722 | | | |
| | (1.64)* | (2.47)** | | | |
| medinc | 1.783 | 1.223 | -6.214 | -7.380 | 3.224 |
| | (1.01) | (0.85) | (2.90)*** | (3.36)*** | (0.90) |
| aged | -3.498 | -1.452 | 0.881 | 0.668 | -3.267 |
| | (2.09)** | (1.56)* | (2.34)** | (1.60)* | (2.19)** |
| kids | 5.253 | -0.459 | 1.006 | -0.481 | 0.119 |
| | (2.18)** | (1.98)* | (4.04)*** | (0.47) | (0.85) |
| minority | -1.355 | -0.535 | 0.723 | 0.393 | -1.032 |
| | (2.22)** | (2.26)** | (1.83)* | (2.42)** | (2.90)*** |
| pop | -0.982 | 4.079 | 3.221 | 1.017 | 2.137 |
| | (1.58)* | (3.70)*** | (2.18)** | (2.56)** | (4.74)*** |
| _cons | 33.335 | 28.220 | 45.479 | 56.906 | 27.302 |
| | (16.39)*** | (15.11)*** | (5.34)*** | (11.66)*** | (12.26)*** |
| $R^2$ | 0.43 | 0.58 | 0.72 | 0.54 | 0.55 |
| $N$ | 1,776 | 1,776 | 1,776 | 1,776 | 1,776 |

* $p$<0.1; ** $p$<0.05; *** $p$<0.01

coefficients on rdfchangeneg and rdfchangepos are scaled to millions

[36] States with high funding control variables use disproportionately higher funding mandates than those with low funding control variables. For example, California mandates that 40% of new general revenues go toward education funding, while Alabama's Education Trust Fund is created from about 25% of all tax revenues.

balances appear correlated with changes to a state's average fiscal mix. Both education and capital projects are significantly and positively correlated with RDF withdrawal. The results indicate that in years in which a state takes money from a RDF, education and capital projects see their shares of TGFE rise by 0.64% and 0.09% respectively for every one million dollars withdrawn.

With respect to RDF deposit, education, infrastructure, and social assistance are all significantly affected. Years in which a state adds money to their RDF, education and infrastructure see their shares fall by 1.51% and 0.62% respectively, while social assistance share rises 1.35% for every one million dollars deposited.

One significant caveat to the results discussed thus far is that RDF usage, while increasingly utilized, remains a relatively small part of a state's budget. As mentioned previously, studies within the literature find that states should maintain RDF balances of at least 5% of TGFE (Nice, 2001), while others suggest significantly more than that (Wagner. 19 states have RDF balances that average over 5% of TGFE as of 2011. To account for differences in behavior among high balance and low balance states, an indicator will be added to the specification. Adding into the model the variable *five* and interacting it with the *rdfchange* variables creates:

$$\frac{Exp_{j,i,t}}{totgenexp_{i,t}} = \delta_0 + \delta_1 rdfchangeneg_{it} + \delta_2 rdfchangepos_{it} + \delta_3 five_{it} + \delta_4 (five_{it} * rdfchangeneg_{it}) + \delta_5 five_{it} * rdfchangepos_{it} + \theta \boldsymbol{Z}_{it} + \delta_i + \varphi_t + t_i + \varepsilon_{it} \quad (3)$$

where, the indicator *five* equals 1 if a state has average RDF balances greater than or equal to 5% of TGFE, and 0 otherwise. Since state RDF balances vary significantly both across and within states, the indicator variable also varies within states, allowing for a FE panel estimation.

Table 2.4 presents the results from this estimation, and similar to the effects across all states, high balance state's RDF usage is correlated with several spending categories.

Table 2.4 RDF Usage and The Fiscal Mix: Fixed Effects Panel Estimation with High Balance Indicator

| | educshare | infshare | socialshare | healthshare | capshare |
|---|---|---|---|---|---|
| rdfchangeneg | 0.341 | 0.667 | -0.421 | 1.763 | 0.075 |
| | (1.07) | (0.77) | (0.49) | (0.74) | (1.66)* |
| rdfchangepos | -0.314 | -0.422 | 1.218 | 1.433 | 0.129 |
| | (1.68)* | (1.11) | (1.84)* | (1.72)* | (1.03) |
| five | -0.048 | -0.009 | 0.067 | 0.001 | 0.003 |
| | (2.31)** | (2.56)** | (2.45)** | (1.10) | (1.69)* |
| rdfchangeneg*five | 0.553 | -1.007 | 1.106 | -0.281 | 1.221 |
| | (3.18)*** | (2.98)*** | (2.87)*** | (0.84) | (2.27)** |
| rdfchangepos*five | -1.155 | -0.221 | 0.123 | 0.231 | 1.434 |
| | (2.98)*** | (1.00) | (2.41)** | (1.42) | (2.88)*** |
| funding | 2.278 | 0.842 | | | |
| | (1.58)* | (2.34)** | | | |
| medinc | 1.655 | 2.024 | -5.287 | -6.639 | 4.108 |
| | (0.89) | (0.62) | (3.25)*** | (3.22)*** | (1.67)* |
| aged | -4.104 | -1.379 | 1.131 | 0.445 | -4.002 |
| | (2.19)** | (0.96) | (1.84)* | (1.84)* | (2.09)** |
| kids | 4.243 | -1.133 | 1.296 | -0.476 | 0.091 |
| | (2.38)** | (1.76)* | (3.18)*** | (0.99) | (0.88) |
| minority | -1.355 | -0.505 | 0.522 | 0.387 | -1.210 |
| | (1.72)* | (2.77)*** | (1.95)* | (1.72)* | (3.11)*** |
| pop | -1.372 | 3.773 | 4.626 | 2.008 | 1.994 |
| | (2.11)** | (2.99)*** | (4.13)*** | (3.10)*** | (2.93)*** |
| _cons | 31.221 | 32.220 | 47.003 | 49.656 | 29.560 |
| | (12.74)*** | (16.21)*** | (7.26)*** | (14.67)*** | (13.93)*** |
| $R^2$ | 0.47 | 0.59 | 0.74 | 0.57 | 0.58 |
| *N* | 1,776 | 1,776 | 1,776 | 1,776 | 1,776 |

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

coefficients on rdfchangeneg and rdfchangepos are scaled to millions

The shares of Education, social assistance, and capital projects spending are positively and significantly correlated negative changes to RDF balances, rising 0.50%, 1.17%, 1.24% respectively for every one million dollars withdrawn from a RDF in a high balance state. Infrastructure spending shares are negatively correlated with negative changes to RDF balances, falling 1.02% for every one million dollars withdrawn from high balance state RDFs.

With respect to positive changes to RDF balances, the spending share of education falls by 1.52% for every one million dollars deposited into high balance state RDFs. Spending shares of social assistance and capital projects are positively correlated with RDF deposit, rising 1.41% and 1.44% respectively for every one million dollar addition to a high balance state RDFs.

### 5.2 Discussion of Results

In the initial RE probit estimation, the analysis provides support for the generally accepted hypothesis that RDF adoption was driven primarily by state-specific fiscal stress (Hou and Duncombe 2008; Douglass and Gaddie, 2001). The findings suggest that RDF adoption was correlated with state fiscal stress, and that states were more likely to adopt funds in the year subsequent a year in which a negative fiscal balance was experienced. A fiscal deficit increases the likelihood of adoption by 32% the year after it is experienced. However, states are 14% less likely to adopt a RDF in the year of experienced negative fiscal imbalance, indicating that states are more likely to adopt funds during years in which the budget is balanced or in surplus. In this sense, fiscal stress is a trigger for RDF adoption, but adoption also relies crucially on current fiscal health.

The above discussed results are unsurprising and in line with the paper's median voter framework. In years immediately following experienced fiscal stress, there will likely be pressure from the electorate to reduce fiscal stress and RDFs are an accepted form of fiscal discipline. This effect may be behavioral, either because current elected officials feel pressure to have improved fiscal health, or because newly elected officials institute RDFs to avoid the fate of their predecessors.[37] On the other hand, there may be a spatial effect at play, with states adopting funds because the states around them were also adopting. While the RE probit cannot account for this, states who sought fiscal relief by mimicking RDF adoption still did so because of their own fiscal stress. Therefore, it is reasonable to interpret the coefficients from this estimation as the behavioral effects of experiencing a fiscal deficit.

In order to analyze the effect of RDF usage on specific spending shares of TGFE, the paper relies on a FE panel estimation. The results indicate that RDF usage is significantly correlated with changes to states' fiscal mixes among the five largest general fund spending categories, education, infrastructure, social assistance, healthcare, and capital projects. Of primary concern for this paper is how RDF usage, the depositing and withdrawing of funds, may affect specific spending categories and ultimately alter the fiscal mix.

From the analysis, education's share of TGFE among all states is positively correlated with RDF withdrawal, rising 0.64%, and negatively correlated with RDF deposit, falling 1.51%. Overall, the effect of RDF usage is negative, indicating that RDFs may be crowding out some education spending. When the analysis is focused on those states with high RDF balances (greater than or equal to TGFE), educations shares are similarly impacted, rising 0.50% when money is deposited, and falling 1.52% when money is withdrawn.

[37] Recall that prior to nationwide RDF adoption in the late 1980s and early 1990s, fiscal stress was often accompanied by high political turnover (Wagner and Sobel, 2006)

The lack of substantial difference between the estimates for all states and those for high balance states regarding education shares, likely points to education's formulae based spending structure. Therefore, it is unsurprising to see education's share of TGFE rise during a period of RDF withdrawal, since those instances occur most likely during weak economic periods. The effect from RDF deposit is somewhat surprising. Instances of RDF deposit most likely occur during strong economic periods, which should see increased electorate support for education. However, the analysis shows that RDF deposit is negatively correlated education's share of TGFE.

In a sense, education's share is being slightly, yet significantly, crowded out at the same time states are placing money into their RDFs. On the other hand, when a state withdraws money from their RDF, education's share of TGFE rises. This could be occurring for two reasons. One, RDF withdrawal allows states to avoid cutting education spending during weak economic periods. Two, because education funding is tied to formula rules in many states, weak economic periods will not necessarily reduce education's share of TGFE. Nevertheless, the inclusion of the *funding* variable should control for some of this effect, suggesting that the increase in education's share when a state withdraws funds may indeed be due to that state's ability to use RDFs to mitigate reductions in other categories. In addition, this may point to the issue of social assistance and healthcare shares rising significantly over the time period. Given that both categories see their average share rise, it makes sense that any money placed into a RDF coming from general revenues would likely reduce the share of education spending among TGFE.

The analysis of infrastructure spending share reveals a significant correlation with RDF deposit for all states, and RDF withdrawal among high balance states. In the initial estimation

encompassing all states, RDF deposits are correlated with a 0.62% fall in infrastructure's share of TGFE. For high balance states, RDF withdrawals are correlated with a 1.02% fall in infrastructure's share of TGFE.

The significant difference in correlated coefficients across the two models is striking. High balance states see their shares of infrastructure spending fall when money is withdrawn from a RDF. This is a relatively unsurprising result, as electorate preferences for infrastructure spending are likely to fall during weak economic periods. It is also important to note that high balance states do not appear to crowd out infrastructure spending when money is deposited into a RDF. Though there is a negative relationship nationwide between infrastructure share and RDF deposit, the effect is quite small.

With respect to social assistance spending, the estimations find several significant effects. Among all states, RDF deposit is correlated with a 1.35% increase in the share of social assistance spending. Among high balance states, RDF withdrawal is correlated with a 1.17% increase in the share of social assistance spending, while RDF deposit is correlated with a 1.41% increase in the share of social assistance spending. Overall, social assistance spending appears to benefit from RDF usage, rising in both periods of deposit and withdrawal.

While the effect of RDF withdrawal is unsurprising, the positive coefficient on RDF depositing is puzzling. During strong economic periods, one would expect the share of social assistance to fall, as electorate preferences will favor less spending in that area. Nevertheless the result found here suggests that social assistance spending share rises as a result of RDF deposit, and even more so among high balance states. A possible explanation lies in the fact that social assistance has been growing as a share of TGFE for the past few decades. As discussed above, when money is placed into a RDF, the shares of education and infrastructure

fall. Since these shares fall, social assistance share may rise by default. Another possible reason lies within the specific states that have experienced the greatest increase in social assistance share of TGFE. These states may rely more heavily on RDF balances to cover the increases of social assistance spending during weak economic periods, and therefore see a positive correlation between RDF usage in social assistance spending share. Nevertheless, time-specific trends are included in the model to help control some of these time issues.

The final significant spending category experiencing significant correlation with RDF usage is capital projects. Among all states, RDF withdrawal is correlated with a 0.09% increase in the share of capital projects spending. Among high balance states, RDF withdrawal is correlated with a 1.24% increase, while RDF deposit is correlated with a 1.45% increase. Similar to social assistance, both effects of RDF usage appear positively correlated with the share of TGFE spent on capital projects.

Exhibiting similar behavior to the coefficients on social assistance, especially among high balance states, RDF usage appears to increase capital project's share of TGFE. As mentioned previously, capital projects spending in nearly all states is relatively discretionary and reflects the public's preferences for efficiency and aesthetic enhancements.[38] The positive coefficients on both RDF usage variables may reflect the political nature of the spending category. Public enhancements are often viewed favorably by the public and can assist in reaching or staying in office, which then applies pressure to elected officials (Rose, 2008). Another possibility may be that capital projects can be longer-term projects, and their expenditure is spread over periods of varying economic health.

With respect to the estimation results found in Tables 3 and 4, some caution should be

[38] Common capital projects among states are improvements to public transportation, reductions in the deprecation rates among public capital, and investments in future public space.

expressed with respect these findings. For example, the numbers say nothing about increased or decreased political efficiency, as Baicker (2003) points out. Only one year, 2009, saw total state expenditure for the U.S. fall, but it is hard to determine if this amount is directly related to the growth in state governments, or if there are efficiency issues putting upward pressure on state expenditure. Nevertheless, it is statistically easy to assume that increases in expenditure reflect the increase in state obligations stemming from increased populations, technology inflation, and fiscal fractionalization. In theory, changes to a state's fiscal mix reflect similar and statistically controllable variables.

As a robustness check, the model is estimated using spending categories as a share of total state personal income. The results from this specification are found in Tables 2 and 3 of Appendix C. The results from this robustness check are very much in line with the results from our baseline models, with one exception. Healthcare as a share of state personal income is correlated with RDF usage, rising during withdrawal and falling during deposit. Regardless, the findings in our baseline model appear robust across specifications.

## 6 Conclusion

While much has been written about the broad level affects of RDF balances on state fiscal stress, no study has undertaken the task of attempting to disentangle these effects. This paper attempts to do so, and finds some very interesting results. First, RDF adoption does in fact appear correlated with state specific fiscal stress, most notably; states experiencing a fiscal deficit were over 32% more likely to adopt a fund the following year. This result confirms what numerous papers in the literature have assumed, that adoption was borne out of state fiscal

stress. Such behavior suggests that state have been proactive in reducing fiscal stress, though many continue to experience it.

The heart of the paper deals with the specific effects RDF usage may have on spending categories. In this paper, the categories that make up the largest portion, over 75%, of TGFE were chosen. The categories include education, infrastructure, social assistance, healthcare, and capital projects spending. Utilizing a median voter framework, several hypotheses are formed about the possible impact of a state depositing and withdrawing funds on that state's fiscal mix, the relative shares of each spending category. Employing simple fixed effects panel estimation for the years 1975—2011 and controlling for various demographic, socioeconomic, and institutional factors, the paper finds that RDF usage is significantly correlated with changes to states' fiscal mix. Education and infrastructure appear to be slightly crowded out by RDF usage, especially in states with RDF balances at least 5% of TGFE, where both categories see their shares of TGFE fall by about 1% as a result of depositing and withdrawing from a RDF. These results suggest that both education and infrastructure are weakly crowded out by RDF usage. Social assistance and capital projects spending shares appears positively correlated with RDF usage in high balance states rising 2.58% and 2.69% respectively. Overall, RDFs appear to assist states in maintaining shares of education, social assistance, and capital projects during weak economic periods, while crowding out education and infrastructure during strong economic periods.

Aside from adding to the literature on fiscal institutions, the paper implies that states are choosing to boost RDF balances at the expense of their education and infrastructure budget shares. As mentioned above, this is likely occurring due to increases in social assistance and healthcare spending at the state level and the heightened need for these services during weak

economic periods. States should be vigilant with their RDF deposit and withdrawal decisions, balancing the dual needs of healthy balance reserves and assistance during weak economic periods. One way in which states can avoid crowding out spending categories when using their RDFs is to focus on generating more robust tax revenues in order to generate revenue surpluses. Further, given the importance most states now place on accumulating and maintaining balances, strong economic periods should be utilized for substantial revenue generation.

Future research should be turned to impacts on taxes and revenues. There is some evidence that RDF usage is correlated with a reliance on lower tax revenue and non-traditional forms of revenue generation, this should be investigated further. Additionally, future research should tackle the specific rules governing RDF usage, to see if various rules affect the effects found in this paper. Lastly, while RDF adoption does not appear correlated with existing fiscal institutions, such as balanced budget rules, tax and expenditure limits, and debt limits, RDF balances are likely to be correlated with these institutions as each alters a state's ability to raise tax revenue and expend revenue among budgetary categories.

## Appendix A

Table A.2 Rainy Day Funds

| | RDF Adoption Year | Avg. RDF balance as of FY2006 | Balance as % of TGFE | > than 5% of TGFE |
|---|---|---|---|---|
| Alabama | 2008 | 419 | 6% | X |
| Arkansas | 1986 | 650 | 11.4% | X |
| Arizona | 1990 | 0 | 0 | |
| California | 1985 | 10,816 | 11.8% | X |
| Colorado | 1983 | 0 | 0 | |
| Connecticut | 1979 | 1,113 | 5.6% | X |
| Delaware | 1977 | 161 | 5.1% | X |
| Florida | 1973 | 1,069 | 4.1% | |
| Georgia | 1976 | 793 | 4.5% | |
| Idaho | 1984 | 109 | 4.9% | |
| Illinois | 2004 | 0 | 0 | |
| Indiana | 1982 | 328 | 2.7% | |
| Iowa | 1992 | 392 | 7.8% | X |
| Kansas | 1993 | 0 | 0 | |
| Kentucky | 1983 | 119 | 1.4% | |
| Louisiana | 1990 | 681 | 8.8% | X |
| Maine | 1985 | 80 | 2.8% | |
| Maryland | 1986 | 759 | 6.1% | X |
| Massachusetts | 1986 | 2,155 | 8.4% | X |
| Michigan | 1977 | 2 | 0 | |
| Minnesota | 1981 | 1,113 | 7.2% | X |
| Mississippi | 1982 | 73 | 3.7% | |
| Missouri | 1992 | 247 | 3.5% | |
| Montana | 2012 | 0 | 0 | |
| Nebraska | 1983 | 274 | 9.4% | X |
| Nevada | 1991 | 184 | 6.3% | X |
| New Hampshire | 1987 | 69 | 5.2% | X |
| New Jersey | 1990 | 560 | 2.0% | |
| New Mexico | 1978 | 798 | 14.7% | X |
| New York | 1970 | 944 | 2.0% | |
| North Carolina | 1991 | 629 | 3.7% | |
| North Dakota | 1987 | 100 | 10.4% | X |
| Ohio | 1981 | 1,011 | 4.1% | |
| Oklahoma | 1985 | 496 | 9.0% | X |
| Oregon | 2005 | 622 | 10.2% | X |
| Pennsylvania | 1985 | 512 | 2.1% | |
| Rhode Island | 1985 | 95 | 3.1% | |
| South Carolina | 1978 | 154 | 2.7% | |
| South Dakota | 1991 | 137 | 12.0% | X |
| Tennessee | 1973 | 325 | 3.6% | |
| Texas | 1987 | 2,001 | 3.4% | |
| Utah | 1986 | 255 | 5.6% | X |
| Vermont | 1988 | 52 | 4.7% | |
| Virginia | 1992 | 1,065 | 7.0% | X |
| Washington | 1981 | 4 | 0 | |
| West Virginia | 1994 | 359 | 10% | X |
| Wisconsin | 1981 | 0 | 0 | |
| Wyoming | 1982 | 146 | 12% | X |
| Total | | 32,498 | 6.0% | |
| Source: NASBO and The U.S. Census Bureau, 1970-2012. Dollar amounts in millions | | | | |

## Appendix B

Table B.2 U.S. Census Bureau Definitions of Spending Categories

| | includes | excludes |
|---|---|---|
| **Education** | Schools, colleges, and other educational institutions (e.g., for blind, deaf, and other handicapped individuals) and educational programs for adults, veterans, and other special classes. ***Higher Education*** includes activities of degree-granting post-secondary institutions operated by the state and local governments. ***Elementary and Secondary Education*** comprises payments for instructional, support services and other activities of local public schools for kindergarten through high school programs. This includes the operation of public schools, construction of school buildings, purchase and operation of school buses, and other services ancillary to the provision of public schools. Revenue and expenditure for dormitories, cafeterias, athletic events, bookstores, and other auxiliary enterprises financed mainly through charges for services are reported on a gross basis in both higher and elementary-secondary education. ***Other Education*** includes state educational administration and services, tuition grants, fellowships, aid to private schools, and special programs. | agricultural extension services and experiment stations are classified under *Natural Resources* and hospitals serving the public are classified under *Hospitals*. |
| **Infrastructure** | ***Highways:*** Construction, maintenance, and operation of highways, streets, and related structures, including toll highways, bridges, tunnels, ferries, street lighting and snow and ice removal. ***Sewerage and Solid Waste Management.*** | |
| **Social Assistance** | ***Cash Assistance***. Direct cash payments to beneficiaries of public welfare programs. And Cash payments to beneficiaries (including withdrawals of retirement contributions) of employee retirement, unemployment compensation, workers' compensation, and disability benefit social insurance programs. ***Public Welfare***. Support of and assistance to needy persons contingent upon their need. Excludes pensions to former employees and other benefits not contingent on need. Expenditures under this heading include: ***Cash Assistance*** paid directly to needy persons under the categorical programs (Old Age Assistance, Aid to Families with Dependent Children, Aid to the Blind, and Aid to the Disabled) and under any other welfare programs; *Vendor Payments* made directly to private purveyors for medical care, burials, and other commodities and services provided under welfare programs; and provision and operation by the government of welfare institutions including nursing homes not directly associated with a government hospital. ***Other Public Welfare*** includes payments to other governments for welfare purposes, amounts for administration, support of private welfare agencies, and other public welfare services. | Cost of administering insurance trust activities, state contributions of programs administered by the state or by the Federal Government, intergovernmental expenditure for support of locally administered employee-retirement systems, and noncontributory gratuities paid to former employees.<br><br>***Health and Hospital*** services provided directly by the government through its own hospitals and health agencies, and any payments to other governments for such purposes are classed under those functional headings rather than here. |
| **Healthcare** | Outpatient health services, other than hospital care, including: public health administration; research and education; categorical health programs; treatment and immunization clinics; nursing; environmental health activities such as air and water pollution control; ambulance service if provided separately from fire protection services; and other general public health activities such as mosquito abatement. Financing, construction, acquisition, maintenance or operation of hospital facilities, provision of hospital care, and support of public or private hospitals. ***Own Hospitals*** are facilities administered directly by the government concerned; ***Other Hospitals*** refers to support for hospital services in private hospitals or other governments. | Nursing homes are included under *Public Welfare* unless they are directly associated with a government hospital. |
| **Capital Outlays** | Direct expenditure for contract or force account construction of buildings, and other improvements, and purchase of equipment, land, and existing structures, and for payments on capital leases. Includes amounts for additions, replacements, and major alterations to fixed works and structures. And repairs to such works and structures (Operating Expenses). | Any capital used for or in accordance with a program relating to education, healthcare or infrastructure. |
| Source:U.S. Census Bureau Glossary of State Government Finances, 2008. | | |

## Appendix C

Table C.2.1 Coefficients of Variation Among Spending Category Shares: Comparing High RDF Balance States to Low RDF Balance States

| | $\frac{educ}{totgenexp}$ | $\frac{infrast}{totgenexp}$ | $\frac{social\ assistance}{totgenexp}$ | $\frac{health}{totgenexp}$ | $\frac{capital}{totgenexp}$ |
|---|---|---|---|---|---|
| **CV (<5%)** | 0.0401/0.2420 = **0.1657** | 0.0628/0.1310 = **.4793** | 0.0912/0.1261 = **0.7232** | 0.0956/0.1743 =0 .5447 | 0.0551/0.1420 = **0.3880** |
| **CV (>5%)** | 0.0388/0.2419 = 0.1603 | 0.0622/0.1310 = .4748 | 0.0923/0.1345 = 0.686 | 0.1009/0.181= **0.578** | 0.0503/0.1423 = .3517 |

Source: U.S. Census Bureau Annual Fiscal Survey, 1975-2011.

Table C.2.2 RDF Usage and The Fiscal Mix: Fixed Effects Panel Estimation to Check Robustness

| | educshare | infshare | socialshare | healthshare | capshare |
|---|---|---|---|---|---|
| rdfchangeneg | 0.508 | -0.043 | -1.451 | -0.930 | 0.176 |
| | (2.32)** | (0.78) | (2.89)*** | (2.44)** | (2.20)** |
| rdfchangepos | -2.036 | -0.882 | -2.449 | 0.993 | -0.390 |
| | (3.26)*** | (1.17) | (1.65)* | (0.06) | (1.31) |
| funding | 1.964 | 1.221 | | | |
| | (1.76)* | (1.97)* | | | |
| medinc | 2.472 | 2.647 | -2.937 | -4.117 | 1.001 |
| | (1.17) | (1.85)* | (3.30)*** | (4.32)*** | (1.90)* |
| aged | -6.113 | -0.812 | 1.004 | 0.532 | -5.121 |
| | (2.45)** | (2.16)** | (1.61)** | (1.91)* | (1.89)* |
| kids | 4.033 | -0.330 | 2.761 | -0.671 | 0.118 |
| | (3.08)*** | (1.06) | (1.04) | (0.91) | (0.79) |
| minority | -1.822 | -0.443 | 0.099 | 0.420 | -3.562 |
| | (1.13) | (2.99)*** | (0.73) | (2.82)*** | (1.98)* |
| pop | -0.066 | 1.609 | 5.321 | 0.993 | 4.778 |
| | (0.58) | (1.70)* | (2.78)*** | (3.02)*** | (3.44)*** |
| _cons | 38.554 | 31.889 | 42.550 | 48.328 | 31.893 |
| | (6.39)*** | (11.77)*** | (10.24)*** | (10.93)*** | (9.44)*** |
| $R^2$ | 0.29 | 0.36 | 0.39 | 0.21 | 0.34 |
| $N$ | 1,776 | 1,776 | 1,776 | 1,776 | 1,776 |

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

coefficients on rdfchangeneg and rdfchangepos are scaled to millions

Table C.2.3 RDF Usage and The Fiscal Mix: Fixed Effects Panel Estimation with High Balance Indicator Robustness Check

| | educshare | infshare | socialshare | healthshare | capshare |
|---|---|---|---|---|---|
| rdfchangeneg | 0.012 | 0.617 | -0.518 | 2.093 | 0.185 |
| | (1.11) | (0.47) | (0.89) | (2.14)** | (2.04)** |
| rdfchangepos | -0.567 | -0.376 | 1.657 | -1.433 | 0.312 |
| | (1.21) | (1.13) | (2.24)** | (1.72)* | (0.44) |
| five | -0.221 | -0.011 | 0.100 | 0.001 | 0.224 |
| | (3.31)*** | (1.66)* | (1.85)* | (0.66) | (1.78)* |
| rdfchangeneg*five | 0.334 | -2.207 | 2.306 | 0.171 | 1.023 |
| | (2.06)** | (2.08)** | (2.74)*** | (1.64)* | (2.44)** |
| rdfchangepos*five | -2.002 | -0.443 | 0.425 | -0.467 | 1.452 |
| | (3.22)*** | (1.71)* | (1.71)* | (2.42)** | (1.88)* |
| funding | 1.004 | 1.126 | | | |
| | (2.58)** | (3.64)*** | | | |
| medinc | 1.889 | 3.223 | -6.225 | -8.231 | 5.632 |
| | (0.77) | (0.66) | (2.25)** | (3.05)*** | (0.67) |
| aged | -2.005 | -1.003 | 0.831 | 0.0993 | -3.768 |
| | (1.79)* | (0.56) | (1.98)* | (1.44) | (1.69)* |
| kids | 4.034 | -1.654 | 1.002 | -0.023 | 0.245 |
| | (1.88)* | (1.89)* | (3.43)*** | (0.44) | (2.03)** |
| minority | -1.643 | -0.938 | 0.487 | 4.238 | -2.000 |
| | (0.75) | (1.77)* | (1.73)* | (2.42)** | (2.11)** |
| pop | -2.071 | 2.334 | 2.635 | 3.116 | 2.994 |
| | (3.44)*** | (1.99)* | (3.15)*** | (2.08)** | (3.46)*** |
| _cons | 12.003 | 16.428 | 27.003 | 53.113 | 11.324 |
| | (18.14)*** | (10.51)*** | (17.47)*** | (14.67)*** | (13.01)*** |
| $R^2$ | 0.29 | 0.19 | 0.23 | 0.31 | 0.17 |
| $N$ | 1,776 | 1,776 | 1,776 | 1,776 | 1,776 |

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

coefficients on rdfchangeneg and rdfchangepos are scaled to millions

# Essay 3. Where is the Rain? The Effect of Fiscal Restraints on RDF Balances Among U.S. States, 1975—2011

**Abstract**

For more than two decades states have vacillated from periods of fiscal health to periods of fiscal stress, mostly due to negative macroeconomic shocks. During this time, states have relied on existing fiscal restraints, adopted new ones, and adopted rainy day funds in an attempt to mitigate fiscal stress and improve the long run sustainability of a state's budget. Fiscal restraints include balanced budget rules, tax and expenditure limits, and debt limits, and their purpose is to mitigate fiscal stress by restraining spending and revenue generation. Rainy day funds have become popular tools among states to reduce fiscal stress during weak economic periods. This paper analyzes the potential for fiscal restraints to effect rainy day fund accumulation. A Fixed-Effects panel estimation indicates that revenue limits and stringent balanced budget rules appear significantly correlated with rainy day fund share of total general fund expenditure. Revenue limiting laws reduce the share by 1.96 percentage points. Stringent balanced budget rules reduce the effect of revenue surpluses on the share, with stringent rule states having lower rainy day fund shares by about 9 basis points for every $100 million in surplus revenue. This effect is exacerbated in states with both a balanced budget rule and revenue limiting law. Here the share of RDF falls by over 2 full basis points compared with non-stringent rule and non-revenue limiting states for every $100 million in surplus revenue.

## 1 Introduction

As states experience the various expansions and contractions associated with the business cycle, they have increasingly focused their efforts on adopting fiscal institutions to aid in the sustainability of state budgets. For more than two decades states have vacillated from periods of fiscal health to periods of fiscal stress, mostly due to negative macroeconomic shocks. During this time, states have utilized existing fiscal institutions, and adopted new ones in an attempt to mitigate fiscal stress and improve the long run sustainability of a state's budget. Rainy day funds (RDFs) are very popular fiscal tools which require the accumulation of funds during strong economic periods. Fiscal restraints, such as tax and expenditure limits (TELs), balanced budget rules (BBRs), and debt limits (DLs) are among the various institutions whose intended purpose is to prevent states overextending themselves. Each institution interacts with the budgeting process in different ways, and each leads to varying degrees of fiscal discipline. RDFs have emerged as surprisingly strong means to induce both fiscal discipline and provide states a reasonably efficient way to improve state fiscal sustainability. Currently used by 49 states, RDFs have shown to assist states in mitigating fiscal stress during weak economic periods. However, the ability of RDFs to curb fiscal stress relies crucially on a state's ability to accumulate significant fund balances.[1] Due to the various ways each fiscal restraint have shown to interact with states budgets, there is reason to believe that such restraints potentially affect the ability of a state to accumulate significant RDF balances. Currently, all states have a RDF and at least one fiscal restraint, 40 have at least a RDF and two restraints, and 20 have a RDF and three restraints.[2]

No study, at the time of writing, has investigated the effect of the various fiscal restraints

[1] Joyce (2001) and Wagner (2006) suggest that fund balances should be at least 5% of total general fund expenditure (TGFE). More recent research, including Hou and Duncombe (2008) find that states should have RDF balances as high as 15% of TGFE in order to legitimately reduce fiscal stress.

[2] Data on fiscal institutions collected from the NASBO and NCSL, as well as an updated versions of the data used in Wagner (2006) and Rose (2008)

on a state's RDF balance. This paper adds to the literature on fiscal institutions by investigating the interaction of fiscal restraints and RDF balances. RDFs represent a popular and reasonably efficient way for states to save money and better prepare for future fiscal angst. If the presence of fiscal restraints has an apparent impact on a state's rainy day fund balance, then understanding this impact would be important to the design and implementation of a state's fiscal policies. The central question of this paper is: what affect do tax and expenditure limits, balanced budget rules and/or debt limits have on the balance levels of state RDFs?

A fixed effects panel estimation indicates that revenue limits and stringent BBRs appear significantly correlated with RDF balances as a percentage of total general fund expenditure (TGFE). Revenue limits reduce the share by 1.4%. Stringent BBRs reduce the effect of revenue surpluses on the share, with stringent rule states having lower RDF shares by about 9 basis points for every $100 million in surplus revenue. This effect is exacerbated when a state has both a revenue limit and stringent BBR. Here, the share of RDF falls by over 2 basis points compared with non-stringent and non-revenue limiting states for every $100 million in surplus revenue.

## 2 Literature Review

Previous literature on RDFs shows that they create incentives and obligations that alter the fiscal decisions of states. Empirically, Gold (1983) and Douglas and Gaddie (2001) find evidence that adoption was primarily an outgrowth of the 1980—1983 recessions, suggesting that states did indeed adopt RDFs as a means to avoid future fiscal crises. Sobel and Holcombe (1996) and Douglas and Gaddie (2002), both studying the 1990—1991 recession, found that expenditures in states with RDFs fell by less than states without funds, suggesting that RDFs have helped states

smooth expenditures. A more recent study, Hou and Duncombe (2008), finds that adopting a RDF increases state saving between 2-3 percentage points. Overall, RDF adoption and usage has been correlated with an easing of fiscal stress in states that accumulate significant fund balances. Therefore, it is crucial for states to accumulate reasonably large balance levels in order to both smooth expenditure over the business cycles, and avoid tax increases to reduce potential budget deficits.

In an early empirical study of BBRs, the ACIR (1987) created an index of stringency for BBRs, and used cross-section data from 1984 to find that stringent BBRs are associated with lower state deficits. On the other hand, von Hagen (1991), using a panel of data from 1975—1985, tested the same relationship and found no statistically significant impact of BBRs on deficits, but did find that stringent BBRs are associated with lower capital debt. In a panel of 48 states from 1965—1992, Alesina and Bayoumi (1996) find that stringent BBRs are associated with larger average budget surpluses. Nevertheless, there are potentially adverse outcomes resulting from states with stringent BBRs. Bayoumi and Eichengreen (1995) find that states with stringent BBRs undertook less fiscal stabilization than those states with weaker rules, suggesting that states with stringent rules were less impacted by cyclical economic fluctuations. Levinson (1998), analyzing the period 1969—1995, finds that states with stringent BBRs experience greater cyclical variability and are more prone to fiscal stress over the business cycle. This result is partly due to the presence of state tax and expenditure limits, which also reduces the flexibility of a state to alter their fiscal mix. In their investigation, Fatas and Mihov (2006) find that BBRs may impair a state's ability to run countercyclical economic policy and slow the pace of recovery. Overall, BBRs offer varying degrees of success with respect to reducing fiscal stress. On one hand, stringent rule states have lower debt and a much smaller likelihood of fiscal deficit.

For example, Connecticut, a weak BBR state, had FY2012 debt per capita over $25,000, while Tennessee, a stringent BBR state, had FY2012 debt per capita less than $5,000. Further, Connecticut has a relatively weak statutory debt ceiling, while Tennessee lacks an explicit debt limit. Lastly, both states have expenditure limiting laws and sizable RDF balances (Both states have RDF balances greater than 5% of TGFE). On the other hand, stringent BBRs can reduce the ability of a state to respond to economic shocks without raising taxes or cutting expenditure.

Previous literature on the effects of TELs is rather mixed. Abrams and Dougan (1986), using cross-section data from 1980, find that spending in states with TELs is the same as in states without such limits. Cox and Lowery (1990) and Shadbegian (1996) use panel data from some subset of the years 1960–1990, and all three find that state TELs have had little to no effect on spending, some effect on revenues, and have helped curtail the growth of state governments. Krousser, McCubbins, and Moule (2008) use a "quasi-experimental" approach in which they examine changes within a given state following the adoption of TELs instead of comparing TEL states to non-TEL states, and find little impact on state spending but relatively small impacts on state revenues. Poulson and Kaplan (1994) study 22 states with TELs from 1946–1990 and find that the institution is associated with lower expenditures as a share of personal income in several states with TELs.

Like other fiscal restraints, previous literature has focused on the rules governing debt limits. Moak (1982) argues that referendum requirements should be most effective in limiting debt. In contrast to this, Buchanan (1958) argues that voters enjoy benefits but dislike taxes, TELs will be biased toward debt financing, and debt ceilings are effective in constraining debt. Kiewiet and Szakaly (1996) argue that legislative supermajority requirements may be ineffective. Several early studies find evidence of a negative relationship between debt-limit restrictiveness

and government borrowing. Pogue (1970), in a study of 48 states in 1957 and 1962, finds a negative correlation between debt-limit restrictiveness and debt, and that this effect is primarily due to lower spending rather than higher taxes. Abrams and Dougan (1986), in a study of all 50 states in 1980, find that debt limits have no impact on per capita spending. Clingermayer and Wood (1995) find that debt ceilings, public referenda, and legislative supermajority requirements have no impact on the growth of long-term state debt.

In summary, the literature on fiscal institutions has shown mixed results with respect to these institutions inducing fiscal discipline. RDFs appear to do a good job in allowing states to smooth expenditures over the business cycle, and are associated with higher savings and lower deficits and debt. BBRs are efficient in reducing deficits and debt, but the stringency of these rules is crucial for this result. However, strong BBRs may limit a state's ability to respond to fiscal shocks and increase the variability of their fiscal mix. TELs appear to slow down the growth of state governments through revenue limits, but have had little impact on state spending. Debt limits have had very little discernable impact on the levels of total state debt held by states, but state specific debt ceilings are associated with less debt per capita.

## 3 RDFs and Fiscal Restraints

RDFs and fiscal restraints have historically had large support across party lines and are thought to curb potential political opportunism during the budgeting process (Rose, 2010). BBRs and debt limits have each existed for well over a hundred years, many written into state constitutions, and rarely changing over time.[3] RDFs and TELs on the other hand, are relatively recent

[3] California is an exception, recently amending their constitution by voter referendum to adopt a constitutionally stringent BBR (NASBO).

innovations to state budgeting, largely brought about by the severe fiscal stress of the late 1970s and early 1980s (Douglass and Gaddie, 2001). BBRs, debt limits, and TELs are intended to assist in inducing fiscal discipline by placing restrictions on the overall size of a state's budget relative to incoming revenues, or in the case of tax limits, reducing the amount of revenue that can be raised (Rose, 2010). RDFs work by providing elected officials an outlet for which they can save surplus revenue for use during weak economic periods (Wagner, 2003). Again, the focus of this paper is to investigate the impact BBRs, TELs, and debt limits have on a state's ability to accumulate RDF balances. Fiscal restraints that restrict expenditures and/or taxes have the potential to also restrict or assist states in placing significant money into their RDFs by affecting the ability to have robust revenues. Similar to other studies on fiscal institutions (Baicker, 2003; Rose, 2008) this paper assumes a basic median voter framework to motivate the empirical approach. A central assumption of this paper is that the electorate applies pressure to elected officials to use their RDFs to help smooth consumption of public services.[4] In the proceeding sections, each institution will be placed within this context, and several hypotheses related to their impact on state RDF balances will be formed.

### 3.1 RDFs

While each state has their own specific rules for RDFs, the basic idea is the same across states. During strong economic periods, when revenues are robust and spending on cyclically-sensitive spending is low, a state may realize surplus tax revenue. Some or all of this surplus can then be saved by placing it into a RDF. Then, during weak economic periods, when revenues are anemic and spending on commitments are relatively higher, a state may experience fiscal stress. Money

[4] This would in part explain the quick proliferation of RDFs immediately after the severe fiscal stress of the early 1980s, a period marked by high political turnover (Wagner, 2006).

within a RDF can be withdrawn and used to mitigate painful expenditure cuts or tax increases necessary to reduce or eliminate potential fiscal deficits. Most states grant their elected officials considerable autonomy in how RDFs are used, while some have strict deposit and withdrawal rules (Wagner, 2006). Historically, RDFs have assisted states in reducing fiscal stress when significant balances exist, but many states routinely deposited too little money into their funds to significantly reduce fiscal stress (Joyce, 2001). Previous literature cites weak deposit and withdrawal rules as contributing factors to low RDF balances, but the effects appears very small (Hou and Duncombe, 2008). Recent data suggest that a surge in RDF balances has occurred, signaling that states are more focused on accumulating high balances.[5] This is partly due to credit rating agencies who often point to RDF balances as a strength or weakness for a state.[6] In the time immediately following the Great Recession, states closed budget deficits by withdrawing modest amounts of RDF balances, raising some taxes, but primarily through expenditure cuts (Inman, 2012).

Over the past three decades, states have increasingly adopted and utilized RDFs. Figure 3.1 shows the behavior of RDF balances as a percentage of TGFE from 1975—2011 for the 48 contiguous U.S. states.

[5] Despite continued fiscal stress, the national average RDF balance rose over 50% from 2010-2012.

[6] A 2013 credit rating report for the state of Connecticut, rated by Moody's, suggested that a weakness of the state was "the modest rainy day fund".

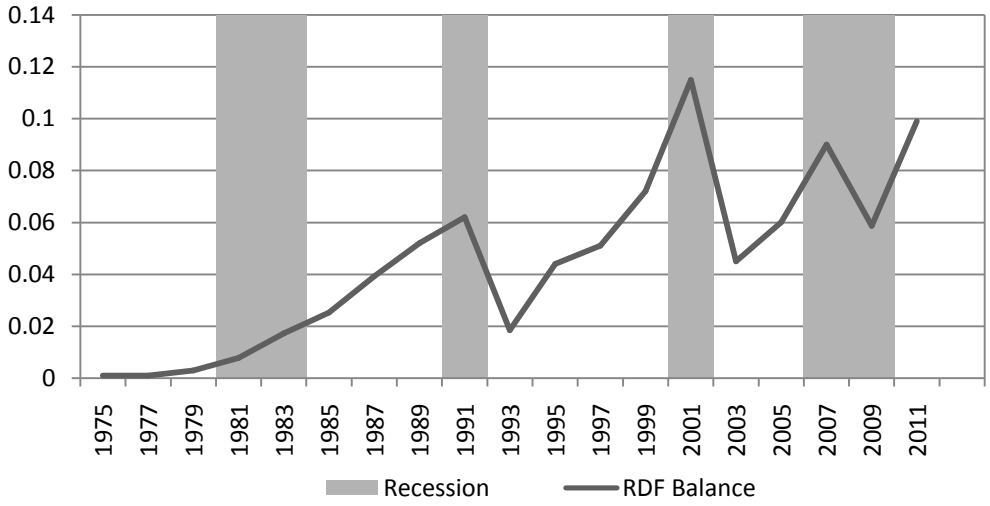


Figure 3.1 Total RDF Balances as % of Total General Fund Expenditure, US States 1975-2011

Source: NASBO and US Census Bureau, 1975-2011.

This buildup of funds reflects both the increased adoption of funds among states in the 1980s (Douglass and Gaddie, 2001), as well as the attempt of many states to better prepare for weak economic periods (Sobel and Holcombe, 1996). From 1994—2000, states deposited over $40 billion into their RDFs, amounting to over 11% of TGFE. From 2001—2003, in the immediate aftermath of the 2001 recession, states drew down their RDFs to about $9 billion, less than 5% of TGFE.[7] The cyclical nature of RDF usage reflects the major recessionary periods faced by U.S. states in 1990—1991, 2001—2002, and 2007—2008.

### 3.2 Balanced Budget Rules

Similar to RDFs, each state has their own version of a BBR, but again, the intent is nearly constant across states. Conventional wisdom suggests that a balanced budget rule induces fiscal discipline by requiring a state's expenditure be less than or equal to incoming tax revenues. In

[7] All dollar amounts here and for the rest of the paper are deflated to 2000—2001 $U.S., and all calculations here and for the rest of the paper exclude Alaska and Hawaii.

reality, the term BBR is a misnomer. It implies a complete balancing of the state budget, i.e. expenditures equaling tax revenues. However, in practice BBRs typically refer to a restriction on the allowed time a state can run a fiscal deficit. Stringent rules mandate that the state close their deficit by the end of the current fiscal year or by the end of the next fiscal year either by cutting spending or increasing taxes (von Hagen, 1991).[8] Weak rules allow deficits to persist for several years or allow deficit reduction by debt financing. While weak rule states do typically have more persistent deficits and higher debt, these states have been remarkably quick to balance their budgets after weak economic periods. In fact, states appear compelled to balance their general fund budgets even when deficit carryover is permitted (Hou and Smith, 2006). Regardless, given that stringent BBRs are associated with fewer deficits and lower debt, the presence of such a rule matters.

From a Median Voter perspective, BBR stringency reflects public support for the elimination of fiscal stress brought about by deficit financing of imbalanced budgets. Historically, states have closed budget deficits by expenditure reduction during weak economic periods, though such reductions were at times mitigated by withdrawals from a RDF (Poterba, 1995). While states have the option to raise revenues though tax increases, these policies are politically unpopular and used sparingly.[9] Considering that many states have explicit debt limit laws, RDFs appear as a good option for deficit reduction. Recall, the purpose of RDFs is to mitigate expenditure cuts or tax increases during weak economic periods. If a state has a stringent BBR, elected officials are under pressure to have balanced budget regardless of economic health (Poterba, 1995). Therefore, one could imagine that states with stringent BBRs may feel

[8] Alabama and Oklahoma require mandatory reductions in spending to keep their budgets balanced, though this rule is extremely rare.

[9] Inman (2010) points out that states relied on deficit financing, expenditure cuts, and modest RDF withdrawal to close budget deficits during the 1990s and early 2000s. From 2008 to 2010, only 12 states sought revenue increases as a means to reduce their deficits (CBPP, 2012).

heightened scrutiny to accumulate high RDF balances, as such funds are a good option for deficit reduction. On the other hand, stringent BBRs apply pressure to states to have expenditures as close to revenues as possible (Rose, 2010). Since states have historically closed budget deficits largely with expenditure cuts, this would suggest that states tend to err on the side of lower revenues.[10] Lower revenues do not translate well into sizable RDFs, as lower revenues do not produce high budget surpluses. In addition, since stringent rule states are associated with fewer fiscal deficits, they may feel less pressure to have high RDF balances. For some anecdotal guidance, Figure 3.2 shows average RDF balances as a percentage of TGFE in states with and without stringent BBRs.

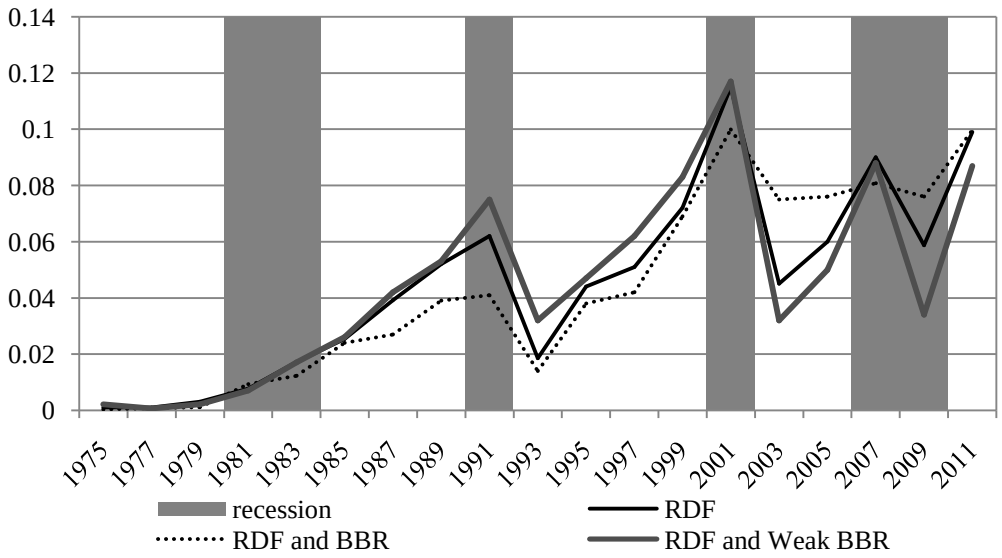


Figure 3.2 RDF Balance as % of Total General Fund Expenditure Across BBR type, US States 1975-2011

Source: NASBO and NCSL, 1975-2011.

Evidence from the Figure 3.2 suggests that stringent rule states have similar RDF balances to weak rules states, though the behavior does appear different over the time period. First, it seems

[10] Following the Tax Revolt era of the 1970s, states began relying on slightly lower taxes to generate necessary revenue (Wagner, 2003).

that stringent rule states consistently had slightly lower balances as a percentage of their TGFE until the early 2000s, when it consistently remained higher than weak rule states. Second, during the mid to late 2000s, stringent rule state RDF balances became less cyclical than weak rule states. By only looking at the graph, it would be hard to understand why the behavior, albeit slight, is different across the two types of states. As mentioned above, stringent rules states are more likely to have expenditures as close to revenues, suggesting that it may be difficult for stringent rule states to generate surplus revenue. Further, electorate pressure to have fiscal discipline will come from the presence of a stringent BBR, meaning that the pressure to have high RDF balances may be somewhat offset by a stringent BBR. Even so, recent RDF balance behavior indicates that stringent rule states, on average, are able to accumulate sizable fund balances, but reluctant to use such funds.

### 3.3 Tax and Expenditure Limits

Tax and expenditure limits (TELs) made their way into state budgeting during the tax revolt era, when direct democracy became a popular tool for limiting the size of state governments (Rose, 2010). New Jersey was the first state to institute a TEL in 1976 and within ten years nineteen states followed suit. Today, thirty states have adopted TELs. These rules fall into five broad categories: (1) limits on revenue based on demographic indexes, such as median income and population growth, (2) limits on expenditures based on similar demographic indexes, (3) voter referendum requirements for tax increases, (4) legislative supermajority requirements for tax or expenditure increases and (5) limits on expenditure to some percentage of revenue forecasts.[11] For the purposes of this paper, these five categories will be grouped by relative stringency. The first

[11] This index is similar to the one used in Martell and Teske (2007), only this paper refines and updates the data used to generate the index. Table A.3 in Appendix A lists each state with their TEL type.

three will be grouped into weak TELs, while the latter two will be considered stringent TELs.

Given that the majority of TELs arose from the direct democracy surge of the late 1970s and early 1980s, it is relatively easy to place them within a median voter framework. In an effort to limit the size of their state and local governments, voters took to the polls and helped establish varying types of TELs, directly applying pressure to elected officials to maintain or enhance fiscal discipline (Abrams and Dougan, 1986; Bails, 1990). Expenditure limits appear correlated with reductions in the growth rate of state governments (Poulson and Kaplan, 1994), while revenue limits are correlated with localities relying on lower property taxes and higher user fees (Mullins and Joyce, 1996). These changes to state and local budgeting may have impacts on a state's ability to accumulate significant RDF balances. For the purposes of this paper, it is assumed that local TELs do not have any direct effect on state budgets, but may alter the electorates "tastes" for government. On one hand, expenditure limits may assist accumulation by restricting the scope of the state government, allowing a state to generate sizable surplus revenues. On the other hand, revenue limits may impede a state's ability to accumulate funds by making surplus revenue hard to realize. In either case, the relative stringency should matter, specifically the supermajority requirement for expenditure and revenue increases. Voter referenda targeting expenditure and revenue limits have shown little in their ability to make sizable changes to state budgeting (Kousser, McCubbins, and Moule, 2008). However, previous studies have investigated their impact on the overall size of the budget, leaving open the possibility that such restrictions do affect a state's ability to accumulate RDF balances. Figure 3.3 shows the average RDF balance among states as a percentage of TGFE for states with expenditure and/or tax limit laws, regardless of stringency.

Evidence from Figure 3.3 indicates that TELs may also be correlated with specific RDF

balance behavior. As states began adopting both TELs and RDFs in the 1980s and 1990s, states with both expenditure and revenue limits were able to accumulate sizable fund balances during boom periods, and withdrew significant amounts during recessionary periods. What is most striking about Figure 3.3 is that the behavior among expenditure and revenue limit states appears intuitive. Revenue limit states consistently have lower average RDF balances, regardless of relative economic health. Expenditure limiting states consistently have higher than average RDF balances. At issue is the effect causing this difference in RDF balance behavior. States with revenue limits may also have low RDF balances because their elected officials favor small governments, including small RDFs. However, this doesn't explain why expenditure limiting states have consistently higher balances. What may explain this behavior is that the electorate is applying different levels of pressure to use RDFs conditional on the presence of an existing TEL. For example, voters in a state with strict expenditure limits may prefer sizable fund balances to help offset fiscal stress during weak economic periods. RDFs create a buffer against these spending limits.[12] On the other side, voters in tax limiting states prefer smaller fund balances because the size of the budget is already being restricted. Therefore, RDFs may represent an additional spending category, rather than a safety net for weak economic periods.[13]

[12] Wagner (2006) shows theoretically how states with existing TELs may use their RDFs to circumvent limiting laws. This occurs because money placed in a RDF is counted as revenue, not expenditure.

[13] It should be noted that only 7 states currently have tax limiting laws.

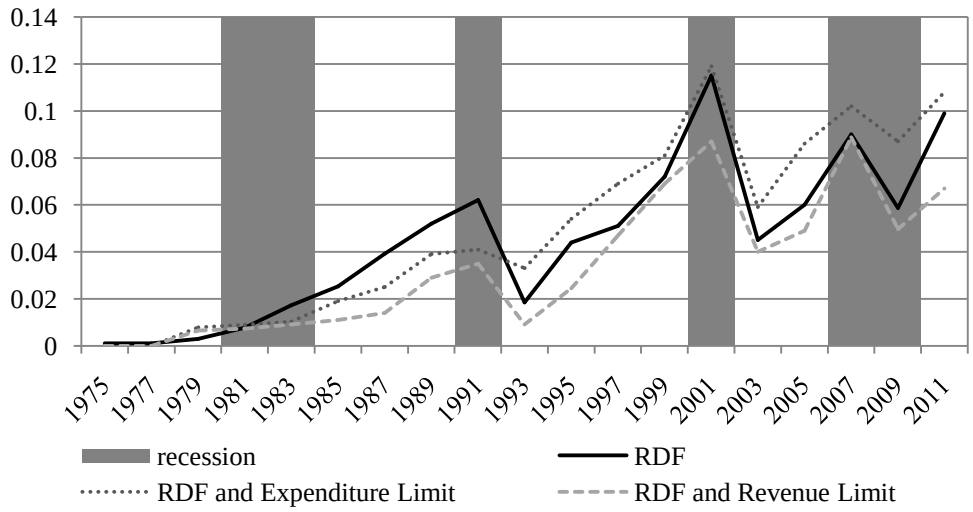


Figure 3. RDF Balances as % of TGFE Across TEL Type, US States 1975-2011.

Source: NASBO and NCSL, 1975-2011.

### 3.4 Debt Limits

Debt has long played an important role in financing state expenditures, specifically for infrastructure spending and deficit reduction during weak economic periods Rose (2010). Nonetheless, fiscal illusion may lead states to rely too heavily on debt financing. Many states adopted debt limits (along with BBRs) in the 19th century amidst allegations of excessive borrowing.[14] There are four main types of debt limits. The most stringent, and least utilized, is an outright ban on guaranteed debt. Less so, but relatively stringent nonetheless, are legislative super majority requirements for any debt issued. Less stringent limits include debt ceilings, usually measured as a percentage of the tax base, and voter referenda requirements. Moak (1982) argues that voters are more fiscally conservative than elected officials, so voter referenda requirements should be the most debt limiting. However, Buchanan (1958) posits that voters like benefits but

[14] Some states even defaulted during this time period, making debt limits a crucial fiscal institution states used to induce fiscal discipline (Nice, 1991).

dislike taxes, and therefore direct democracy will be biased toward debt financing, thus legislative super majority requirements or debt ceilings will be the most effective. Evidence suggests that only outright bans have any significant affect on state debt (Clingermeyer and Wood, 1995). Regardless, the potential impact on RDFs lies in the electorate's preference for public support during weak economic periods. States with stringent debt limits will face greater pressure to have sizable fund balances such that weak economic periods do not drastically reduce expenditures. States with weak or no rules will have less pressure to have high balances because the state can borrow relatively easily to cover deficit reduction during weak economic periods. Alternatively, states with weak or no debt rules may suffer from sustained high debt, and thus electorate pressure may build to have sizable RDF balances to offset any additional accumulation of state debt. Further, stringent limit states may have fewer episodes of fiscal stress, and thus require lower fund balances. Figure 3.4 shows average RDF balance as a percentage of TGFE for states with outright debt bans, and states with less restrictive debt limits.

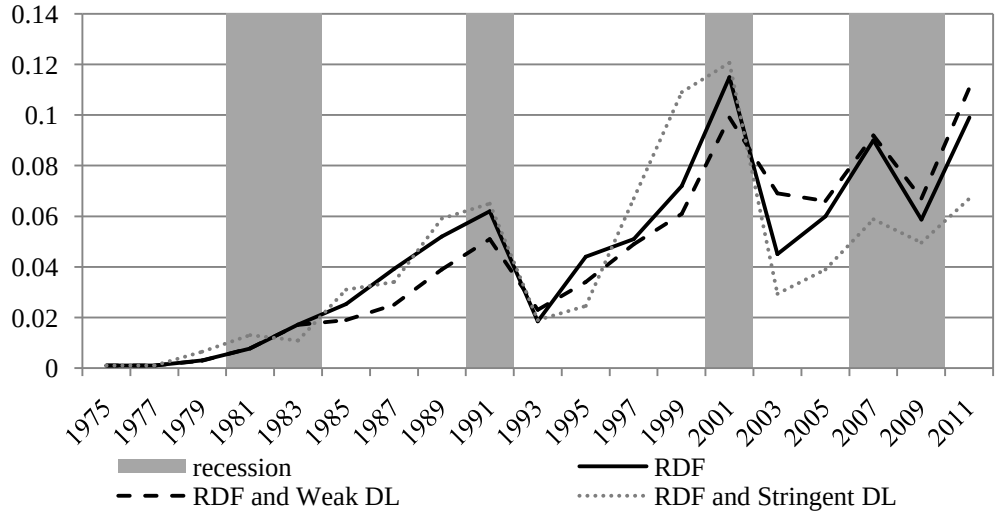


Figure 3.4 RDF Balance as % of Total General Fund Expenditure Across Debt Limit Type, US States 1975-2011

Source: NASBO and NCSL, 1975-2011.

Evidence from Figure 3.4 is the most inconclusive. At times, both weak debt limit states and stringent debt limit states have higher than average RDF balances. Prior to the 2000s, stringent limit states had significantly higher than average balances, while weak limit states had lower than average balances. Most recently, the opposite has been true, with weak rule states accumulating above average balances. However, given the lack of disparity, it is difficult to infer whether debt limit stringency has any impact on a state's ability to generate sizable fund balances. Again, the most interesting behavior occurs after the most recent recession, where stringent limit states appear reluctant to generate sizable fund balances.

## 4 Data and Empirics

In order to investigate the effect of the various fiscal restraints on state RDF balance, this paper employs a panel of U.S. state fiscal data from 1975—2011. Table 3.1 provides means, standard deviations, and brief definitions of each variable. This data includes state specific RDF balances, BBR stringency, TEL type, and debt limit type collected from the National Association of Budget Officers (NASBO), the National Conference of State Legislatures (NCSL), and the U.S. Census Bureau Annual Fiscal Survey.[15] In addition, several state specific expenditure and revenue data are collected from the U.S. Census Bureau, including TGFE, general revenues, and total state debt. Further, demographic data are collected from the U.S. Census Bureau, including population, median income, percent of the population that is 65 years or older, percent of the population that

[15] This is an updated version of the data used in Wagner (2003), Rose (2006), and Sobel and Holcombe (2006) who all kindly made their data available.

is under 18 years old, and percent of the population that is an ethnic minority.[16]

Table 3.1 Means, Standard Deviations and Variable Definitions

| Data | Means (Std. Deviation) | Definition |
|---|---|---|
| tgfe | 30,211.98 (29,087.45) | Total General Fund Expenditure |
| rdf | 1,409.51 (2,873.72) | Total Rainy Day Fund Balances |
| bbr | 0.54 (.23) | =1 if state has stringent BBR, 0 otherwise |
| telexp | 0.69 (.67) | =1 if state has an expenditure limit, 0 otherwise |
| telrev | 0.13 (0.04) | =1 if state has a revenue limit, 0 otherwise |
| debt limit | 0.12 (0.01) | =1 if state as stringent debt limit, 0 otherwise |
| totalbalance | 12,736.66 (33,210.44) | = Total State Revenue – Total State Expenditure |
| totaldebt | 22,087.26 (24,437) | Total State Debt |
| pop | 4.99 (5.1) | Total Population |
| medinc | 0.035 (0.011) | Median Income |
| aged | 11.82 (2.0) | Percentage of the Population over 65 years of age |
| child | 20.81 (2.1) | Percentage of the Population under 18 years of age |
| minority | 19.22 (13.21) | Percentage of the Population that is an Ethnic Minority |

All dollar amounts deflated to 2000—2001 dollars and are in millions.
Source: NASBO, NCSL, ACIR, and U.S. Census Bureau, 1975—2011.

[16] This is an updated version of the data used in Besley and Case (2003), who also kindly made their data available.

BBR stringency is rated by the Advisory Commission on Intergovernmental Relations (ACIR) and encompasses a dichotomous and time invariant indicator variable equaling 1 if the state has a stringent BBR, and 0 otherwise. TEL type is defined by previous literature and readings of state constitutions and is separated into expenditure or revenue limits. The variable representing expenditure limits takes on a value of 1 if the state has a expenditure limit law, and 0 otherwise. The variable representing revenue limit laws takes on a value of 1 if the state has a revenue limit law, and 0 otherwise. TELs vary across states, across types, and across years. Finally, the variable representing debt limits is a time invariant dichotomous indicator equaling 1 if the state has a stringent debt limit, and 0 otherwise. Stringent debt limits are defined as either explicit bans on the accumulation of any debt or a legislative supermajority requirements for debt issuance. General expenditure is defined as all expenditure stemming from each state's general fund, comprising spending on education, infrastructure, healthcare, public safety, and public assistance. Total fiscal balance is defined as total state revenues minus total state expenditures.

State spending data are collected from the U.S. Census Bureau's Annual Survey of State Government Finances, 1975—2011. Data on RDFs, TELs, Debt Limits and Balanced Budget Rules was collected from the National Association of State Budget Officers (NASBO) and the National Conference of State Legislatures (NCSL). Demographics, RDF adoption year, and budget rule data are an updated version of data used previously in much of the literature.

### 4.1 Empirics

In order to investigate the impact of various fiscal restraints on a state's ability to accumulate sizable fund balances, a Fixed-Effects (FE) panel estimation is employed. Using the FE approach

follows other fiscal and political institutions literature (Baicker, 2001; List and Sturm, 2006). The benefit of the FE approach is that it allows for the inclusion of state and year fixed effects, in order to control for some endogeneity. Additionally, the inclusion of demographic and socioeconomic variables further removes state specific effects from the estimated coefficients, and allows some isolation of effects stemming directly from fiscal restraints.

The dependent variable is the RDF balance as a percentage of TGFE for each state in each year. This percentage is chosen because it relates the size of the RDF to the size of the state government. The independent variable *totalbalance* equals the difference between total revenue and total expenditure for each state in each year. In theory, this should be the most determining factor, aside from possible political motivations, in the size of a state's RDF. To test the effects of fiscal restraints, indicators will be added to the model for each type of fiscal restraints. The variables *telexp* and *telrev* represent indicators for whether a state has an expenditure limit and/or a revenue limit respectively. The variable *bbr* indicates if the state has a stringent BBR, while *debtlimit* indicates if the state has a stringent debt limit.

There are two especially important econometric issues to consider with this approach and this data. First, both the BBR and debt limit variables are time-invariant, meaning their effects cannot be directly interpreted. Both will enter their respective regressions interacting with *totalbalance*, which will relate the effect of fiscal balance on RDF balances for states with stringent BBRs/debt limits. In other words, the coefficient will capture the propensity for a state with a stringent BBR/debt limit to add surplus revenue to their RDFs. Second, the use of interaction terms, instead of separate regressions, could causes issues because a pooled model constrains the variance to be equal for each group. To get around this, the model is fully interacted. This prevents the need to assume equal variances across groups in the calculation of

the coefficients.

Lastly, to ensure the FE approach is superior to the Random-Effects approach, a Hausman Test is run to test the coefficients across the two approaches to determine which is more efficient relative to the data. The test produced a significant p-value (chi2( 1) = 89.32 and prob>chi2 = 0.0072). Though the significance is relatively weak, the test confirms that the FE approach is superior to the RE approach for this data.

An initial estimation is carried out to determine the effect of fiscal balance on RDFs. To do so the following baseline model is initially estimated:

$$rdfshare_{it} = \beta_1 + \beta_2 \text{totalbalance}_{it} + \gamma \mathbf{X}_{i,t} + \delta_i + \varphi_t + t_{it} + \varepsilon_{it} \quad (1)$$

where the dependent variable equals the state and year specific RDF balance as a percentage of TGFE for state i in year t. Independent variables include total state fiscal balance, totalbalance, for state i in year t. The vector X includes demographic control variables. Demographic variables include median income, population, percent of the population who age is greater than 65, percent of the population whose age is less than 18, and the percent of the population that is an ethnic minority. Additionally, state fixed effects $\delta_i$, time fixed effects $\varphi_t$, and state specific time trends $t_i$ are included. Lastly, $\varepsilon_{it}$ is a contemporaneous error term.

Equation 1 is augmented to investigate the potential for existing fiscal restraints to impact a state's ability to accumulate RDF balances by employing an interacted FE panel approach. Indicator variables for TELs are added to the model to create:

$$rdfshare_{it} = \beta_1 + \beta_2 totalbalance_{it} + \gamma_1 telexp_{it} + \gamma_2 telrev_{it} + \delta_i + \varphi_t + t_{i,t} + \varepsilon_{it} \quad (2)$$

where indicators, *telexp* and *telrev*, enter the equation to control for the existence of TELs.

Equation 2 is augmented to estimate the impact of debt limits and stringent BBRs on a state's ability to accumulate RDF balances. Since both debt limits and BBRs are represented by a time-invariant indicator variable, they enter the equation interacting with *totalbalance* to create:

$$rdfshare_{it} = \beta_1 + \beta_2 totalbalance_{it} + \gamma_1 telexp_{it} + \gamma_2 telrev_{it} + \theta \boldsymbol{Q}_{it} + \alpha totalbalance_{it} * debtlimit_{it} + \mu totalbalance_{it} * debtlimit_{it} + \rho \boldsymbol{X}_{it} + \delta_i + \varphi_t + t_{i,t} + \varepsilon_{it} \quad (3)$$

where the indicator *debtlimit* enters the equation interacting with *totalbalance* to control for states with stringent debt limits. Lastly, the indicator *bbr* enters the equation interacting with *totalbalance* to control for states with stringent BBRs. **Q** enters the model as a vector of interaction terms for *totalbalance*, *telexp*, and *telrev*. Each variable is interacted with the other two variables to create three interaction terms, as well as a term combining all three.

Finally, to get an idea of how existing fiscal restraints may interact to impact RDF accumulation, an additional augmentation to equation 3 for BBRs is instituted. Since TELs have the ability to limit the amount of state spending and/or state revenue, there is a potential for these rules to interact with existing stringent BBR to significantly affect RDF balances. To test for this, the model takes the form:

$$rdfshare_{it} = \beta_1 + \beta_2 totalbalance_{it} + \gamma_1 telexp_{it} + \gamma_2 telrev_{it} + \theta \boldsymbol{Q}_{it} + \tau \boldsymbol{Z}_{it} + \rho \boldsymbol{X}_{it} + \delta_i + \varphi_t + t_{i,t} + \varepsilon_{it} \quad (4)$$

where **Z** enters the equation as a vector of interaction terms between *telexp*, *telrev*, and *bbr* (*telexp*bbr; telrev*bbr; totalbalance*telexp*bbr; totalbalance*telrev*bbr*). These interactions allow for the estimation of the impact on RDF balances among states with both BBRs and TELs.

### 4.2 Results

Table 3.2 presents the results from each estimation. In the initial estimation (1), *totalbalance* is positively correlated with RDF balances, with RDF share of TGFE rising 1.4 basis points for every 100 million dollars in realized surplus revenue.

In the second estimation (2), the results indicate that revenue limits are negative correlated with RDF balances, with revenue limit states having on average 1.98% lower RDF balances as a percentage of TGFE.

The third estimation (3) reveals the relationship between BBRs and RDF balances. BBRs appear negatively correlated with RDF balances, with stringent rule states having lower RDF shares of TGFE by 9.91 basis points on average.

The final estimation (4) suggests that states with BBRs and revenue limits interact to further reduce RDFs as a share of TGFE. States with both a BBR and revenue limit have 2.6% lower RDF balances as a percentage of TGFE. Further, these states place less of their revenue

Table 3.2 Where is the Rain?: Fixed Effects Panel Estimation

| | rdfshare (1) | rdfshare (2) | rdfshare (3) | rdfshare (3) | rdfshare (4) |
|---|---|---|---|---|---|
| totalbalance | 0.0014 | 0.0017 | 0.0013 | 0.0014 | 0.0012 |
| | (2.31)** | (2.47)** | (2.49)** | (1.74)* | (1.66)* |
| telexp | | 0.0097 | 0.0088 | 0.0092 | 0.0091 |
| | | (1.11) | (1.44) | (1.12) | (0.93) |
| telrev | | -0.0198 | -0.0172 | -0.0116 | -0.0134 |
| | | (2.05)** | (2.45)** | (1.80)* | (1.69)* |
| totalbalance*telexp | | | 0.0077 | 0.0081 | 0.0076 |
| | | | (0.64) | (0.84) | (0.27) |
| totalbalance*telrev | | | -0.0124 | -0.0130 | -0.0115 |
| | | | (1.81)* | (1.92)* | (1.88)* |
| totalbalance*telrev*telexp | | | -0.0098 | -0.0078 | -0.0065 |
| | | | (1.72)* | (1.22) | (0.79) |
| totalbalance*debtlimit | | | 0.0029 | | |
| | | | (0.88) | | |
| totalbalance*bbr | | | | -0.0099 | -0.0086 |
| | | | | (3.22)*** | (2.77)*** |
| telexp*bbr | | | | | 0.0091 |
| | | | | | (0.88) |
| telrev*bbr | | | | | -0.0126 |
| | | | | | (2.11)** |
| totalbalance*telexp*bbr | | | | | 0.0032 |
| | | | | | (0.93) |
| totalbalance*telrev*bbr | | | | | -0.0218 |
| | | | | | (2.37)** |
| medinc | -0.2313 | -0.2451 | -0.2311 | -0.2307 | -0.1988 |
| | (1.39) | (1.92)* | (1.25) | (1.22) | (0.67) |
| aged | -0.2177 | -0.1809 | -0.1313 | -0.1452 | -0.1578 |
| | (0.78) | (0.68) | (0.84) | (1.29) | (1.09) |
| kids | 0.0228 | 0.0181 | 0.0183 | 0.0147 | 0.0159 |
| | (2.38)** | (1.83)* | (1.68)* | (1.69)* | (1.88)* |
| minority | -0.0097 | -0.0125 | -0.0222 | -0.0173 | -0.0165 |
| | (1.72)* | (1.95)* | (1.55) | (1.72)* | (1.11) |
| pop | -8.5423 | 7.3403 | 4.6261 | 2.0083 | 1.9941 |
| | (2.21)** | (2.12)** | (4.13)*** | (3.10)*** | (2.93)*** |
| _cons | 0.0606 | 0.0620 | 0.0732 | 0.0656 | 0.0560 |
| | (9.38)*** | (11.92)*** | (12.65)*** | (11.34)*** | (10.21)*** |
| $R^2$ | 0.33 | 0.38 | 0.74 | 0.57 | 0.58 |
| N | 1,776 | 1,776 | 1,776 | 1,776 | 1,776 |

* p<0.1; ** p<0.05; *** p<0.01

Coefficients on totalbalance interactions are scaled to hundred millions

surplus into their RDF, with such states having a 2.18 basis point lower RDF balances for every 100 million dollars in revenue surplus.

### 4.3 Discussion of Results

Relying upon a FE panel estimation of U.S. states from 1975—2011 the paper finds that existing state fiscal restraints, such as BBRs and TELs are correlated with a state's ability, or willingness, to accumulate sizable RDF balances. From a median voter perspective, non-RDF institutions affect a state's ability to generate high RDF balances by limiting or increasing their ability to raise surplus revenue. Without surplus revenue, states will find it near impossible to generate sizable fund balances, without crowding out other expenditure categories. While significant results were found, the estimation output should be taken with great caution.

The baseline model indicated that high fiscal balances, or surplus revenue, is correlated with an increase in RDF balances as a percentage of TGFE. While modest, a 1.4 basis point increase in share for every $100 million dollars in surplus revenue, the result does confirm the intuition that states experiencing greater revenue surpluses will see higher RDF shares of TGFE. While unsurprising, the result may indicate the need to generate high revenue surpluses in order for states to feel comfortable placing money into their RDFs. Meaning, that while states are likely to place some money into a RDF during strong economic periods, they are much more likely to do so when they experience large amounts of surplus revenue.

The augmented model (2) controls for the existence of TELs. Revenue limits are negatively correlated with a state's RDF balance as percentage of TGFE. This suggests that states with revenue limits find it hard to generate substantial surplus revenue, and thereby find it difficult to have sizable RDF balances. States with revenue limits are correlated with 1.98%

lower RDF balances as a percentage of TGFE. This confirms the intuition that revenue limits, though few in number, do prevent the states that have them from generating revenue surpluses. This may occur because states with revenue limits have such limits to "tame the leviathan" and thus do not find a need for substantial revenue surplus. Alternatively, revenue limits may indeed reduce the ability of a state to generate sizable RDF balances, in which case revenue limit states will find it difficult to have significant balances.

The third estimation (3) sought to uncover the impact of stringent debt limits and stringent BBRs on RDF balances. Debt limits do not appear correlated with RDF balances. Stringent BBRs are correlated with lower RDF balances as a percentage of TGFE by about 9 basis points per $100 million in surplus revenue. This result indicates that regardless of revenue surplus generation, states with stringent BBRs are less likely to put that money into a RDF. As discussed earlier this may speak to the fact that stringent rule states have lower deficits  than weak rules states, and thus do not need as much fiscal stress relief. Therefore, electorate pressure for RDFs may be lower in those states. Nevertheless, this result could also be due to the type of state that would have a stringent BBR in the first place. If stringent rule states create an atmosphere where fiscal discipline is accepted prior to fiscal stress, not because of it, then the need to have RDFs balances is likely much lower than states who have experienced substantial fiscal stress. In this sense, political precedent, not electorate pressure, reduces RDF balances as a percentage of TGFE. It is unclear which is occurring in the results.

The last estimation (4) deals with the need to control for states that have two non-RDF fiscal restraints, such as BBRs and TELs. By interacting stringent BBRs with expenditure and revenue limits, the estimation captures the impact of these institutions on both revenue surplus generation and RDF balances as a percentage of TGFE. Again, expenditure limits do not appear

correlated with RDF balances. States with both stringent BBRs and revenue limits have lower RDF balances as percentage of TGFE by about 2.62%. Additionally, these states appear to place less of their surplus revenue into their RDFs, with such states having RDF balances 2 basis points lower for every 100 million dollars in surplus revenue. These results help to confirm that revenue limits and stringent BBRs apply downward pressure on RDF balances. Previous literature (Rose, 2010) suggest that stringent BBR states attempt to have expenditures as close to revenues as possible. In this sense, the need for balance budgets reduces the ability to generate revenue surpluses, which are then further reduced by the presence of revenue limits.

## 5 Conclusion

There is a broad and deep literature on the impact of fiscal institutions on the various aspects of state budgeting, such as spending, deficits, and taxation. No study, at the time of writing, has turned the focus of this impact on another fiscal institution. This paper does this by investigating the potential impact of fiscal restraints on the ability of a state to accumulate significant RDF balances. In order to gauge the importance of revenue surplus generation, the baseline model is an altered median voter specification in the vein of Besley and Case (2003), with various state and time fixed effects variables along with state specific total fiscal balance (total revenue minus total expenditure) as the independent variables. The baseline estimation finds that revenue surpluses are positively correlated with RDF balances as a percentage of TGFE among states, rising 1.4 basis points for every $100 million dollars in surplus revenue.

The central focus of this paper is to investigate the specific impact of fiscal restraints on RDF balances. First, looking at revenue liming laws the paper finds that such laws are negatively

correlated with RDF balances as a percentage of TGFE, suggesting that revenue limits prevent states from generating high revenue surpluses. The effect is that states with revenue limits see their RDF balances as a percentage of TGFE fall by about 1.96% compared with states absent such limiting laws. Expenditure limiting laws in and of themselves do not appear correlated with RDF balances. Next, the focus was turned to stringent BBRs. Here the existence of stringent BBRs appears to reduce the impact of revenue surplus generation, with stringent rule states seeing RDF balances as a percentage of TGFE fall by over 9 basis points for every $100 million in surplus revenue compared to non-stringent rule states, suggesting that stringent rule states place less surplus revenue into their RDF. Debt limits do not appear correlated with RDF balances. Lastly, the interaction of stringent BBRs and revenue limits appear negatively correlated with RDF balances. In states with stringent BBRs and expenditure limiting laws, RDF balances as a percentage of TGFE are 2.62% lower than states absent these restraints. These states also place less surplus revenue into their RDFs, with RDF balances as a percentage of TGFE about 2.18 basis points lower than states absent these restraints.

In conclusion, evidence is found that existing fiscal restraints do significantly affect a state's ability to accumulate RDF balances. Future work should continue to develop and refine the definitions and data surrounding state fiscal institutions, as historically these have been issues. Additionally, something missing from this analysis is the impact of politics on RDF balances. Given the inherent political nature of state budgeting, politics are likely to play a very important role in a state's ability to accumulate RDF balances. Another possible avenue for future research would be to investigate the spatial component of fiscal institutions, and determine if adoption of various institutions was truly a result of fiscal stress, or a general trend started by a few states in the late 1970s.

## Appendix A

Table A.3 RDFs, BBRs, TELs, and Debt Limits among U.S. states as of FY2012

| | RDF Adoption Year | BBRs (Type) | TEL Adoption year and type | Debt Limit Type |
|---|---|---|---|---|
| Alabama | 2008 | Constitutional (Stringent) | | Constitutional Ban |
| Arizona | 1986 | Constitutional (Stringent) | 1978-Expenditure | Constitutional Ceiling |
| Arkansas | | Statute (Weak) | | Constitutional Ceiling |
| California | 1985 | Constitutional (Stringent)[17] | 1979-Expenditure | Voter Referendum |
| Colorado | 1983 | Constitutional (Stringent) | 1991-Expenditure and Tax | Voter Referendum |
| Connecticut | 1979 | Statute (Weak) | 1991-Expenditure | Statutory Ceiling |
| Delaware | 1977 | Constitutional (Stringent) | 1979-Tax | |
| Florida | 1973 | Constitutional (Stringent) | 1994-Tax | Constitutional Ceiling |
| Georgia | 1976 | Constitutional (Stringent) | | Constitutional Ceiling |
| Idaho | 1984 | Constitutional (Stringent) | 1980-Expenditure | Voter Referendum |
| Illinois | 2004 | Constitutional (Weak) | | Constitutional Ceiling |
| Indiana | 1982 | Statute (Stringent) | 2002-Expenditure | Constitutional Ceiling |
| Iowa | 1992 | Constitutional (Stringent) | 1992-Expenditure | Constitutional Ceiling |
| Kansas | 1993 | Constitutional (Stringent) | | |
| Kentucky | 1983 | Constitutional (Stringent) | | Voter Referendum |
| Louisiana | 1990 | Constitutional (Weak) | 1993-Expenditure | Constitutional Ceiling |
| Maine | 1985 | Constitutional (Weak) | 2005-Expenditure | |
| Maryland | 1986 | Constitutional (Weak) | | |
| Massachusetts | 1986 | Constitutional (Weak) | 1986-Tax | Constitutional Ceiling |
| Michigan | 1977 | Constitutional (Weak) | 1978-Tax | |
| Minnesota | 1981 | Constitutional (Weak) | | |
| Mississippi | 1982 | Statute (Stringent) | 1982-Expenditure | Constitutional Ceiling |
| Missouri | 1992 | Constitutional (Weak) | 1980-Tax | |
| Montana | 2012 | Statute (Stringent) | 1981-Expenditure | |
| Nebraska | 1983 | Constitutional (Stringent) | | |
| Nevada | 1991 | Statute (Weak) | 1979-Expenditure | Constitutional Ceiling |
| New Hampshire | 1987 | Statute (Weak) | | Constitutional Ceiling |
| New Jersey | 1990 | Constitutional (Weak) | 1990-Expenditure | |
| New Mexico | 1978 | Constitutional (Stringent) | | Constitutional Ceiling |
| New York | 1970 | Constitutional (Weak) | | |
| North Carolina | 1991 | Constitutional (Stringent) | 1991-Expenditure | |
| North Dakota | 1987 | Constitutional (Weak) | | |
| Ohio | 1981 | Constitutional (Stringent) | 2006-Expenditure | Constitutional Ban |
| Oklahoma | 1985 | Statute (Stringent) | 1985-Expenditure and Tax | |
| Oregon | 2005 | Constitutional (Weak) | 2000-Tax | |
| Pennsylvania | 1985 | Constitutional (Weak) | | Constitutional Ceiling |
| Rhode Island | 1985 | Constitutional (Stringent) | 1992-Expenditure | |

[17] California voters recently voted in a stringent balanced budget requirement, after decades of the state having a weak balanced budget rule.

| | | | | |
|---|---|---|---|---|
| South Carolina | 1978 | Constitutional (Stringent) | 1980-Expenditure | Constitutional Ceiling |
| South Dakota | 1991 | Constitutional (Stringent) | | |
| Tennessee | 1973 | Constitutional (Stringent) | 1978-Expenditure | |
| Texas | 1987 | Constitutional (Weak) | 1978-Expenditure | Constitutional Ceiling |
| Utah | 1986 | Constitutional (Stringent) | 1989-Expenditure | Constitutional Ceiling |
| Vermont | 1988 | | | |
| Virginia | 1992 | Non-Constitutional (Weak) | | Constitutional Ceiling |
| Washington | 1981 | Statute (Weak) | 1993-Expenditure | Constitutional Ceiling |
| West Virginia | 1994 | Constitutional (Stringent) | | Constitutional Ban[18] |
| Wisconsin | 1981 | Constitutional (Weak) | 2001-Expenditure | Constitutional Ceiling |
| Wyoming | 1982 | Non-Constitutional (Stringent) | | Constitutional Ceiling |
| Source: NASBO and NCSL, 1975—2011. | | | | |

[18] While the West Virginia Constitution does not have an explicit ban on debt, incurring debt does require an amendment to the state constitution.

# Conclusion

The three essays contained herein illuminate the public finance literature to the secondary effects of various fiscal institutions. In essay one, evidence is found that balanced budget rules choke off environmental expenditure at the state level, but that the presence of environmental interest groups mitigates this effect somewhat. Additionally, a political mismatch between the governor and state legislature further reduces environmental expenditure when the governor is a Republican. In essay two, evidence is found that in the attempt to accumulate sizable rainy day fund balances states have been altering their fiscal mix among their general fund. Spending on education, infrastructure, social assistance, and capital projects all see their relative shares change when a state decides to use their rainy day fund. In essay three, evidence is found that existing fiscal restraints, such as balanced budget rules and revenue limits significantly affect a state's ability to accumulate sizable rainy day fund balances. Both balanced budget rules and revenue limits reduce the size of rainy day funds on average.

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# Vita

Todd Richard Yarbrough was born in San Antonio, Texas in 1985 to James R. Yarbrough Jr. and Barbara Hudson Yarbrough. An only child, he attended Brookside Elementary School in Kingsport, Tennessee from 1990—1996, Ketron Middle School from 1996—1999, and Sullivan North High School from 1999—2003. Todd earned a Bachelor of Science in Business Administration majoring in Economics from the University of Tennessee in May 2007. Todd received a graduate teaching assistantship from the University of Tennessee Department of Economics to continue his education, and eventually earned a Master's Degree in Economics in the August 2009. In August 2010, Todd accepted a graduate research assistantship at the Center for Business and Economic Research at the University of Tennessee, where he completed two years of research work. Under the supervision of Dr. Matthew Murray, Todd began work on his dissertation, entitled "Essays on State Fiscal Institutions" during the Fall of 2011. He completed his Doctor of Philosophy degree in Economics in December 2013. Specializing in Public Finance and Environmental Economics, Todd's research focuses on how existing state and local institutions influences the policy decisions carried about by elected officials. Beginning in August 2013, Todd will be teaching as a tenure-track assistant professor at Aquinas College in Grand Rapids, Michigan.