Studies in Public Budgeting

Yilin Hou
Editor

Local Government Budget Stabilization

Explorations and Evidence

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Chapter 1
Local Government Budget Stabilization: An Introduction

Yilin Hou

Abstract This chapter is the general introduction and overview of the volume. The first section provides the motivation and rationales for this volume. The second section discusses some major issues and considerations of a tentative framework for empirical analyses of government budget stabilization at the local level. This discussion prepares readers of this volume for the chapters included. The issues discussed are intended to be the basis and raw material for use in other studies. The third section summarizes each of the following chapters as a quick overview of their components and major findings. The last section casts some prospective thoughts of the editor on what remains to be done and explored in these areas of research based on what has been provided in this volume.

1.1 Introduction

This volume is a *sequel* to Hou (2013), shifting the focus of examination from the subnational level ("states" in the United States and "provinces" in other countries) to the local level. Both of the two books in this sequel examine the central question of how the government sector can better weather revenue fluctuations due from economic cycles. This line of research is inspired by a core concern: How can the government sector well play its due and necessary roles in the smooth and stable provision of public services? This concern is closely related to and inseparable from economic and social development as well as democratic and effective governance at all levels of government. This project is solidly based in the public policy and public administration tradition, with an interdisciplinary approach towards economics, law, and politics.

The study of economic cycles has a history almost as long as the market economy in the western world. Mankind has been dealing with the cycle of rich and poor

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harvest years since the beginning of agriculture. The rich vs. poor harvest years are cycles of nature reflected in the output of agricultural activity. Out of centuries' experience, some common-sense insight accumulated. Long-standing is the teaching to "save grains in case of famine." The Industrial Revolution (beginning from mid-eighteenth century) brought about dramatic improvement of productivity; the modern economy also has innate cycles. Continuous expansion of the economy has enlarged the cyclical economic fluctuations and made such fluctuations more acutely felt, with increasingly more damage to productivity and the life quality of all people during recessionary periods. Thus, the need to better handle such economic shocks had become increasingly urgent and relevant to public policy.

The theme of this volume is an important one, related closely to the core *economic stabilization* function of the government in the modern society and to the key roles of local governments in public service provision. Research findings in this vein can help governments at different levels in their efforts to smooth their revenue side as well as the expenditure side—program outlays for public service provision.

The practice and research on economic stabilization at the central government level can be said to have a long history. Despite the fact that the efficacy of economic stabilization remains subject to academic suspicion, it is safe to say that there has been at least some minimal consensus on this function to be played by central governments, as has been illustrated during the Great Recession by the use of stimulus packages in almost all major economies. Even at the subnational level, this function claims almost as long a history as with the national level. Hou (2013) offers a detailed review of the development and discussion (Chaps. 2 and 3). At the local level, there is sporadic evidence of some US localities exercising countercyclical administrative practices in the early twentieth century. Evaluation of the efficacy of such practices, however, is mixed as a hesitant "YES and NO…."

Research on the role by localities dates back at least to the 1940s, but claims a relatively thin accumulation of literature though it never completely stopped. Academic interest in this topic became rekindled since the 2000s, adding more substance and insight than before. Due to data limitations and diverse legal and administrative contexts in the various states under the federal structure of the United States, this research has had to focus on localities in specific states. Even so, the findings have tended to be inconclusive, sometimes even conflicting. The Great Recession (2007–2009) and the sluggish recovery thereafter (2010–2013) remind us that the action or inaction of local governments in a deep recession causes serious consequences in multiple aspects. Therefore, a thorough re-examination of this theme is timely, urgent, and important.

The research on budget stabilization at the local level has some major unsettled issues that are the main concern in this volume. These are: (1) Do local governments seriously engage in saving financial resources? In simple words, do localities accumulate savings and keep these savings for use in emergency situations out of financial and managerial precaution? A seemingly simple answer is "YES, they do, almost always." Then (2) Do localities persistently maintain a high level of savings as a ratio of their total revenue or expenditure, in comparison to their state governments? Again the answer is "YES," and "the local ratio of savings often is quite high." Simplistic statistics does suggest that localities differ from their states with a much

higher savings ratio. Some papers in the literature also report that localities carry quite high ratios of savings. Next (3), What are the determinants of the local saving levels? Are there any patterns across states beyond the "tradition" that is unique to individual states and specific localities? (4) Do localities use boom-year savings to fill in bust-year revenue shortfalls? That is, do they really use savings as a countercyclical device? Or what are the purposes of keeping savings at the local level? Some scholars say the savings are to boost the local credit rating. (5) What have been the effects of these savings on smoothing public service provision? And finally, (6) Is there an optimal level of savings to maintain, as a level or ratio, for any locality? Some scholars say "YES" and have been trying hard to find such a point or range. If such a benchmark exists out of practice or empirical research, the job for policy makers would be much easier. So far, these questions remain open. Chapters in this volume will provide further evidence, helping us move towards some consensus.

1.2 Issues and Dimensions for a Tentative Theoretical Framework

Hou (2013, Chap. 3) offers a comprehensive review of the theories about and the practices of the so-called "stabilization function" of the government. He concludes that the stabilization function is best interpreted as macroeconomic stabilization by central governments, and that at the subnational level, this function is *budget stabilization* for smoother program outlays on public services through the expansion and contraction phases of the economic cycle. Subnational governments need to make strong and committed efforts in order to stabilize their budget so as to smooth program outlays across the boom and bust cycles.

Drawing from research in multiple areas, Hou (2013) finds that budget stabilization is a natural demand by the society—citizens and businesses alike. The demand for government budget stabilization is related to the basics and quality of life for human beings, with all kinds of fluctuations and uncertainties.[1] Certainty is a universal, proactive pursuit of human beings in order to reduce anxiety, thereby improve life quality. Savings and other precautionary measures for emergencies and disasters and life-time planning for old age and retirement are handy examples. It is in this sense that the countercyclical fiscal policy (CCFP) and related financial and managerial practices to implement CCFP are justified and have been shown as useful and assuring through past recessions, even though their efficacy remains subject to doubt in the eyes of some macroeconomists.

[1] At a more basic level of understanding, survival is an animal instinct. For example, polar bears and snakes tackle harsh winters with hibernation; that is, they resort to a passive method to smooth out their consumption of food over summer and winter seasons. Other animals like foxes and beavers in contrast proactively store food for winter. But the best that animals can do is the 1-year window.

Budget stabilization by local governments faces broad conundrums; some of these are generic to all levels of government, like the common pool problem, adverse selection and moral hazard, and principal-agent relations or information asymmetry. That is why we need a tripartite analytical framework that consists of economics, politics, and law. Among economic principles, efficiency under tax/revenue certainty explains the demand for CCFP; the diminishing marginal utility theorem illustrates why countercyclical policies offer efficacy. From the political economy perspective, the public choice theory and democratic political process offer insight into the restraints that governments face. From the rule of law point of view, any government must stay within constitutional bounds in their regulation of individual and business behavior. In particular, budget stabilization at the local level faces several challenges that are unique to local governments. These challenges include state mandates and rules that they must abide by, proximity to voters (who are simultaneously taxpayers and service recipients), and the openness of the local economy. The following subsections first dwell on some generic issues and then on major issue that are unique to the local level.

1.2.1 Generic Issues

The *time window for budget stabilization* is intended for the duration of the full economic cycle, which averages 5–8 years in the US from the late 1940s to the 2000s. This choice takes into consideration government budget cycles.[2] Examining the prevalent budgeting practices, we know that most governments use annual budget cycles and the 1-year window is no guarantee of "annual balance" (Hou 2006), yet budget stabilization under CCFP is technically possible under the tax-smoothing model of optimal taxation (Barro 1979; Lucas and Stokey 1983). That is, tax rates are better kept relatively constant to ensure certainty so that individuals, households, and businesses can plan their finances in advance, which minimizes the possible distortionary effects of taxation on economic agents. Constant tax rates, coupled with economic fluctuations, result in surpluses in expansion years. Surpluses can accumulate in boom-years in order to serve as a buffer to smooth out deficits that occur in recession years. These financial reserves are countercyclical savings.

[2] From the shortest to very long windows of budgeting, there is *Instantaneous Balance* $\boldsymbol{R}=\boldsymbol{E}$, by which current revenue is instantly consumed. It is typical in the earliest ages of human history, more of animal behavior or that by reckless people who do not consider anything beyond the "here and now." Annual balance is $\boldsymbol{R}_t=\boldsymbol{E}_t$, i.e., across seasons, $\sum_1^4 \boldsymbol{Rs} = \sum_1^4 \boldsymbol{Es}$, where s is reason. It is developed from the agricultural society. This is the most widely used budget window among all governments as a result of the modern budget reform movement. Life-time balance applies to pensions and social security systems where $\sum_1^i \left[\frac{\boldsymbol{Rt}}{(1+\boldsymbol{r})\boldsymbol{t}}\right] = \sum_1^i \left[\frac{\boldsymbol{Et}}{(1+\boldsymbol{r})\boldsymbol{t}}\right]$, i = 1 young, 2 old.

Budget stabilization requires coordination of both sides of the fiscal account, revenues and expenditures (Buchanan 1952). As Hansen (1941) put it: there are *two sides of CCFP*—countercyclical use of fiscal policy should include both the spending component and the tax (revenue) component, both to be countercyclically administered.[3] Any study will become futile if it separates one side from the other, or focus on one side without considering the other side. No doubt, while budget stabilization serves to reduce fluctuations for short-run stability, the policy should help target efficiency of the economy for long-run growth (Friedman 1948). Thus arises the need to strike a *balance between short-run stability and long-run efficiency*.

At the implementation level, budget stabilization is possible and CCFP can be adopted and put into use only when there is the political will and consensus among the key players in policy making and implementation. Administrative mechanisms are as important; so is the managerial and technical capacity of a government in the implementation process.

1.2.2 Open Economy; State-Local Relations

The open economy statement is particularly accurate to describe the local level. Any local policy has to account for the fact that the local economy is small and fully open, exogenous to local policies. A local economy is mostly dependent on a few sectors, if not just one sector. Local tax bases follow the macro economy, which makes local revenues volatile or procyclical with the economic upturn and downturn. Local tax hikes and charge increases often easily drive businesses, especially small- and medium-sized ones to neighboring towns, which makes the work force highly mobile, following jobs. In addition, local program outlays are easily subject to spillover effects. These features distinguish the local level from the subnational and national levels.

The relationship between state and localities is an important aspect in fiscal policy and budgeting. First and foremost, localities are creations of their state by the Dillon's Rule; hence localities fall under state direction and oversight. All states have established rules for localities to follow and issued mandates for localities to carry out, with or without state funding. Even after state legislatures granted varying degrees of local autonomy in functional areas, personnel, and forms of government (Stenberg 2001), home rule practices have not fundamentally relaxed state supervision of local financial affairs (Zimmerman 1981). When serious financial problems occur, states do not hesitate to intervene, even take over financial administration as with New York City in the mid-1970s and more recently during the Detroit debacle.

[3] Hansen (1941) also requires countercyclical adjustment of tax rates. That proposition has rarely been put into practice. From the theoretical point, frequent adjustment to tax rates reduces economic efficiency by increasing uncertainty.

States now provide substantial financial assistance in project grants and school aids, both factoring into state–local fiscal relations. State grants often ride the tide of the economy; the procyclical changes in the availability and generosity of state money stay out of the reach of local policy makers, adversely affecting the revenue side of localities by worsening its volatility, thus leaving localities relying to a large extent on themselves.

1.2.3 Tax and Expenditure Limitations

Apart from state constraints, citizen initiatives impose further restrictions on local tax rates and the growth of revenue and expenditure. Citizen-initiated tax and expenditure limitations (TELs) are an intriguing dimension in state–local fiscal relationship: the design of TELs does not consider the boom–bust cycles of revenue or the increased need for services during downturns; therefore, their effects may exacerbate local revenue volatility and impede budget stabilization. Matsusaka (1995, 2000) offers evidence that these citizen initiatives diverge more spending from state to localities in that states push down service expenses to the local level. The state-to-local devolution of outlays further exacerbates the latter's difficulty in maintaining services during periods of revenue shortfalls. Shadbegian (1999) provides evidence that TELs substitute property and other taxes with miscellaneous revenues and fees; only very stringent TELs can prevent tax-charge substitution to really lower overall local tax burden. This finding reflects the conundrum facing localities: With more service responsibilities, they must find alternative sources to fill in revenue shortfalls during a downturn.

There have been three different views about the consequences of TELs on public service. Public choice scholars like Brennan and Buchanan (1980) believe that TELs cast positive effects by eliminating waste, with no adverse effects on the quality of public services. In contrast, the common, intuitive perception holds that tax revolts reduce government services. For example, Stocker (1991) generated evidence that Proposition 13 cut not only taxes but also public services. A third view (McGuire 1999) argues that the answer depends on which model of local government behavior is operative: Under the median-voter or benevolent-dictator model, TELs effects can only be negative; but under the Leviathan or budget maximizing-bureaucratic model, TELs has the potential to improve local welfare.

1.2.4 Localities as Frontline Governments

Local governments are *front-liners* in public service provision (Benton 2002), which offers keen insight for studies of local fiscal behavior. Frontline governments are the closest among all layers to citizens. They provide on a daily basis key public services that residents cannot go without; the demand for which goes

countercyclical—citizens rely more on them during economic downturns when their income is lower than during boom years. This against-economic-tide demand cries for local government budget stabilization: CCFP helps smooth revenue and outlay peaks and troughs in order to ensure a decent living standards in hard times.

However, being front-liners means *proximity* of local governments to the three-in-one citizens. As service recipients, citizens naturally demand more, better, and stable services. As voters, citizens possess the most direct contact with, and almost real-time information about the efficiency and cleanness of their governments—officials and employees of the town/city are their neighbors; they frequently react in the quickest fashion to local policies. As taxpayers, the same citizens scrutinize the financial status and operation of the locality. The same (three-in-one)group may have been active in initiating the restrictive TELs. The property tax, the most important local revenue source, has long been the most hated tax for its high visibility. This visibility in couplet with proximity makes it politically very hard for local governments to save in boom years, especially with the TELs. Partly as a result of the TELs and partly as an overall trend, local sales taxes (under different names) have been added alongside numerous fees and charges, which adds revenue sources but reduces revenue stability over the economic cycle (Hou and Seligman 2008).

In sum, the several unique local features place local policy makers in a difficult situation with regard to budget stabilization. The small, open economy, state-local fiscal relations, and citizen initiatives work together moving the local revenues outside of local own control and more towards high volatility; but the frontline nature of local governments imposes the high demand for budget stabilization in order to smooth service provision. The two sides in couplet present a mission impossible scenario. Finally, proximity of local elected officials to the voters, taxpayers, and service recipients fabricates a hotspot for local policy makers where it is difficult to coordinate the revenue side with the expenditure side, almost impossible to balance the long-run efficiency of economic growth with the short-run benefit of mitigated volatility—local budgeting looks more at an annual window rather than the full business cycle.

1.2.5 Patterns of Local Savings and Spending

The Great Recession (December 2007–June 2009) made it urgent for the public finance community to reexamine the local public sector and provide empirical evidence on whether and how localities would implement a fiscal policy against the boom–bust cycle of tax revenues. Since local economies are usually not diversified and local governments are small, we would not expect them to be active in stabilizing the economy. However, situated at the frontline for service provision, localities ideally should uphold their fiscal policies against the cycle, because recessions are exactly the time when citizens with (sometimes drastically) reduced income need the basic services to be reliable so that they can better weather the financial and employment hardships. But questions are: Given their thin revenue portfolio, strict

balanced budget requirements, political proximity to voters, and TELs, do localities possess the fiscal capacity, policy tools, and political support to save during boom years and then use the savings in bust years in order to stabilize service provision? Once equipped with accumulated savings, do localities really spend for service stabilization when their own-source revenues fall short of forecasts and when federal/state governments cut grants and aid? These are important questions that cry for empirical evidence.

Wolkoff's (1987) study sounds a bit dated, but his summary of four *features of local fiscal behavior* seems still relevant to some extent. First, the proximity of local governments to tax payers deters high savings level (a lesson from the 1978 Proposition 13) because there does not exist the political constituency for savings. Second, local politicians assume short horizons in their decision matrix because they do not have the incentive to look far. Third, localities rely on very limited revenue sources, thus have little to put aside for downturns. Finally, during downturns, local officials tackle revenue shortfall by cutting programs and delaying capital projects. As long as these features persist and the current intergovernmental fiscal relations matrix does not change drastically, it is predictable that local governments may not have the drive to save for purposes of service stabilization. Conant (2003) provides evidence that local saving for out-years instead of providing current services or cutting taxes is a hard sell to residents. Thus, the picture looks dire: We can only expect local fiscal behavior to ride the cyclical wave—providing more services when revenues are abundant and cutting services regardless of citizens' need when revenues fall short. In other words, local governments do not play the stabilizing public services game.

On the *composition of local savings*, Hou (2013, Chap. 3) points out that there has been misunderstanding about government savings.[4] The term "governmental savings" has been used as a broad concept to refer to four building blocks that pile up like a four-layer cake. The four layers are derived from varying perspectives via different managerial, administrative, and political mechanisms, each serving different purposes and uses. The bottom layer is barebones balance, not savings; the lower-middle layer serves to meet "personnel operation" demands; the upper-middle layer is "working capital." Real savings are only the top layer that can serve the countercyclical stabilization function. At the local level, the bottom layer is required by law. The two middle layers are often subject to legal provisions as well. Our concern lies with the top layer: Given the proximity and cyclical feature of local fiscal behavior, can localities manage to save in boom years? Once a locality has successfully accumulated real savings in boom years, will it use these savings to counter revenue busts? And how can the savings be used under state provisions and voter oversight?

As for the *instrument of accumulating savings*, the budget stabilization fund (BSF) was invented as a formal saving device to circumvent boom-year spending

[4] A typical example of such misunderstanding is the anecdote that the 1978 California citizen initiative, Proposition 13, was triggered by the "sizeable" fund balances of local governments at a time when the inflation was high and the property tax increased fast.

pressure, depositing year-end surpluses into the fund to be withdrawn for covering revenue shortfalls (Hou 2003). These savings belong in the top layer defined above. While most states have established a BSF, states vary widely on whether they allow their localities to create a local version of BSFs. Some states, like Massachusetts, encourage local BSFs (Gianakis and Snow 2007); some others, like New Jersey, prohibit local BSFs (Hou 2002); the rest, like Georgia, do not encourage or prohibit. Therefore, stabilization funds are not as widely used at the local level as by the states; they are "an alternative rather than a unique mechanism for local governments to deal with cyclical changes" (Wolkoff 1987, p. 62).

Taking the place of a formal saving device is the year-end balance accumulated in the general fund, called "general fund balance" (GFB), as an informal, implicit saving vehicle. The pattern of fund balances is to grow in boom years and to decline in bust years (Rafuse 1965). Since financial resources are fungible whatever funds they are stored in, other informal devices also exist. Marlowe (2005) finds that local governments also save "slack" resources in various funds; most of these slacks are useable one way or another to fill in holes during a revenue bust. In states that prohibit local stabilization funds, localities rely more on these informal savings (Gianakis and Snow 2007; Hendrick 2006; Marlowe 2005; Wolkoff 1987; Tyer 1993). When the state allows localities to create their own stabilization funds, the choice between formal vs. informal savings becomes a matter of preference related to local political values and financial management strategies (Gianakis and Snow 2007). Local governments also resort to other strategies in coping with revenue shortfalls. These include delaying capital spending (Dougherty et al. 2003), reducing pension contribution in defined benefit systems (Peng 2004), and "borrowing," against state restrictions and professional best practices, from enterprise funds to finance the operation of current programs (Hendrick 2006; Tyer 1989).

As discussed above, positive balance in the budget and working capital are regular requirements of operations; fund balances are expected even in the presence of stabilization funds. Therefore, savings of a government entity is the sum of its total formal and informal accumulated slack resources. When these two major saving instruments coexist, a question arises as to whether the two devices substitute or supplement each other. At the state level, Knight and Levinson (1999) show a 1-to-1 supplementation effect—one dollar increase in the BSF crowds out one dollar of GFB. Wagner (2003) reveals a substitution effect of up to 60 %. Hou and Brewer (2010) examine details of BSF; they show the overall effect to be 85 % supplementation with 15 % substitution. There have not been studies about this issue at the local level.

1.2.6 Effects of Savings on Expenditures

Prior studies about the role of local governments in stabilizing services have obtained some preliminary results. Marlowe (2005) found some evidence that savings do help maintain trend level spending in downturns, but he cautions that it is not conclusive. Hendrick (2006) found the size of unreserved balances is negatively

related to total expenditure, but her work focuses more on determinants of fund balance level instead of the effects of saved balances on smoothing expenditure. Gianakis and Snow (2007) also look at fund balance determinants; their results do not provide a direction. Hou (2008) uses the state of Georgia county data (1985–2006) to test the determinants and effects of savings in local general funds. Wang and Hou (2012) use North Carolina counties (1990–2007) to conduct the same tests. Both these data sets cover two recent business cycles; results thereof do not support the claim for a local role in stabilizing public expenditure; the evidence, however, does not enable generalization beyond state borders. Hou (2010) uses a panel of randomly selected counties ($n=651$, $T=1973–2004$) throughout the United States for tests; he does not find evidence that US county governments smooth across boom–bust cycles. In sum, it remains an open question whether localities can and do play an active role in going against the revenue cycle. This volume is an attempt to help move towards some consensus.

1.3 Overview of the Volume

This volume is a concentrated collective effort that has been designed to provide updated answers to the questions raised in Sect. 1.1. The project was organized as a deliberative one. The editor first conducted a thorough literature review of the afore-mentioned and related topics in core journals and books, thereby identified scholars who have either specialized in research on these very topics or have persistently done research in some related areas that can potentially extend to the topics. These identified scholars are each invited to write a chapter on an aspect of the overall theme of this volume. The chapter authors were requested to provide new insights, building on their prior research, into the dimensions and perspectives on the fiscal behavior of local governments across the boom-bust years of the economy. These evidence-based expert opinions will be the inspiration for a new round of exploration.

Chapters 2 *to* 4 provide empirical analyses and evidence from general purpose as well as special (single) purpose governments on the practices of CCFP. *Chapter* 2 takes the county level as its sample. Choosing "county" as the unit of analysis makes full sense in that "the county is the dominant form of local government as provider of basic services in most parts of the country" (Hou 2010). *Chapter* 3 takes school districts as its sample; the choice is based on the fact that basic education is the predominant public service provided by local governments and school districts are probably the most prominent among special purpose governments. Then, *Chap.* 4 provides a composite look that embraces both general purpose and special purpose (excluding school districts) governments; it also shifts the focus to analyses of local fiscal condition. In this fashion, these three chapters offer a more all-rounded perspective.

The examination of county governments in *Chap.* 2 uses data of all 100 counties in the state of North Carolina. This is an updated version of an earlier study (Wang and Hou 2012) of the same sample, to include years of the Great Recession. These

two consecutive studies both use the unreserved balance of the general fund as measure of local savings. The research question is whether counties save unreserved balances in order to smooth outlay across the boom–bust cycle. The previous (2012) study, with observations from 1990 to 2007 (prior to the start of the Great Recession), did not generate evidence that counties save resources in boom years for use in bust years so as to fill in revenue shortfalls. This chapter, with four more years of data to cover exactly the Great Recession period of government revenue troughs, takes advantage of the recession by separating the Great Recession period from prior years. The results show that accumulated savings appear to have played a countercyclical role in smoothing program outlays from 2005 through 2011, whereas this role was not seen in the prior years (1990–2004).

The examination of special purpose governments in *Chap.* 3 uses data of school districts in the state of New York, with sample years 1997–2010, across two economic cycles. The chapter first measures volatility of school district revenues—the property tax and state aid, then tries to identify tactics that schools used to tackle revenue volatility. It finds that the property tax base and state aid are both quite volatile, with over 7 % deviations from their trends. However, the two deviations are not highly correlated, thereby mitigating the overall revenue volatility. The chapter further finds that school districts handle the two types of volatility with different tactics: They smooth out the growth in property tax levy to flatten volatility in the property tax base, and adjust the levels of fund balances and expenditures to address fluctuations in state aid. The chapter does not find strong evidence that New York schools changed their fund balances substantially in the sample period. That is, their fund balances are NOT countercyclical; rather, school districts slash expenditures when there is downward pressure on their revenues.

Chapter 4 shifts the focus to the fiscal condition of localities of all types, with an emphasis on special districts (excluding schools). It tries to identify the determinants of local fiscal condition, using the "extreme bounds analysis" method to filter through a long list of variables from both the revenue and the expenditure sides, from demographics to local fiscal structure, economic composition, and housing market. The chapter uses data from the state of Washington, a state that boasts the largest per capita number and types of special purpose governments of all states in the United States. The test results show that ten variables are key drivers of local fiscal condition; these ten fall into three categories: (1) demand for local services (population growth and density, housing permits growth, and crime rate), (2) local economic composition (shares of the farm and forestry, the mining and manufacturing, and the construction sectors, respectively), and (3) revenue structure (property tax base, intergovernmental revenue, and revenue elasticity). However, the magnitude of the impact of these ten driver factors varies by the type of government. For example, population density is a key driver of own-source revenue collection for cities, counties, towns, and transportation districts, but not for other types of special districts such as economic development authorities, libraries, or public safety districts. Further, the results from the extreme bound analysis suggest that personal income, revenue diversification, and unemployment do not have robust effects; at least these variables are less important than the ten identified.

Chapters 5 through 8 explore the relationship between several important areas of local financial management and budget stability or their impact on budget stabilization. These are pension fund management, debt management, the use of local option sales taxes (LOSTs), and TELs. Such exploratory work is largely missing in the literature on local level budget stabilization, but it is urgently needed for several reasons. First, the local level hires by far the largest number of employees among the several levels of government; the benefits of local employees (including teachers and police among others) like pensions are a substantial chunk of local government outlays and liabilities. Second, localities also use debt, in particular long-term debt frequently for capital spending; the management of these long-term obligations affects local budget stability in marked ways. Likewise, the use of local option taxes like the sales tax and the consequences of the TELs both impact local budget stability in multiple ways.

Chapter 5 provides insight into the causes of volatility in local pension financing and examines the effects of volatility on local government budgets. Though financing volatility is not the source of all troubles for public pensions, many pension financing issues can be traced to it. The chapter focuses on pension benefit design, pension contributions, and in particular investment returns to explore their effects on pension contributions by local governments out of their annual general fund budget. The chapter suggests gradual as well as fundamental solutions on how to mitigate the volatility in pension financing and its destabilizing effect on local government budgets.

Chapter 6 examines the delicate relationship between revenue volatility and local adoption of marginal tax instruments, using county level data on the adoption of local option sales taxes (LOSTs) in the state of Georgia from 1985 to 2010. The research question is: Do local governments that adopt marginal tax policy changes tend to enhance or reduce their revenue stability, after controlling for recessionary impacts? The chapter is a continuation of the authors' work since the early 2000s. Their findings suggest that, in light of their earlier findings, controlling for recessions has a meaningful impact on estimation of sales tax policy's implications for revenue volatility. Tax instruments behave quite differently from each other over the business cycle—LOSTs and special purpose local options sales taxes (SPLOSTs) show different behavior over the course of a cycle. For example, results for LOSTs are in line with those of a sales tax that by design acts as a substitute for property taxes. LOSTs are not designed to be revenue-enhancing as SPLOSTs are. Once recessions are accounted for, the implementation of LOSTs is associated with large relative increases in short-run volatility. The results for interactions are also quite large but are not statistically valid—probably because a relatively low number of LOSTs are adopted during recessionary periods. In terms of marginal revenue impacts, after controlling for recessions, LOST results are no longer statistically valid and their magnitudes are relatively small.

The use of debt is an essential occurrence at the state and local level to enable timely construction of capital projects by committing future taxes to the service of debt. Debt hereby comes into the equation of local public finance since it is a leverage on revenues and budget expenditure. *Chapter 7* deliberates on the interaction

of local long-term debt and budget expenditure volatility of local governments, using data from the Census, aggregated by state. It examines the correlation of expenditure volatility with outstanding debt balances; in other words, the relationship between debt utilization and volatility in budget expenditures. Findings from the chapter show that debt exerts statistically significant impact on the volatility of budget expenditure of localities in 13 states, and that in ten of these 13 states high levels of debt are associated with greater expenditure volatility. The results suggest that in three of these states, local governments might have been able to strategically use debt (or other means, like savings) to reduce expenditure volatility, pointing to some potentially powerful tool kit that public managers will benefit if they can better understand the interaction between debt levels and the operating budget.

Tax and expenditure limitations (TELs) became widespread since the late 1970s; over time they have been institutionalized one way or another in almost all 50 states in the US, altering the fiscal landscape of local governments and compromising their ability to deliver essential public services. *Chapter* 8 offers a very detailed examination of this aspect, contributing to the literatures on TELs and local government savings behavior. The author puts together a nationwide data set of TELs and uses Census data to conduct empirical analysis, using "unrestricted cash and security holdings" as the measure of savings. Results show that TELs had a negative impact on local government savings, and that the ability of local governments to accumulate savings is a function of procyclical revenues and intergovernmental transfers. Some further results, however, are not significantly different from zero for the property tax limits (rate limits, levy limits, limit on assessed values), with the exception of the binding limit. Thus, the results suggest that the TELs had only a marginal effect on the savings behavior of local governments.

In recent year, there have been several papers discussing, even looking for, an (the) optimal size of fiscal reserves that state and local governments can use in recession years to fill in revenue holes. The search dates back several decades to some rule of thumb by practitioners. So far, however, this pursuit has not been successful. *Chapter* 9 examines this topic from an empirical approach. The chapter starts with the fundamental question of whether there is an optimal level of reserves, even only at the local level, with the necessary elements of an empirical model. The chapter uses a forecast simulation approach and data of a metro city, then simulates two equations to generate estimates of revenues and expenditures for the city, thereby derives the level of fiscal reserves that are required to cover potential revenue shortfalls. The chapter suggests *cautiously* that more research is required before making any conclusions. The author admits that it will be a tough job to develop a model that is easy to implement and can be widely acceptable.

How do nonprofit organizations cope with their revenue fluctuations across the expansion and shrinkage of their resources? The literature is almost nonexistent in the budget stabilization aspect. *Chapter* 10 offers a first look in this direction. It is overall a literature review, identifying some causes ("barriers") for why nonprofits are unable to accumulate and maintain surpluses. This chapter can serve as a starting point for more detailed, empirical studies to come.

1.4 Prospect: Questions This Volume Has Raised

While explorations and evidence in this volume provide many important and interesting findings, these new results also give rise to some new questions that demand further analyses and answers. The following are some immediate examples that provoke our thoughts.

The study of North Carolina counties (Chap. 2) shows that unreserved fund balances were not significant as a countercyclical fiscal tool over several earlier economic cycles; but they were significant as such a tool during the Great Recession. This seemingly contradictory finding raises a fundamental question: Though local governments may hesitate to use their (accumulated) cash to smooth operations in a bust year, when the situation is really dire as during a deep recession, they may have to dole out their last dime to muddle along. Such a practice, however, may turn out to be purely passive coping rather than a proactive, regularly used financial management strategy.

A thorough financial condition analysis (Chap. 4) found that contrary to the existing evidence (some suggestive) in the literature by public finance scholars as well as local and regional economists, variables that have been claimed as important in explaining local fiscal condition (such as personal income, revenue diversification, diversity of local industry, and the unemployment) did not have robust effects. Diversification and unemployment in particular are commonly cited measures by scholars of financial management, but this analysis suggests those variables are less important than many others. Obviously, there is a niche to fill.

Chapter 7 found that local governments in three states (of the 13 states where the use of long-term debt is found to significantly impact outlay volatility) might have been able to strategically use debt (or other means) to reduce expenditure volatility. This is encouraging; it is partial confirmation to what Hou (2013, Chap. 10) found at the state level. This finding points to some potentially powerful tool kit that researchers and practitioners need to explore more thoroughly. Finally, Chap. 8 found that the effects of TELs at the local level are not significantly different from zero for the property tax limits (rate limits, levy limits, limit on assessed values), with the exception of the binding limit. Thus, the results suggest that the TELs had only a marginal effect on local government savings behaviors.

To conclude, careful and deliberate as these chapters are, the findings and answers therein provided are by no means conclusive, let alone definitive. The purpose of putting together these studies is to start a new round of discussion. We will be happy to see that our findings can serve as the starters preceding a "feast" and that a new round of deliberation will come to more bountiful fruition.

References

Barro RJ (1979) On the determination of the public debt. J Polit Econ 87(5, Part 1):940–971
Benton JE (2002) Counties as service delivery agents: changing expectations and roles. Praeger Publishers, Westport
Brennan GH, Buchanan JM (1980) The power to tax: analytical foundations of a fiscal constitution. Cambridge University Press, Cambridge
Buchanan JM (1952) Federal grants and resource allocation. J Polit Econ 60(3):208–219
Conant JK (2003) Wisconsin's budget deficit: size, causes, remedies, and consequences. Pub Budget Finance 23(2):5–25
Dougherty MJ, Klase KA, Song SG (2003) Managerial necessity and the art of creating surpluses: the budget-execution process in West Virginia cities. Public Adm Rev 63(4):484–497
Friedman M (1948) A monetary and fiscal framework for economic stability. Am Econ Rev 38(3):245–264
Gianakis G, Snow D (2007) Implementation of local government stabilization funds in Massachusetts. Pub Budget Finance 27(1):86–103
Hansen AH (1941) Fiscal policy and business cycles. W.W. Norton & Company, Inc., New York
Hendrick R (2006) The role of slack in local government finances. Pub Budget Finance 26(1):14–46
Hou Y (2002) Financial management (Ch 2) and New Jersey laws governing municipal administration. In: The New Jersey initiative: building management capacity in New Jersey municipalities. Maxwell School of Citizenship and Public Affairs, Syracuse University, Syracuse
Hou Y (2003) What stabilizes state general fund expenditures in downturn years-budget stabilization fund or general fund unreserved undesignated balance? Pub Budget Finance 23(2):64–85
Hou Y (2006) Budgeting for fiscal stability over the business cycle. Public Adm Rev 66(5):730–741
Hou Y (2008) Parameters of local government options for a downturn: evidence from Georgia counties. Paper presented at the 2008 annual conference of the association for budgeting and financial management (ABFM), Chicago, 23–25 Oct
Hou Y (2010) Local fiscal behavior under state provisions: do local governments smooth revenue from booms across busts? J Pub Finance Pub Choice 28(1):3–27
Hou Y (2013) State government budget stabilization: policy, tools and impacts. Springer, New York
Hou Y, Brewer G (2010) Substitution and supplementation between co-functional policy instruments—evidence from state budget stabilization practices. Public Adm Rev 70(6):915–925
Hou Y, Seligman JS (2008) LOST stability? Consumption taxes and the cyclical variability of state and local revenues. In: Proceedings 100th annual meeting of the National Tax Association
Knight B, Levinson A (1999) Rainy day funds and state government savings. Nat Tax J 52(3):459–472
Lucas R, Stokey NL (1983) Optimal fiscal and monetary policy in an economy without capital. J Mone Econ 12:55–94
Marlowe J (2005) Fiscal slack and counter-cyclical expenditure stabilization: a first look at the local level. Pub Budget Finance 25(3):48–72
Matsusaka JG (1995) Fiscal effects of the voter initiative: evidence from the last 30 years. J Polit Econ 103(3):587–623
Matsusaka JG (2000) Fiscal effects of the voter initiative in the first half of the twentieth century. J Law Econ XLIII:619–650
McGuire TJ (1999) Proposition 13 and its offspring: for good or for evil? Nat Tax J 52(1):129–138
Peng J (2004) Pension fund management and government operating budget: a tale of three states. Pub Budget Finance 24(2):59–73
Rafuse RW (1965) Cyclical behavior of state-local finances. In: Musgrave RA (ed) Essays in fiscal federalism. The Brookings Institution, Washington, DC, pp 63–121

Shadbegian RJ (1999) The effect of tax and expenditure limitations on the revenue structure of local government 1962-87. Nat Tax J 52(2):221–238
Stenberg CW (2001) Forward. In: Krane D et al (eds) Home rule in America. CQ, Washington, DC
Stocker FD (ed) (1991) Proposition 13: a ten-year retrospective, introduction. Lincoln Institute of Land Policy, Cambridge
Tyer CB (1989) Municipal enterprises and taxing and spending policies: public avoidance and fiscal illusions. Public Adm Rev 49(3):249–256
Tyer CB (1993) Local government reserve funds: policy alternatives and political strategies. Pub Budget Finance 13(2):75–85
Wagner GA (2003) Are state budget stabilization funds only the illusion of savings? Evidence from stationary panel data. Q Rev Econ Finance 43:213–238
Wang W, Hou Y (2012) Do local governments save and spend across budget cycles—evidence from North Carolina? Am Rev Pub Admin 42(2):152–169
Wolkoff MJ (1987) An evaluation of municipal rainy day funds. Pub Budget Finance 7(2):52–63
Zimmerman JA (1981) Measuring local discretionary authority. Advisory Commission on Intergovernmental Relations, Washington, DC

Chapter 2
The Great Recession and the Use of Fund Balances in North Carolina Counties

Wen Wang

Abstract This chapter examines the determinants of local fund balances and the effects of the fund balances on stabilizing local spending and maintaining the continued provision of public services across business cycles. The empirical results show that fund balances appear to have played a countercyclical role in North Carolina counties during the Great Recession, but not during previous recessions. Over the years, these local governments may have improved their fiscal capacity in using fund balances for dealing with economic downturns.

2.1 Introduction

The Great Recession between 2007 and 2009 has been generally acknowledged as the longest and deepest economic downturn since World War II. While the policy response of American governments to the crisis has augured intense political controversy (Burtless and Gordon 2011), scholars regard this as an important opportunity to uncover the drawbacks of the standard policy response and to improve future fiscal policy decisions (Tcherneva 2011). In recent decades, public finance scholars have advocated for countercyclical fiscal policy by subnational governments to stabilize their spending over the business cycle (Gramlich 1987; Hansen and Perloff 1944; Hou and Moynihan 2008). The majority of the existing research on subnational fiscal reserves and their effects on budget stabilization focus on state governments in the United States (Douglas and Gaddie 2002; Hou 2003a, 2005; Sobel and Holcombe 1996; Wagner and Elder 2007). Relatively little is known about local governments' fiscal behavior during the boom and bust of business cycles. As local governments are affected by recessions differently and use different strategies to cope with recessions from other levels of government (Afonso 2013), this chapter attempts to fill the niche in the literature by investigating the accumulation and use of fund balances in North Carolina counties during the Great Recession and previous two recessions.

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Local governments in the United States are operating in an increasingly difficult fiscal environment that has often been made worse by the impact of an economic recession. Decreases in revenues from sources that are responsive to national economic conditions often lead to budget shortfalls and deficits at the local level. Similar revenue collection problems at the federal and state levels have resulted in cutbacks in intergovernmental aid to local governments (Allan 1990; Hou 2003b). In order to improve their chances of avoiding financial difficulty during economic recessions, local governments can take various actions, among which the use of fiscal balance resources is one of the most important. The accumulation of unreserved fund balance, or monies set aside in a budget stabilization fund, can ensure the uninterrupted provision of public services and preserve the stability of the local tax structure. Local governments with sufficient unreserved fund balance resources can avoid or reduce budget cuts and tax increases during an economic downturn. The maintenance of fiscal stability is a particularly important criterion for credit rating agencies when they evaluate the creditworthiness of local government debt, with instability potentially leading to a lower bond rating and higher borrowing costs (Hou 2003b). Since the Great Depression, the state of North Carolina has established a strong oversight system to monitor the financial operations of its local governments; this system is considered a model for other states (Coe 2007). The study of the financial management practices of North Carolina county governments may have important implications for other states that intend to prevent local government fiscal crises.

This study intends to investigate the fiscal behavior of local governments to safeguard against economic recessions, focusing on the accumulation and use of fund balances. Using a dataset of all of the 100 North Carolina counties in the period of 1990–2011, it attempts to examine the performance of budget stabilization measures employed by North Carolina counties during the Great Recession and earlier recessions. Specifically, the analysis focuses on two research questions. First, what factors affect the size of North Carolina county governments' unreserved general fund balances? Second, have unreserved general fund balances had different effects on budget stabilization during the Great Recession and the previous two recessions? Contributing to the literature on local government budget stabilization, the empirical results of the analysis shed light on the effectiveness of attempts by local governments to maintain the stability and continuity of their public service provision.

This chapter is organized as follows. The next section discusses local government fund balance policy, followed by a section providing relevant background information on North Carolina counties. The fourth section reviews the existing literature on factors affecting local fund balance and its impact on budget stabilization. The fifth section presents details on the data, model, and methodology of this analysis, followed by a section discussing the empirical results. The final section provides a conclusion.

2.2 Local Government Fund Balance Policy

State and local governments often accumulate their fiscal reserves through either formal or informal vehicles. The formal means of saving is to create budget stabilization funds, popularly called "rainy day funds." Most states have created statutory provisions regarding the deposits of previous-year fiscal surplus into the budget stabilization fund (Hou 2004). States vary widely in whether they allow their local governments to establish budget stabilization funds. Some states allow local governments to formally establish budget stabilization funds, while others do not (Hou 2008). The informal means of saving refers to the fiscal resources accumulated in the general funds, other governmental funds, and enterprise funds that can be used to stabilize spending across business cycles. Unlike state governments, local governments rarely establish a separate budget stabilization fund; they rely more on the informal vehicle of saving, such as general fund balances (Marlowe 2005).

A government's fund balance is, fundamentally, the difference between assets and liabilities reported in the financial statements, rather than the cash balance, or the difference between revenues and expenditures. The fund balance often consists of two components: reserved fund balance and unreserved fund balance.[1] Reserved fund balance refers to the portions of fund balance that are either legally restricted to a specific future use or are not available for appropriation or expenditure. Unreserved fund balance refers to the portions local governments maintain in their general fund for contingencies and which are available for use when a government experiences fiscal distress (Gauthier 2002).

Several justifications exist for the establishment and maintenance of adequate levels of unreserved fund balance for preserving the stability of local tax and revenue structure, the orderly provision of public services, and local government credit rating. Dealing with economic uncertainty is a foremost challenge for local finance officials; they have to determine the performance of local and regional economy and its subsequent impact on local government finances. The effects of changes in economic activity on the revenue structure and government spending vary from jurisdiction to jurisdiction. The finances of local governments that are dependent on economically sensitive revenues, such as sales and income taxes, will usually be affected to a greater extent by an economic recession than governments that are dependent on more stable revenue sources, such as property taxes. However, the housing crisis that occurred during the Great Recession underscores the devastating

[1] There has been a change in fund balance classifications after the issuance of GASB 54 in 2009. This study uses the fund balance classifications prior to the change because local governments have not adopted the format required by GASB 54 in our sample period. Please see the following link for more details on GASB 54: http://www.gasb.org/st/summary/gstsm54.html

impact that severe housing price declines may have on local finances. In some cases, local governments have little control over the factors that affect their expenditures. For example, during an economic recession, the demand for—and spending on—entitlement programs such as public welfare services often go up dramatically. Other forms of uncertainty include unanticipated changes in federal and state tax and spending policies, the imposition of federal and state mandates, court decisions that result in unexpected local expenditures, the passage of limitations on a government's taxing and spending powers by voters, exposure to natural disasters, or disparities in timing between revenue collections and expenditures (Allan 1990; Gauthier 2009). Intergovernmental grants from the federal and state governments, a significant source of local government revenue, are often unreliable during economic downturns since those governments are also experiencing fiscal distress. Local governments also face constraints on how much they can incur public debt due to constitutional and statutory debt limitations. Therefore, it is important for local governments to accumulate fiscal reserves as a reliable means to cushion against revenue shortfalls and increased demand for public expenditures during recessions (Hou 2003b).

The Government Finance Officers Association (GFOA) recommends that state and local governments establish a formal policy on the level of unreserved fund balance that they wish to maintain. The unreserved fund balance is expected to safeguard against the effects of economic and other uncertainties and to help stabilize tax and fee rates and public service levels (Coe 2007; Shelton and Tyer 2000). GFOA recommends that unreserved general fund balance should account for no less than 5–15 % of general fund revenues, or no less than 1–2 months of general fund operating expenditures (Gauthier 2002).

2.3 North Carolina Counties

Counties are the dominant form of local government in North Carolina, playing a vital role in the provision of public services (Benton 2002; Marando 1979). Counties in North Carolina have several distinguishing features in comparison with those from other states. The majority of local government responsibilities rest with counties (and cities), rather than with special districts, school districts, and other authorities, which are relatively much more important in many other states. The responsibility for providing several major human services, including public health, education, and welfare, is taken up by counties rather than by cities or special districts as is common in other states. North Carolina counties have more extensive authority than those in other states to provide municipal services such as water and sewer services, fire protection, and so on. The state-local revenue system in North Carolina tends to be more sensitive to fluctuations in the economy than that of many other states because it relies more on sales and income taxes and less on property tax (Bell 2007; Wang and Hou 2012).

The three bond rating agencies consider the North Carolina system an exemplary model for its oversight of local governments' financial management practices.

During the Great Depression, North Carolina had the second highest number of municipal bond defaults. Consequently, the legislature established a strong oversight system to impose financial controls and assist troubled communities. The Local Government Commission (LGC) created by the legislature closely monitors the financial operations of local governments. North Carolina is the only state legally responsible for the issuance of all of its local government debt. It also regulates the audit process of local governments, extensively reviews their financial reports, proactively provides assistance to troubled localities, and intervenes to assume financial control when necessary. As a result, though not ranking high in population and per capita income, North Carolina has the most local governments with the highest bond rating of any state (Coe 2007).

North Carolina counties do not maintain budget stabilization funds. The LGC recommends that local governments maintain a minimum unreserved general fund balance of 8 % of annual expenditures. When a local general fund balance goes below 8 % of annual spending, the local governing board must formally notify the LGC how it will respond. It normally will not issue bonds if jurisdictions have less than 8 % fund balance. Beyond the minimum, the LGC recommends that local governments maintain significantly higher fund balances, using the average for like-sized counties or towns as a benchmark (Coe 2007).

2.4 Literature Review

2.4.1 Factors Affecting the Size of Local Fund Balance

Determining the appropriate magnitude of unreserved fund balance as well as monies set aside for contingencies in other funds may be one of the more formidable challenges facing local government finance officers and elected officials. Whether the level of unreserved fund balance is adequate depends largely on the particular financial and economic characteristics of each jurisdiction (Allan 1990). This study focuses on the unreserved general fund balance to test our research questions. The general fund is singled out because it contains the bulk of budget appropriations for general government operations.

In practice, local governments maintain their unreserved general fund balances at much higher levels than the recommended 5–15 % benchmark (Hendrick 2006; Marlowe 2005; Stewart 2009). Marlowe (2005) found that 103 Minnesota municipalities in 1990–2000 maintained their unreserved fund balance resources at levels higher than necessary to protect service levels during downturn years. Marlowe suggested that resources might be retained for multiple ends; for example, for the purpose of improving creditworthiness, hedging against revenue projection errors, guarding against property tax delinquencies, or accommodating increasing service needs during periods of population growth. In his study of New York school districts in 1997–2002, Ványalós (2005) found that school districts tended to build up large fund balances as a response to state aid uncertainties as a result of late budgets.

Previous research in this area did not identify many common factors that affected the size of unreserved general fund balance maintained by local governments. Looking at 239 Chicago suburban municipalities in 1997–2003, Hendrick (2006) found that the current fiscal performance was the strongest predictor of fiscal reserves compared to other variables in the model. Debt per capita had a significant negative relationship with fiscal reserves, which suggested a tradeoff between pay-as-you-go and debt financing of capital expenditures. The higher the level of municipal debt, the less reserve was used to fund capital spending. Larger governments appeared to accumulate smaller reserve balances. The results presented a mixed picture of the relationship between risk and slack. Municipalities with more stable residential property bases and higher levels of revenue diversification accumulated less unreserved fund balance. Nevertheless, municipalities with less stable populations and greater reliance on intergovernmental revenues had lower levels of reserve. These municipalities probably did not consider population change and reliance on intergovernmental revenues as risk factors. With regard to political and governing preferences, more political conservative, reformed, and professional municipalities tended to accumulate more reserves. Contrary to expectations, municipalities with home rule privileges, or more flexibility in levying additional taxes, accumulated more resources than others.

Stewart (2011) attempted to explain why some local governments maintained much more savings than the recommended benchmark of 5–15 %. The study examined the effects of financial and environmental factors on the unreserved fund balance in Mississippi counties. The results showed that these factors affected unreserved fund balance differently by forms of government under different financial environments. Financial factors, including income, debt, property tax, intergovernmental revenue, and other revenues, had a significant impact on county governments' savings in a period of resource abundance. As for environmental factors, population change was the only significant variable during a time of resource abundance. The empirical results also indicated different savings behavior by administrative and political forms of government in Mississippi counties under different financial conditions. Contrary to the popular view that politicians were more concerned with short-term and parochial needs in order to win re-elections, this study suggested that elected officials in Mississippi counties built a revenue cushion in a period of resource abundance in order to deal with unexpected contingencies in the future. On the other hand, the study did not find much difference in behavior of saving for governments during a time of resource scarcity. Only majority-non-white counties appeared to decrease their fund balance much more slowly than other counties. Stewart (2011) argues that applying a standard benchmark of fund balance across all jurisdictions is unacceptable. Rather, it should be determined by the political, financial, and environmental characteristic of each jurisdiction.

In their study of Massachusetts municipalities, Snow et al. (2008) emphasized the impact of political culture variables on the maintenance of slack resources by localities. The authors argued that states could not simply make tools such as stabilization fund available to municipalities, since they would be used differently in different political contexts and as a function of managerial capacities. Snow et al.

suggested that a municipality's organizational culture might also interact with political culture in determining financial management strategies.

Utilizing a dataset of all 100 North Carolina counties in 1990–2007, Wang and Hou (2012) examined the effects of financial, social, and economic factors on general fund balances. This analysis showed that county tax revenues and wealth were positively associated with county savings, whereas capital outlays and unemployment were associated with reduced savings. Population size had a nonlinear relationship with general fund balances; economies of scale only existed within a certain range.

2.4.2 Impact of Local Fund Balance on Budget Stabilization

Few studies provide direct evidence for the effects of fund balances on budget stabilization at the local level in the United States. Marlowe (2005) found that the unreserved general fund balance of Minnesota municipalities exhibited some marginal stabilizing effect during downturn years. Hendrick (2006) did not find any significant impact of unreserved fund balance in reducing the percentage change of expenditures in Chicago suburban municipalities. Hendrick suggested that the complex relationship between fiscal slack and governments' other structural and environmental factors made it difficult to determine its contribution to alleviating fiscal stress. Future research on this topic should attempt to develop a theoretical model that incorporates relevant managerial, organizational, and political features.

Hou (2008) proposed a number of parameters for studying local governments' fiscal behavior over the boom and bust of business cycles, including states' permission for their local governments to create rainy day funds, their adoption of a formal or informal countercyclical fiscal policy, diversification of revenue portfolios, and increased professionalism of local governments. His analysis of Georgia counties showed that local governments had few alternatives other than coping during economic downturns, due to their less diversified revenue portfolios and strict balanced budget requirements. Wang and Hou (2012) did not find any significant countercyclical effects of fund balance in North Carolina counties over the period 1990–2007.

2.5 Model, Data, and Methodology

With newly collected data covering the period of the Great Recession, this study updates the previous research of Wang and Hou (2012) on fund balances in North Carolina counties. The dataset covers three full business cycles in recent decades, including the most recent Great Recession. This analysis intends to test the effects of financial, economic, and social indicators on county savings with the longest time span of data currently available (1990–2011). In addition, it examines whether there are differences in the use of local savings for the purpose of budget stabilization in different financial situation.

2.5.1 Dependent Variables

In order to identify the factors affecting local fund balances, we construct two dependent variables: the level of unreserved general fund balance in dollar terms and the balance as a share of total expenditures. To investigate the impact of fund balance on budget stabilization across business cycles, we construct an expenditure gap variable as the differences between actual expenditures and expenditures projected from a linear trend. County expenditures are predicted as below:

$$E_{it}^{*} = a_i + b_i T$$

Where E_{it}^{*} is the predicted expenditure for county i in year t, a_i the constant for county i, b_i the linear trend coefficient for county i, and T the value of the year in year T. Then the expenditure gap is expressed as the difference between the actual and predicted expenditures as a percentage of the predicted expenditure:

$$\text{Expenditure gap} = \frac{E - E^{*}}{E^{*}}$$

Negative expenditure gaps are expected during economic downturns.

2.5.2 Independent Variables

To examine the determinants of local fund balances, I include three groups of explanatory variables, including revenues, economic indicators, and social indicators. As indicated by previous studies, stable revenue sources could help governments to maintain a higher level of fund balance (Marlowe 2005; Stewart 2009). With cyclical revenue sources, local governments may have to use fund balance to smooth the tax rate and offset erratic revenue fluctuations (Massey and Tyer 1990; Stewart 2009). Since property tax, local option sales tax, and intergovernmental revenue are the most important revenue sources for North Carolina counties, I include the shares of the three revenues as a percentage of total revenue in the models to capture counties' differences in revenue structure. As property tax is the most stable revenue source among the three, a higher share of property tax in total revenue is expected to facilitate maintaining a higher level of fund balance. In comparison, sales tax, which is more prone to business cycle fluctuations, may be negatively associated with fund balance. Previous research posited that local governments tended to build up large fund balances as a response to state aid uncertainties (Ványalós 2005). However, the negative relationship found between intergovernmental grants and fund balance in other studies suggested that local governments might not recognize the risk involved in relying on such a revenue source (Hendrick 2006; Stewart 2009) or that they might not have the capacity to safeguard against cuts in intergovernmental aid that lead to reduced local revenue (Wang and Hou 2012). Therefore, the share of intergovernmental revenue in total revenue is expected to be negatively associated with fund balance. Data for revenue variables were collected from the *Annual Financial Information Forms* issued by the State Treasurer's Office in various years.

Table 2.1 Descriptive statistics (North Carolina county data: 1990–2011)

Variable	Mean	Min	Max
Dependent variables			
Fund balance available	234.94	−108.76	2,010.03
Fund balance available as % of total expenditure	22.47	−9.94	138.64
Expenditure gap (%)	−0.077	−46.03	83.00
Revenue sources			
Property tax	503.63	161.42	1,367.13
Sales tax	184.74	42.21	555.24
Intergovernmental revenue	296.37	83.30	2,567.43
% of property tax in total revenue	37.99	10.51	63.20
% of sales tax in total revenue	14.41	3.10	27.46
% of intergovernmental revenue in total revenue	22.27	3.26	58.97
Economic indicators			
Personal income	31,619.39	19,448.29	54,165.14
Unemployment rate (%)	6.49	1.20	19.80
Social indicators			
% of population under 18	23.47	13.62	30.99
% of population over 65	14.59	4.44	27.38
Population (1,000)	81.56	3.73	940.06

Note: All financial level figures are in per capita real terms. The number of observation is 2,182

Two economic indicators are included in the models: per capita income and unemployment rate. Based on results from previous studies (Stewart 2009; Wagner 2003), per capita income is expected to be positively associated with fund balance, and unemployment rate negatively associated. The income data were collected from the U.S. Bureau of Economic Analysis, and the unemployment rate data from the U.S. Bureau of Labor Statistics. Social indicators include population size, population squared, and shares of the school-age children and senior citizens. Data for these variables were obtained from the North Carolina Office of the State Budget and Management.

I also investigate the impact of fund balances on budget stabilization. If fund balances are positively correlated with expenditure gaps during downturn years, they contribute to reducing expenditure gaps, thereby having a countercyclical stabilizing effect. Revenue source variables are included to test their potential effects on expenditure gaps in different financial situations. Income and unemployment rate are included in the models to capture the economic variability of counties over the business cycle. The four social indicators are used to test their impact on spending decisions of North Carolina county governments. Table 2.1 presents the descriptive statistics of variables used in this analysis.

Figure 2.1 shows the per capita real fund balance, the share of fund balance in total revenue, and the first difference of real per capita expenditure over the period of 1990–2011. Fund balance fluctuated across business cycles, increasing from $183 in 1990 to $269 in 2011. Similarly, fund balance share increased from 21 % in 1990 to 26 % in 2011, oscillating around 22 % over the years. North Carolina counties have never drastically spent down their fund balances even during economic

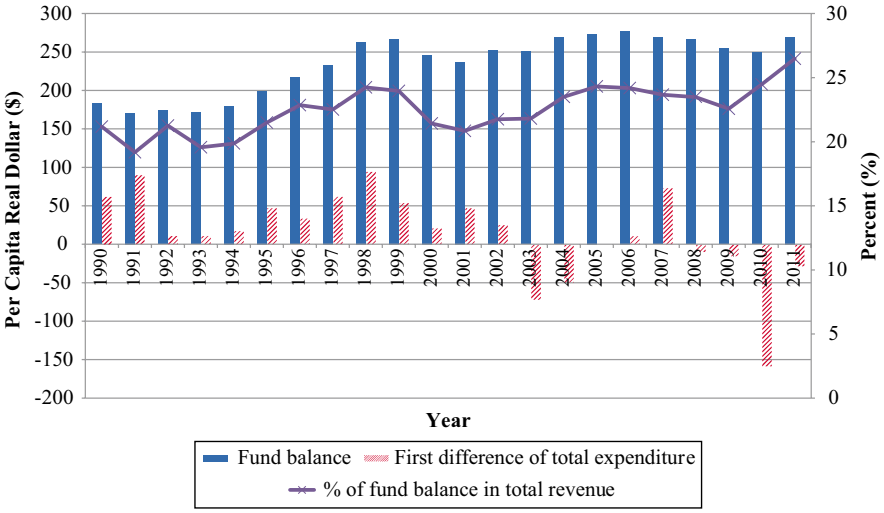

Fig. 2.1 Fund balance, fund balance share and expenditure change (North Carolina counties, 1990–2011)

recessions; fund balance share has been maintained at above 19 % over the sample years. As for the change in county expenditure, Fig. 2.1 shows negative expenditure growth in 2003 and 2004, following the 2001 recession, and in 2008–2011 as a result of the Great Recession. It appears that counties cut their spending in order to cope with recessions.

To address the first research question, I construct two regression models; per capita fund balance and fund balance share are regressed on the above-mentioned explanatory variables, respectively. To answer the second research question, I construct another four models to test the effects of fund balances, both in level and ratio, on expenditure gaps. In order to capture the potential differences in counties' fiscal behavior in different financial situations, I separated the sample years into two time periods of 1990–2004 and 2005–2011, the first of which covers the economic recessions of 1991 and 2001 and the second the most recent Great Recession.[2]

2.5.3 Methodology

I estimate standard two-way fixed effects models to identify the determinants of fund balances, with both county and year fixed effects included. The Newey-West procedure is used to deal with serial correlation and heteroskedasticity in the dataset (Newey and West 1987). OLS coefficient estimates are reported, and standard errors are adjusted for serial correlation and heteroskedasticity.

[2] I experimented with using 2003 or 2004 as the beginning year of the second time period. It did not significantly change the empirical results of the analysis.

Since some county-specific characteristics may have differential effects on county expenditure gaps, I run a Heckman (1979) two-stage selection model to address the potential selection bias. The first stage selects the downturn years for each county by calculating the likelihood of a county's spending falling below the predicted trend line. The second stage estimates the effects of fund balances on expenditure gaps during downturn years. Selection variables used in the first stage include population growth, changes in debt service, and shares of property tax, sales tax, and intergovernmental revenue in total revenue.

2.6 Empirical Results

2.6.1 Determinants of Local Fund Balances

Table 2.2 presents the regression results on the determinants of unreserved general fund balances, expressed in both level and share, in North Carolina counties. The share of property tax in total revenue is highly significant and positively associated with fund balance in both models. A 1 % point increase of property tax share drives up fund balance level by 0.7 % and fund balance share by 0.157 % points. This stable source of revenue seems to help county governments accumulate more slack resources. The share of intergovernmental revenue is statistically significant at the 1 % level and has a negative sign in both models. A 1 % point increase of intergovernmental revenue share is associated with a reduction of 0.4 % in fund balance level and of 0.144 % points in fund balance share. It suggests that county governments do not maintain more resources in fund balance as a cushion against uncertainties in consequence of a higher level of dependence on intergovernmental revenue. As suggested by previous research, local governments may not consider the reliance on such a revenue source as a risky condition, or they simply do not have the capacity to safeguard against cuts in intergovernmental revenue. The share of sales tax in total revenue is only significant in the model with fund balance level as the dependent variable. As a less stable revenue source in comparison to property tax, it does not seem to help county governments accumulate more fiscal slack.

The two economic indicators are both significant in the models and have the expected sign for their estimated coefficients. Wealthier counties tend to build up higher fund balances. A 1 % increase in per capita income leads to an increase of 0.381 % in fund balance level and of 0.103 % points in fund balance share. Higher unemployment rates pull down fund balances in counties. When the unemployment rate goes up by 1 % point, the fund balance level goes down by 2.3 %, and the fund balance share by 0.512 % points, holding all other variables in the models constant.

As for the social indicators, the share of population under 18 years old is significant in the fund balance share model. It probably suggests that a higher demand for school services reduces fund balances. The significance of population squared indicates some marginal impact of population size on fund balances, but the population variable is not statistically significant in either of the two models.

Table 2.2 Results of fund balance models (1991–2011) (two-way fixed effects)

	Fund balance available	% of fund balance available
Revenue sources		
% of property tax in total revenue	**0.007*** **	**0.157*** **
	(3.813)	(2.542)
% of sales tax in total revenue	**−0.012** **	−0.164
	(−1.991)	(−1.094)
% of intergovernmental revenue in total revenue	**−0.004*** **	**−0.144*** **
	(−2.763)	(−2.928)
Economic indicators		
Personal income*	**0.381** **	**10.324***
	(2.362)	(1.669)
Unemployment rate	**−0.023*** **	**−0.512*** **
	(−3.806)	(−2.589)
Social indicators		
% of population under 18	−0.019	**−0.872***
	(−1.382)	(−1.649)
% of population over 65	−0.012	−0.515
	(−0.765)	(−1.022)
Population*	1.303	9.540
	(1.632)	(0.317)
Population squared*	**−0.062***	−0.966
	(−1.793)	(−0.761)
No. of observations	2,076	2,076
Centered *R*-squared	0.14	0.07

Note: Significance levels are: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. All of the independent variables are lagged for 1 year. Variables marked with an * are logged. Numbers in parentheses are *t-statistics*

2.6.2 Effects of Fund Balances on Budget Stabilization

Table 2.3 reports the results of Heckman two-stage selection models for investigating the effects of fund balances, in both the level and the share form, on stabilizing local spending over the business cycle. A significant positive coefficient on the fund balance variable indicates that fund balances help to reduce the expenditure gaps, thereby contributing to budget stabilization. The first two columns of the table present the effects of fund balance levels on negative expenditure gaps in two separate periods of time: 1991–2004 and 2005–2011. The variable of fund balance level is only statistically significant in the model for 2005–2011, but not in the model for 1991–2004. A 1 % increase in fund balance level contributed to reducing the expenditure gap by 0.016 % points in 2005–2011. Similarly, the results in the last two columns of the table show that fund balance share is only significant in the model for 2005–2011. A 1 % point increase in fund balance share helped to reduce the expenditure gap by 0.133 % points in the period of 2005–2011. Fund balances appear to have played a countercyclical role during 2005–2011, but not during 1991–2004.

Table 2.3 Effects of fund balances on total expenditure in "downturn years" (Heckman two-stage sample selection models)

	Downturn years (expenditure gap < 0)			
	1991–2004	2005–2011	1991–2004	2005–2011
Fund balance available* *t_1*	−1.217	**1.589***		
	(−1.174)	(1.862)		
% of fund balance available *t_1*			−0.041	**0.133*****
			(−1.500)	(3.503)
Revenue sources				
Property tax*	3.238	**15.291*****	2.890	**15.454*****
	(1.038)	(3.697)	(0.930)	(3.787)
Sales tax*	2.177	**5.697***	2.120	**7.825****
	(0.800)	(1.742)	(0.784)	(2.341)
Intergovernmental*	**6.946*****	**14.521*****	**6.863*****	**15.419*****
	(5.403)	(7.909)	(5.361)	(8.363)
Economic indicators				
Personal income*	−5.821	12.117	−5.953	12.267
	(−0.817)	(1.355)	(−0.840)	(1.384)
Unemployment rate	−0.063	0.028	−0.049	0.061
	(−0.353)	(0.079)	(−0.280)	(0.173)
Social indicators				
% of population under 18	−0.287	−0.606	−0.302	−0.554
	(−0.516)	(−1.214)	(−0.545)	(−1.118)
% of population over 65	0.173	0.074	0.181	0.083
	(0.288)	(0.153)	(0.304)	(0.172)
Population*	**−44.512****	**38.017****	**−44.771****	**43.205*****
	(−2.009)	(2.309)	(−2.033)	(2.636)
Population squared*	**2.111****	**−1.334***	**2.135****	**−1.615****
	(2.031)	(−1.889)	(2.065)	(−2.294)
Constant	227.632	−590.900***	−625.128***	−3.277***
	(1.571)	(−3.318)	(−3.537)	(−7.902)
Wald χ^2	583.17	895.73	590.53	922.98
(P > χ^2)	0.000	0.000	0.000	0.000
Censored obs	682	215	682	215
Uncensored obs	610	458	610	458

Note: Significance levels are: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Variables marked with an * are logged. Numbers in parentheses are *t*-statistics

Intergovernmental revenues had a significant impact on budget stabilization throughout 1991–2011. A 1 % increase in intergovernmental revenue helped to reduce the expenditure gap by 0.069 % points in 1991–2004 and by around 0.145–0.154 % points in 2005–2011. The other two major revenue sources, property tax and sales tax, contributed to reducing negative expenditure gaps only in 2005–2011. A 1 % increase in property tax pulls down expenditure gap by around 0.153–0.155 % points, whereas the magnitude of the sales tax variable is around 0.057–0.078 % points, based on the results from columns 2 and 4 in Table 2.3.

None of the economic indicators has a significant impact on the dependent variable in the sample period. The significance of population and population squared suggest that there is a nonlinear relationship between population size and the dependent variable.

2.7 Conclusion

This study investigates the determinants of unreserved general fund balances in North Carolina counties and estimates the effects of the fund balances on stabilizing local spending across business cycles. The empirical results show that a higher dependence on property tax increases local savings, whereas a higher reliance on sales tax and intergovernmental revenue is associated with lower local savings. Wealthier local governments tend to save more in their general fund balances. High unemployment significantly reduces local savings.

This analysis attempts to find out whether unreserved general fund balances have posed different effects on budget stabilization in North Carolina counties during the Great Recession and previous recessions. The fund balances appear to have played a countercyclical role in 2005–2011, but not in 1991–2004. Over the years, North Carolina county governments might have improved their countercyclical capacity and learned to make better use of their savings to deal with an economic downturn. That might explain why we have found significant effects of fund balances on stabilizing expenditures in North Carolina counties during the Great Recession. The significant impact of revenue sources shows that property tax and intergovernmental revenue (sales tax to a lesser extent) also have contributed to budget stabilization during the Great Recession.

Consistent with the findings of previous studies (Afonso 2013; Marlowe 2012), county governments in North Carolina appear to be reluctant to drastically spend down their fund balances to cope with economic recessions. As argued by Hou et al. (2012), in addition to improving institutions and financial management practices and accuracy in revenue forecasting so as to obtain more certainty of future revenue streams, state and local governments may need to make more proactive use of their savings to achieve better performance in budget stabilization.

Due to data constraints, this study cannot test the effects of political and organizational factors on local savings. Future research with better data sources may produce fruitful results with important implications for local governments to strengthen their countercyclical fiscal capacity. The accumulation of more empirical evidence on this topic will contribute to the development of a fully-fledged theory on the saving behavior and counter-cyclical fiscal capacity of local governments in the future.

References

Afonso WB (2013) Coping with the great recession: theory and practice for county governments. Int J Public Adm 36(11):768–779

Allan IJ (1990) Unreserved fund balance and local government finance, Research Bulletin, Government Finance Research Center, Government Finance Offices Association, Washington DC. http://budgetfinance.lgawiki.wikispaces.net/file/view/GFOA+Research+Bulletin+Fund+Balance+1990.pdf/58763706/GFOA%20Research%20Bulletin%20Fund%20Balance%201990.pdf

Bell AF (2007) Article 1: an overview of local government. In: Lawrence DM (ed) County and municipal government in North Carolina. UNC-Chapel Hill, Chapel Hill, http://www.sog.unc.edu/pubs/cmg/

Benton JE (2002) Counties as service delivery agents: changing expectations and roles. Praeger, Westport

Burtless G, Gordon T (2011) The federal stimulus program and their effects. In: Grusky DB, Western B, Wimer C (eds) The great recession. Russell Sage, New York, pp 249–293

Coe CK (2007) Preventing local government fiscal crises: the North Carolina approach. Public Budget Finance 27(3):39–49

Douglas JW, Gaddie RK (2002) State rainy day funds and fiscal crises: rainy day funds and the 1990–1991 recession revisited. Public Budget Finance 22(1):19–30

Gauthier SJ (2002) Reserve fund balance policy promulgated. American City and County 117(4):6

Gauthier SJ (2009) What Everyone Needs to Know about the New Fund Balance? Chicago, IL: Government Finance Officers Association

Gramlich EM (1987) Subnational fiscal policy. In: Quigle JM (ed) Perspectives on local public finance and public policy. JAI Press Inc., Greenwich, pp 3–27

Hansen AH, Perloff HS (1944) State and local finance in the national economy. Norton, New York

Heckman JJ (1979) Sample selection bias as a specification error. Econometrica 47(1):153–161

Hendrick R (2006) The role of slack in local government finances. Public Budget Finance 26(1):14–46

Hou Y (2003a) What stabilizes state general fund expenditures in downturn years—budget stabilization fund or general fund unreserved undesignated balance? Public Budget Finance 23(3):64–91. doi:10.1111/1540-5850.2303004

Hou Y (2003b) Budget stabilization fund. In: Rabin J (ed) Encyclopedia of public administration and public policy. Marcel Dekker, New York

Hou Y (2004) Budget stabilization fund: structural features of the enabling legislation and balance levels. Public Budget Finance 24(3):38–64

Hou Y (2005) Fiscal reserves and state own-source expenditure in downturn years. Public Finance Rev 33(1):117–144

Hou Y (2008) Parameters of local government options for a downturn: evidence from Georgia counties. Paper presented at the 2008 Annual Conference of the Association for Budgeting and Financial Management (ABFM), Chicago, 23–25 Oct 2008

Hou Y, Moynihan DP (2008) The case for countercyclical fiscal capacity. J Public Adm Res Theory 18(1):139–159

Hou Y, Wang W, Zhang P (2012) Defining subnational counter-cyclical fiscal capacity: testing its average effects and performance in the great recession. Paper presented at the CAAPA-IRSPM-PMRA Conference, Shanghai, 26–27 May 2012

Marando, VL (1979) City-county consolidation: reform, regionalism, referenda, and requiem. Western Political Quarterly, 32(4):409–421

Marlowe J (2005) Fiscal slack and counter-cyclical expenditure stabilization: a first look at the local level. Public Budget Finance 25(3):48–72

Marlowe J (2012) Fiscal slack, reserves, and rainy-day funds. In: Levine H, Justice J, Scorsone E (eds) Handbook of local government fiscal health. Jones and Bartlett Learning, Burlington

Massey J, Tyer CB (1990) Local government fund balances: how much is enough? South Carolina Forum 1:40–46
Newey WK, West KD (1987) A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. Econometrica 55(3):703–708
Shelton M, Tyer C (with Hembree, Holly) (2000) Local government reserve funds and fund balance: some applications of business concepts. Munic Finance J 21(1):1–18
Snow D, Gianakis G, Fortess E (2008) Simulating Massachusetts municipalities' recession readiness: early warning of a perfect storm? Public Budget Finance 28:1–21
Sobel RS, Holcombe RG (1996) The impact of state rainy day funds in easing state fiscal crises during the 1990–1991 recession. Public Budget Finance 16(3):28–48
Stewart LM (2009) Examining factors that impact Mississippi counties' unreserved fund balance during relative resource abundance and relative resource scarcity. Public Budget Finance 29(4):45–73
Stewart LM (2011) Does the form of government influence Mississippi counties' unreserved fund balance during relative resource abundance and relative resource scarcity? J Public Budget Account Financial Manag 23(4):478–506
Tcherneva PR (2011) Fiscal policy effectiveness: lessons from the great recession, economics working paper archive wp_649, Levy Economics Institute. http://www.levyinstitute.org/pubs/wp_649.pdf
Ványalós I (2005) Fiscal reaction to state aid uncertainties: evidence from New York State. Public Budget Finance 25(4):44–58
Wagner GA (2003) Are state budget stabilization funds only the illusion of savings? Evidence from stationary panel data. Q Rev Econ Finance 43:213–238
Wagner GA, Elder EM (2007) Revenue cycles and the distribution of shortfalls in U.S. states: implications for an 'optimal' rainy-day fund. Nat Tax J 60(4):727–742
Wang W, Hou Y (2012) Do local governments save and spend across budget cycles? Evidence from North Carolina. Am Rev Public Adm 42(2):152–169

Chapter 3
Revenue Volatility in New York State School Districts: Challenges and Responses

Robert Bifulco and Christian Buerger

Abstract This chapter examines revenue volatility across New York State school districts between 1997 and 2010. We find that both the property tax base and state aid have considerable volatility, with average deviations from trend above 7 %. However, deviations from trend in the property tax base and state aid are not strongly correlated, which lessens the overall amount of revenue volatility districts need to address. A preliminary analysis of how school districts in New York have responded to revenue volatility suggests that districts work to smooth growth in the property tax levy and deal with volatility in the property tax base primarily by adjusting effective property tax rates. Fluctuations in state aid, in contrast, are addressed through changes in fund balances and expenditures, and during the period examined, New York school districts relied much more heavily on changes in expenditures than changes in fund balances.

3.1 Introduction

According to the definition provided by the U.S. Census, a special purpose government has authority to provide only a single service or a limited set of services related to a particular function and has substantial administrative and fiscal independence from general purpose local governments such as towns, counties, or municipalities.[1] The services carried out by special purpose governments vary widely and include basic local government functions such as sewers, transportation, fire protection, and parks, as well as lower profile services such as mosquito control and cemeteries, among many others. The 2012 Census of Governments reports over 50,000 special purpose governments in the United States.[2] Because they typically have authority to draw on a limited set of revenue sources, revenue volatility and tools for managing

[1] See http://www.census.gov/govs/cog2012

[2] See U.S. Census Bureau, 2012 Census of Governments: Organization Component Preliminary Estimates and also http://www2.census.gov/govs/cog/2012/formatted_prelim_counts_23jul2012_2.pdf

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it are likely to be different for most special purpose governments than for general purpose governments.

It is easy to argue that public school systems are among the most important type of special purpose government in the United States. First, more tax dollars are raised and spent by public school systems than any other type of special purpose government. In Fiscal Year 2011, local public school systems collected $599.1 billion in revenue, approximately 36 % of total revenues collected by local governments in the U.S. (U.S. Census Bureau 2013). Second, public education is a central function of state and local government. Most state constitutions single out the public provision of education as a constitutional obligation of state governments, and education receives substantial attention in state and local government politics. Despite the large amount of public funds handled by local school districts, school district budgeting, and in particular, the cyclical aspects of school district budgeting, has not been extensively studied by public administration scholars.

School district financing differs from that of state and general purpose municipal governments in a number of ways. First, while state governments and many municipalities have access to a diverse set of taxes, school districts are typically limited to local property taxes. Many school districts are also heavily reliant on programs of state aid specifically designed for schools. In these ways, school district revenue bases are significantly different than those of state and local governments. Second, budgeting institutions are different in school districts than in state and other local governments. Like other local governments, but unlike states, the budgeting processes of school districts focus to a large degree on the amount of the property tax levy. Thus, rather than assuming constant tax rates and projecting changes in the tax base as state governments commonly do, school districts determine the amount of the property tax levy required to cover expenditures and adjust property tax rates annually to achieve the required levy. Also, in many states, including New York, school district budgets must be approved in voter referenda, which is typically not the case for states and general purpose local governments.[3] Finally, like many other local governments, school districts are frequently subject to tax and/or expenditure limits of various kinds (Mullins and Wallin 2004).

Thus, both the amount of revenue volatility school districts face and how school districts respond to that volatility are likely to differ from state and other local governments. In this chapter, we examine these two issues using data on school districts in New York State. We begin by providing some background on school districts in New York State, and then describe the data sources used in our analyses. Next, we provide measures of revenue volatility for New York State school districts and explore the extent to which changes in the primary revenue bases are associated with key choice variables including changes in property tax levies, changes in fund balances, and changes in expenditures. We conclude by discussing the likely effects of a recently adopted property tax cap in New York on the ability of school districts to manage revenue volatility.

[3] Some states require voter approval of the district budget itself and others require approval of the amount of the property tax levy (Hartman 1999).

3.2 Background on New York State School Districts

Excluding New York City and special act districts,[4] there are 679 operating school districts in New York State. The overwhelming majority serve grades K-12, but three are high school-only districts, and 39 serve only elementary school grades.[5] School districts in New York range tremendously in size. During the 2010–2011 school year, 84 districts served fewer than 500 students and had total revenues less than $10 million, while the so-called Big Four city school districts (Buffalo, Rochester, Syracuse, and Yonkers) had average enrollments of 29,194 students and average revenues exceeding $500 million. In the same year, the medain district enrollment was 1,516 and the median revenues were $28.5 million.

Almost all school districts in New York State are governed by an elected school board and managed by a superintendent appointed by the board.[6] The Big Four city school districts are fiscally dependent. Although each of these fiscally dependent districts has a board of education to set policy for the school system, the board does not have the power to levy taxes or incur debt, and local funding for the school system is provided as an appropriation to the district by the municipality. All other school districts in the state are fiscally independent, which means they have the power to levy taxes and incur debt.

With the exception of the Big Four city school districts, New York State school district budgets are subject to approval by the voters in the district. Once approved by the board, final authorization of each year's proposed budget rests with the voters of the district. In districts where voters fail to approve the board of education's proposed budget, the board can present the original budget proposal or a revised budget proposal to the voters a second time for approval. If the board's final proposed budget is not authorized by voters, the district must operate on a contingency budget. The contingency budget requires a property tax levy that is not greater than the levy of the prior year.[7] In the Big Four city districts, the appropriation of local support for the school system is approved as part of the citywide budget, and the adoption processes for the city budgets do not entail direct authorization by local voters.

In 2011, the New York State legislature imposed a property tax cap on all local governments in the state, including municipalities and school districts. The cap limits growth in the total property tax levy to the lesser of 2 % or the rate of inflation. The law allows increases greater than 2 % that result from growth in the tax base due to the addition of new buildings, and additional levy increases to cover certain

[4] Special act districts exclusively serve special education students.

[5] See http://www.p12.nysed.gov/mgtserv/sch_dist_org/GuideToReorganizationOfSchoolDistricts.htm

[6] Members of the Yonkers City School District board are appointed by the Mayor, and the governing boards for the three high school only districts are comprised of appointed representatives from the component elementary school districts' boards of education. See http://www.p12.nysed.gov/mgtserv/sch_dist_org/GuideToReorganizationOfSchoolDistricts.htm

[7] See http://www.p12.nysed.gov/mgtserv/budgeting/handbook/ and also (Ehrenberg et al. 2004).

expenditures.[8] Any budget proposal exceeding the property tax cap must be approved by 60 % of district voters, rather than by a simple majority. This legislation also changed limits on the contingency budget from an increae over the prior year budget of 120 % of the inflation rate or 4 %, whichever is less, to the much more stringent limit of zero increase in the prior year's property tax levy. Together these changes in local finance laws have made it more difficult for school districts to increase property tax levies.

The Big Four city districts are not directly subject to the property tax caps, but the municipalities from which they receive appropriations are subject to the caps. In 2007, the state legislature passed a law prohibiting the city governments in Buffalo, Rochester, Syracuse, and Yonkers from reducing the amount of locally supported funding below the prior year's amount, except in cases where total city revenues decline. In such cases, the city may reduce its support to the local school district by no more than the same percentage that city funds are reduced.

3.3 Sample and Data

The sample of districts used in the analyses presented below include all school districts in the state excluding New York City, special act districts, districts with missing data in one or more of the years included in the analysis, and districts that have both fewer than 300 students and more than $50,000 per pupil in revenue in any of the years observed.[9] After eliminating these districts, 653 districts are included in the analyses.

Revenue and expenditure data for the years 1996–1997 through 2009–2010 are drawn from Annual Financial Reports submitted by local school districts to the New York State Education Department. Districts submit balance sheet information as well as detailed statements of revenues and expenditures for each of the districts' accounting funds in a standard form to ensure comparability across districts and years. Both actual and budgeted revenue and expenditure figures are reported; however, budgeted figures are only reported from 2001–2002 through 2009–2010. District finances are reported in five different funds including: the General Fund, where the bulk of revenues and expenditures are recorded; a Special Aid Fund and School Food Services Fund, where the bulk of federal revenues and expenditures are recorded; a debt services fund; capital funds; and in some cases, miscellaneous other funds. The analyses below focus exclusively on General Fund revenues, expenditures, and fund balances. In addition to data from the Annual Financial Reports, data on full and assessed property values in the district are drawn from the

[8] The expenditures include those needed to cover increases in required pension system contributions in excess of 2 %, court orders or judgments that exceed 5 % of the prior tax levy, and local share of capital expenditures. See https://www.osc.state.ny.us/localgov/realprop/pdf/legislationsummary.pdf

[9] $50,000 per pupil in revenue is more than three standard deviations above the mean and less than 5% of districts have fewer than 300 students, thus districts that exceed both these thresholds are extreme outliers. A total of ten districts are dropped because they meet both of these thresholds.

Financial Data for Local Governments compiled by the Office of the State Comptroller in New York State.

For a variety of reporting purposes, the New York State Education Department classifies school districts in the state into five different categories based on the share of students in the districts who are poor and district wealth.[10] The five categories are: (1) the Big Four city school districts, (2) high need urban/suburban districts, (3) high need rural districts, (4) average need districts, and (5) low need districts. In several of the analyses below, we present separate measures for districts in each of these categories.

As in most other states, the overwhelming majority of revenue for school districts in New York State comes from the local property tax and state aid. Figure 3.1 shows the shares of revenue from various sources recorded in the general funds of school districts in New York State. As of 2010, more than 85 % of general fund revenues were drawn from the property tax and state aid. Between 1997 and 2002, the share from the property tax fell by roughly 10 % points, while the share from other sources increased by that same 10 %. These changes are related to the adoption in 1996 of a school property tax relief program, known as STAR, which was phased in over this period. Under this program, the first $30,000 of assessed value on each property, and higher amounts in some wealthier districts, is exempt from taxation.

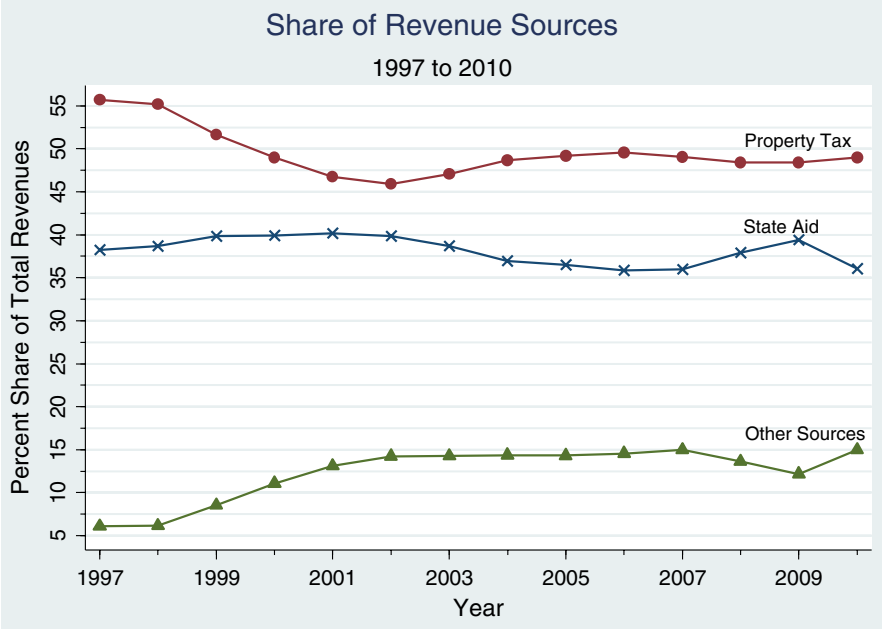

Fig. 3.1 Revenue shares by source, 1997–2010

[10] For an exact description of the index used to classify districts see: http://www.p12.nysed.gov/irs/accountability/2011-12/NeedResourceCapacityIndex.pdf

Table 3.1 Revenues, by source and type of district

	Total per pupil revenues	Percent property tax (%)	Percent state aid (%)
1997			
All districts (656)	$13,167	55.9	38.0
Big Four (4)	$10,779	36.6	55.7
High need urban/suburban (36)	$12,920	42.2	51.5
High need rural (158)	$11,604	30.3	64.1
Average need (335)	$12,639	54.6	39.5
Low need (123)	$16,387	79.0	15.2
2002			
All districts (656)	$14,802	46.1	39.6
Big Four (4)	$12,849	23.5	64.9
High need urban/suburban (36)	$14,332	31.3	55.7
High need rural (158)	$14,313	22.5	65.6
Average need (335)	$14,156	44.3	40.5
Low need (123)	$17,406	69.8	15.6
2007			
All districts (656)	$17,643	49.3	35.8
Big Four (4)	$14,945	22.6	67.0
High need urban/suburban (36)	$16,565	32.8	54.8
High need rural (158)	$16,668	25.6	61.4
Average need (335)	$16,981	47.4	35.9
Low need (123)	$20,747	71.8	13.8
2010			
All districts (656)	$19,486	49.2	35.8
Big Four (4)	$18,245	18.6	70.4
High need urban/suburban (36)	$18,653	31.1	55.3
High need rural (158)	$19,001	25.1	61.5
Average need (335)	$18,415	48.3	35.0
Low need (123)	$22,674	72.5	13.5

The state reimburses revenues lost by districts as a result of the exemptions. Although this funding from the state functions in most important respects as an additional state aid program (Duncombe and Yinger 1998, 2001), it is distributed according to a much different formula than other state aid programs and is not recorded in Annual Financial Reports as either property tax or state aid revenue. Since 2002 the share of general fund revenue from the property tax has fluctuated between 45 and 50 %, while the share from state aid, excluding STAR reimbursements, has fluctuated between 35 and 40 %.

Table 3.1 shows revenues by type of district. Over the period observed, per pupil revenues in the Big Four districts are substantially lower than in other districts in the state, although this disparity has been reduced in the most recent years, and per

Table 3.2 Expenditures, by function and year (all districts)

	1997	2002	2007	2010
Total per pupil expenditures	$13,096	$14,693	$17,223	$18,911
Percent general support	12.4 %	11.6 %	12.3 %	11.3 %
Percent instruction and student support	60.8 %	60.9 %	55.1 %	56.0 %
Percent transportation	5.3 %	5.4 %	5.4 %	5.4 %
Percent employee benefits	15.6 %	14.4 %	19.9 %	19.5 %
Percent debt service	3.9 %	5.3 %	4.6 %	5.2 %

pupil revenues in low need districts are substantially higher than in other districts. The high need districts, including the Big Four, rely much more heavily on state aid than average and low need districts. Reliance on state aid has grown over time in the Big Four districts, and currently more than 70 % of revenues in those districts are provided by state aid programs.

Table 3.2 shows expenditures by function. The share of expenditures in different categories does not vary significantly by the type of district, so only figures for all districts are shown in Table 3.2. Due to state-mandated staffing ratios and general expectations about class sizes, the bulk of spending is linked closely to student enrollments (Hartman 1999, p. 106; Thompson et al. 2008, p. 154). Because districts have little control over enrollments, and expenditures are tied closely to enrollments, the ability to address revenue declines by reducing expenditures is constrained.

3.4 Volatility of School District Revenues

In this section, we examine two forms of volatility in property tax bases and state aid revenues among New York State school districts. First, we examine variability around estimated growth trends. This measure captures the extent to which the growth in school district revenue bases is subject to cyclical fluctuations (Dye and McGuire 1991). Second, we examine deviations of actual revenues from budgeted revenues (White 1983). This measure captures how accurately school districts forecast revenues as part of their budget process. The first measure indicates how large budget deficits (or surpluses) might be during economic downturns (or expansions). The second indicates the extent to which budget gaps might appear during the fiscal year and reflects the predictability of revenues as much as cyclical fluctuation.

To measure variability around trends, we follow Dye and McGuire (1991), and for each school district, regress the natural logarithm of the revenue base on a constant and a linear time trend. The estimated time trend coefficient is the average annual rate of growth. The measure of revenue volatility, computed separately for each district, is the standard deviation of the residuals from the district-specific regression. We refer to this measure interchangeably as the Dye and McGuire (1991) volatility measure or the average deviation from trend.

Table 3.3 Dye and McGuire (1991) volatility measures, 1997–2010

	Property value	State aid	Combined revenue	Enrollment
All districts (653)				
Avg per pupil value	$721,479	$7,710	$18,034	2,632
Avg percentage deviation from trend	7.4 %	7.7 %	6.1 %	2.7 %
Big Four (4)				
Avg per pupil value	$337,514	$10,191	$14,572	30,960
Avg percentage deviation from trend	7.6 %	12.9 %	8.0 %	1.8 %
High need urban/suburban (36)				
Avg per pupil value	$384,247	$9,879	$16,004	5,107
Avg percentage deviation from trend	8.9 %	7.3 %	6.3 %	2.7 %
High need rural (158)				
Avg per pupil value	$429,119	$11,300	$17,278	1,073
Avg percentage deviation from trend	7.2 %	7.2 %	6.5 %	2.9 %
Average need (335)				
Avg per pupil value	$619,200	$7,477	$16,486	2,614
Avg percentage deviation from trend	7.2 %	7.2 %	5.8 %	2.5 %
Low need (120)				
Avg per pupil value	$1,804,847	$2,898	$24,078	3,047
Avg percentage deviation from trend	7.6 %	9.6 %	6.5 %	3.0 %

For each district, we compute this measure for the full market property value in the district, a measure of the property tax base. We also calculate this measure for the general fund state aid revenues, which in New York are provided primarily in lump-sum form, and thus, are not influenced by district policy choices. We also compute average deviations from trend for a measure we call "combined revenue." To compute this measure, we first multiply the full market property value in the district in a given year by an estimate of the average effective tax rate in the district over all the years that we observe the district.[11] This provides a measure of property tax revenue that is unaffected by choices made about assessment ratios and property tax rates. We then add this measure to the district's total state aid revenue to get a measure that captures changes in property tax and state aid revenues that are unaffected by district policy choices. Finally, to measure the volatility in the most important driver of expenditures for school districts, we estimate average deviations from trends in enrollment.

Table 3.3 presents average Dye and McGuire (1991) volatility measures for our 653 sample districts over the 1997–2010 period. Looking first at averages for all sample districts, average deviations from trends are about 7.4 % for the property tax base and about 7.7 % for state aid. However, deviations from trend in the property tax base and deviations from trend in state aid tend not to be strongly correlated and

[11] The estimate of the effective tax rate for a given year is computed by dividing total revenue from property taxes reported in the Annual Financial Report by the full market value in the same year.

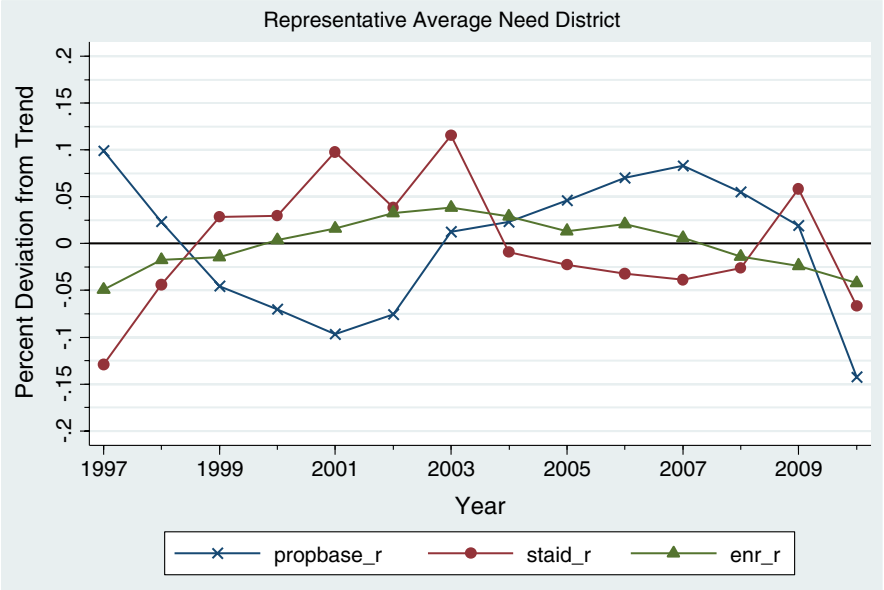

Fig. 3.2 Revenue and enrollment volatility for a selected school district

in some cases are negatively correlated. As a result, the average deviation from trend in combined revenues is only 6.1 %, lower than the volatility in either the property tax base or state aid considered separately. This pattern is illustrated for a selected average need district in the state in Fig. 3.2, where we see that in years when property values fall below trend, state aid tends to be above trend and vice versa. This pattern suggests that state aid policies may help to address volatility in districts' own source revenue bases.

The second result to note in Table 3.3 is that enrollment growth does not deviate considerably from trend and is much more stable than revenue growth. This result indicates that, unlike in the case of state and county governments that are responsible for funding social safety net programs, expenditure demands in school districts do not tend to increase substantially during economic downturns when revenues tend to be below trend. The stability of enrollment growth is illustrated by the line marked with triangles in Fig. 3.2. Thus, revenue volatility is apparently not compounded by expenditure volatility. On the other hand, stable trends in enrollment constrain the ability of school districts to respond to decreases in revenue bases by decreasing expenditures without corresponding cuts in service levels.

Measures of volatility are similar across districts in each of the separate need categories except the Big Four city school districts, where state aid volatility is considerably higher than in the other districts. Given that the Big Four districts are particularly reliant on state aid, the volatility of combined revenue is also higher in the big city districts. The higher level of state aid volatility in the Big Four districts

is partially the result of efforts made by the state to increase support for big city districts after 2007. In 2006, the New York State Court of Appeals ruled that, due to inadequate school funding, the state had failed to meet its constitutional obligation to provide the children of New York City a sound basic education. Although the case focused on New York City, the Governor and Legislature responded by adopting school aid reforms focused on increasing aid to all of the big city school districts.[12] Thus, the Big Four districts saw large state aid increases in 2007 and 2008, which contributed to high volatility measures.

Nevertheless, several factors suggest that revenue volatility presents greater challenges for the large city districts in New York than average need and low need school districts. First, the Big Four have relatively low levels of per pupil spending (see Table 3.1) and relatively high student needs, which makes reductions in expenditures particularly burdensome for the big city districts. Second, the big city school districts have relatively small per-pupil property tax bases (see Table 3.3), and as a result, closing budget deficits by raising own-source revenues requires larger property tax rate hikes in the big city school districts than elsewhere. Finally, because they face declining enrollment bases, the Big Four city districts tend to have high per-pupil legacy costs, particularly retiree benefits.[13] Such expenditures are difficult to cut during economic downturns when revenues decline.

Our second measure of volatility focuses on revenue predictability by comparing budgeted and actual amounts of property tax and state aid revenue. Following White (1983), we compute this volatility measure as:

$$\sigma_i = \sqrt{\frac{\sum_{t=1}^{m}\left[\frac{R_{it} - \hat{R}_{it}}{R_i}\right]^2}{m-1}} \tag{3.1}$$

where σi is the average deviation of actual from budgeted revenue for district i, Rit is the actual revenue for district i in period t, $\hat{R}_{it}$ is the budgeted revenue for district i in period t, Ri is the mean revenue of tax i for periods 1 through m, and m is the number of time periods included in the analysis. We refer to this measure as the White (1983) volatility measure or the average deviation from budget and compute it for property tax revenue, state aid revenue, and the two sources of revenue combined.

Table 3.4 presents average White (1983) volatility measures for districts in New York State by need category. With the exception of the Big Four city districts, actual property tax collections in New York State school districts deviate substantially from budgeted amounts. Whether this is due to poor forecasting practices or other factors is difficult to say. In contrast, actual property tax revenues tend to match budgeted amounts quite closely in the Big Four districts. This difference between the Big Four and other districts is very likely due to the fact that the Big Four are fiscally dependent. Fiscally independent districts bear the risks associated

[12] For more details see http://www.edlawcenter.org/initiatives/campaign-for-fiscal-equity.html

[13] For instance, Bifulco and Reback (2014) report that in 2009–2010, the Buffalo City School District spent $1,658 per pupil on current retiree health care benefits.

Table 3.4 White (1983) revenue volatility measures, 2002–2010

	Property tax	State aid	Sum
All districts (653)			
Avg per pupil value	$8,852	$7,767	$16,619
Avg percentage deviation from budgeted	11.8 %	7.6 %	5.9 %
Big Four (4)			
Avg per pupil value	$3,733	$10,890	$14,623
Avg percentage deviation from budgeted	1.5 %	7.3 %	5.2 %
High need urban/suburban (36)			
Avg per pupil value	$5,676	$9,926	$15,602
Avg percentage deviation from budgeted	12.4 %	6.7 %	5.9 %
High need rural (158)			
Avg per pupil value	$5,109	$11,538	$16,647
Avg percentage deviation from budgeted	17.9 %	6.1 %	6.0 %
Average need (335)			
Avg per pupil value	$7,945	$7,483	$15,428
Avg percentage deviation from budgeted	11.2 %	7.1 %	6.4 %
Low need (120)			
Avg per pupil value	$17,438	$2,842	$20,280
Avg percentage deviation from budgeted	5.3 %	11.3 %	4.4 %

with delinquent tax payments and other reasons that property tax revenues deviate from budgeted amounts. In the case of dependent districts, however, the municipality agrees to make payments to the school district as part of the budget preparation process, and then the municipality bears the risk of lower than anticipated collections. Legal restrictions that constrain municipality's ability to reduce payments to dependent school districts also help to shield Big Four districts from this risk.

State aid revenues deviate from budgeted amounts by an average of 7.6 %. Deviations were somewhat higher in low need districts, but because state aid amounts are very low in these districts, this higher level of volatility in low need districts is inconsequential. Overall, the average deviation of actual from budgeted amounts of combined property tax and state aid revenue is 5.9 %, a figure very close to the average deviation from trends for combined revenue (6.1 %) presented in Table 3.3.

In sum, school district property tax bases and state aid awards in New York State display considerable volatility. Two factors, however, mitigate the budget difficulties this volatility creates for school districts. First, deviations from trend and from budgeted amounts of property tax and state aid tend not to be positively correlated and are in some cases negatively correlated. As a result, volatility of combined revenue bases is less than the volatility of either revenue source considered individually. Second, unlike in the case of many state and county governments, expenditure demands do not necessarily increase during economic downturns when revenues bases tend to decrease. Nonetheless, stable enrollment trends may make it difficult to address declines in revenue growth with expenditure cuts, and dealing with revenue volatility may be particularly challenging for the big city districts that have especially constrained budgets and relatively small local property tax bases.

3.5 How Districts Respond to Revenue Volatility

In this section, we begin to explore how school districts respond to revenue volatility. Specifically, we consider the extent to which changes in property tax levies, unreserved fund balances, and expenditure totals are associated with changes in the property tax base and state aid revenues.

3.5.1 Expectations

Before turning to the data, it is worth considering the choices that school district budget makers face. Typically, the school district budget process focuses on the total amount of the property tax levy, which is equal to the property tax base (FV) times the effective tax rate (r). The total property tax levy is set equal to the difference between projected expenditures (E) and other source revenues (A), the majority of which come from state aid, plus any appropriated fund balances (B).

$$\mathbf{Levy} = \mathbf{FV}(r) = E - (A + B)$$

Often the total property tax levy from the prior year is viewed by district officials and voters as a benchmark, and property tax increases are formulated as percentage increases in the total levy.

If the growth in expenditure needs (E) is larger than the growth in state aid and other source revenues (A), districts have three choices: (1) cut programs to achieve savings in E; (2) increase the amount of fund balance that is appropriated for use (B), and thereby decrease unreserved fund balances; and/or (3) increase the property tax levy. Alternatively, if growth in state aid is larger than usual, a district can either expand programs and thus increase expenditures, or look to reduce or avoid fund balance appropriations and/or tax levy increases.

Fluctuations, particularly increases, in the property tax levy are unpopular, and therefore, we would expect districts to try to smooth growth in the property tax levy. Thus, when the property tax base (FV) increases either more or less than normal, we expect districts to maintain normal increases in the tax levy by changing the effective tax rate (r).[14] Table 3.5 presents indirect evidence that this is the case.

[14] The effective tax rate is the product of the nominal tax rate, which is the rate at which assessed value is taxed, and the assessment ratio, which is the ratio of assessed value to full value. Thus, reductions in the effective tax rate can be achieved either by reducing the nominal tax rate or reducing the assessment ratio. Because changes in assessed value often lag changes in full market property values, short-term changes in effective tax rates are often achieved through changes in the assessment ratio.

Table 3.5 Additional Dye and McGuire (1991) volatility measures, 1997–2010

	Full property value (%)	Property tax revenue (%)
All districts (653)	7.4	3.6
Big Four (4)	7.6	4.6
High need urban/suburban (36)	8.9	3.8
High need rural (158)	7.2	3.9
Average need (335)	7.2	3.5
Low need (120)	7.6	3.0

Specifically, Table 3.5 shows that the volatility in total property taxes tends to be substantially less than the volatility in the property tax base, which suggests that districts do attempt to smooth growth in property tax levy.[15]

If voters are resistant to large increases in the property tax levy, we would also expect districts to respond to lower-than-normal growth in state aid by either appropriating fund balances for use or by cutting program offerings and the accompanying growth in expenditures.

3.5.2 Methods

To examine the extent to which school districts in New York have relied on changes in property tax levies, fund balances, and expenditures to address revenue volatility, we estimated a series of regressions. The dependent variables in each regression are, respectively, the percent change in the property tax levy (PTL), the change in the effective property tax rate ($\boldsymbol{r}$), the change in the ratio of unreserved fund balances (B) to the previous year's total expenditures, and the percent change in total expenditures (E). We regressed each of these dependent variables on the percent change in the property tax base and the percent change in state aid.

[15] Table 3.5 presents Dye and McGuire (1991) measures of volatility of the property tax base (full property value) and property tax revenue. The volatility of the property tax base is the same as that reported in the first column of Table 3.3. The Dye and McGuire measure of volatility in property tax revenues is the deviation from trend in property tax revenue, expressed as a percentage of the prior year's total revenue. The trend is estimated separately for each district by regressing the natural logarithm of property tax revenue on a constant and linear time trend.

More specifically, we estimated the following four regression models:

$$\left(\frac{Levy_{it}-Levy_{i,t-1}}{Levy_{i,t-1}}\right)=\alpha_0+\alpha_1\left(\frac{FV_{it}-FV_{i,t-1}}{FV_{i,t-1}}\right)+\alpha_2\left(\frac{A_{it}-A_{i,t-1}}{A_{i,t-1}}\right)+\varepsilon_{it}$$

$$r_{it}-r_{i,t-1}=\beta_0+\beta_1\left(\frac{FV_{it}-FV_{i,t-1}}{FV_{i,t-1}}\right)+\beta_2\left(\frac{A_{it}-A_{i,t-1}}{A_{i,t-1}}\right)+\upsilon_{it}$$

$$\left(\frac{B_{it}-B_{i,t-1}}{E_{i,t-1}}\right)=\phi_0+\phi_1\left(\frac{FV_{it}-FV_{i,t-1}}{FV_{i,t-1}}\right)+\phi_2\left(\frac{A_{it}-A_{i,t-1}}{A_{i,t-1}}\right)+\mu_{it}$$

$$\left(\frac{E_{it}-E_{i,t-1}}{E_{i,t-1}}\right)=\gamma_0+\gamma_1\left(\frac{FV_{it}-FV_{i,t-1}}{FV_{i,t-1}}\right)+\gamma_2\left(\frac{A_{it}-A_{i,t-1}}{A_{i,t-1}}\right)+\nu_{it}$$

Where i indexes the district and t indexes the year; FV is the full market property value, and A is state aid revenue.

Each regression is estimated by pooling the years 2002 through 2010 for each district in our sample and applying ordinary least squares (OLS). We only include the years 2002 through 2010, because expansion of the STAR program during the earlier years complicates interpretation of changes in property tax levies and rates. For each regression coefficient, we computed Huber-White estimates of standard errors that are robust to clustering within districts.

3.5.3 Changes in the Property Tax Levy

The first column of Table 3.6 indicates that a 1 % increase in the property tax base is associated with a 0.186 % above average increase in the property tax levy. Apparently, districts do respond to increases in the property tax base by increasing the property tax levy. However, the increase in the property tax levy is much smaller than the increase in the property tax base. To illustrate this point, consider that the average value of the property tax base in a district over the period examined is $1.61 billion, and the average effective tax rate is 0.014 %. For a district with these values, a 1 % increase in the property tax base without any change in the effective tax rate would increase the property tax levy by $225,400. However, the estimate in the first column of Table 3.6 indicates that in this hypothetical district, a 1 % increase in the property tax base would only result in a $41,924 increase in the property tax levy. This implies that districts respond to changes in the property tax base primarily by changing the effective property tax rate. This implication is confirmed in the second column of Table 3.6, which shows that an increase in the property tax base is accompanied by a significant decrease in the effective property tax rate.

The first and second columns of Table 3.6 also indicate that changes in the property tax levy and effective property tax rate are unrelated to changes in state aid. This result is consistent with the idea that districts are reluctant to make unusually

Table 3.6 Relationship between revenue base changes and budgetary choices

	% Change in property tax levy	Change in effective property tax rate	Change in unreserved fund balance[a]	% Change in expenditures
% Change in full property value	0.186***	–0.0095***	–0.016	0.076***
	(0.027)	(0.0004)	(0.009)	(0.012)
% Changes in state aid	–0.008	–0.0001	0.038***	0.194***
	(0.007)	(0.0001)	(0.007)	(0.018)
N	5,877	5,877	5,875	5,877
R-square	0.063	0.477	0.014	0.145

Each column presents results from separate regressions. All regressions are estimated using full sample of 653 school districts and years 2002–2010. ***Indicates statistically significant at the 0.01 level

[a]Unreserved fund balance measured as the ratio of unreserved fund balance to total expenditures

large changes in the property tax levy, and instead look elsewhere in responding to fluctuations in state aid awards.

The results of the first and second column of Table 3.6, together with the results in Table 3.5, provide strong evidence that districts work to smooth growth in the property tax levy. Although district budgets are not completely unresponsive to changes in the property tax base, district officials do appear to largely ignore short-term changes in the base when deciding upon the property tax levy. Such behavior is likely the result of institutional features of the property tax, particularly the fact that the total property tax levy and nominal tax rates—rates on assessed rather than real values—are used to assess changes in the property tax.

3.5.4 Changes in Unreserved Fund Balance

The third column of Table 3.6 indicates that changes in unreserved fund balances are unrelated to changes in the property tax base. This result is consistent with the fact that large changes in property tax bases are associated with only small changes in actual revenues collected. Thus, districts have not needed to rely on fund balances to address volatility in the property tax base.

Changes in unreserved fund balances are, however, associated with changes in state aid. The coefficient estimate in the third column of Table 3.6 indicates that a 1 % increase in state aid is associated with an increase of 0.038 in the ratio of unreserved fund balance to total expenditures. In the district receiving the average state aid award, a 1 % change in state aid generates a $164,000 change in revenues, and in the district with average total expenditures, a 0.038 change in the ratio of unreserved balance to total expenditures equals a $16,209 change in fund balance. Thus, although a small fraction of changes in state aid tend to be translated into changes in fund balances, the bulk of changes in state aid end up elsewhere. In other words, districts appear to make only limited use of unreserved fund balances to deal with revenue volatility.

3.5.5 *Changes in Expenditures*

In contrast to fund balances, changes in expenditures are strongly associated with changes in the property tax base and state aid. The estimates in the fourth column of Table 3.6 indicate that a 1 % increase in the property tax base is associated with a 0.076 % increase in total expenditures. As we have already discussed, a 1 % increase in the property tax base in the typical district is associated with a $41,924 increase in revenue. The estimate in column 4 indicates that in a district with the average amount of total expenditures, a 1 % increase in the property tax is associated with $32,376 increase in expenditures. Together, these results suggest that the bulk of the increases in revenues associated with increases in the property tax base are used to fund increases in expenditures.

The results in the fourth column of Table 3.6 also indicate that a 1 % increase in state aid is associated with a 0.194 % increase in total expenditures. In the district with average state aid receipts and average total expenditures, this suggests that a $164,000 change in state aid is associated with a $82,696 change in total expenditures. These results suggest that districts rely primarily on changes in expenditures to address fluctuations in state aid and revenue volatility more generally.

3.6 Conclusion

Despite the enormous amount of public resources allocated to schools, school district budgeting has not been extensively studied by public administration scholars. In this chapter, we use school districts in New York State to estimate volatility in the two primary revenue sources available to school districts: the property tax and state aid. We find that in New York, both the property tax base and state aid have considerable volatility, with average deviations from trend above 7 %, and even greater for some subsets of districts. However, deviations from trend in the property tax base and state aid are not strongly correlated, which lessens the overall amount of revenue volatility districts need to address.

Enrollment, the one indicator of expenditure need that we were able to examine, suggests that expenditure needs do not fluctuate as much as revenues. Thus, although decreases in revenue growth do not tend to be compounded by increases in expenditure demands, relatively constant expenditure demands do constrain to some extent the ability of districts to address revenue volatility. These constraints might be particularly challenging in the large city districts where per-pupil expenditures have been significantly lower and legacy costs significantly higher than in other districts.

We also have provided a preliminary analysis of how school districts in New York have responded to revenue volatility. Our results suggest that districts in New York work to smooth growth in the property tax levy and deal with volatility in the property tax base primarily by adjusting effective property tax rates. The ability to mitigate volatility in the underlying tax base by adjusting rates is facilitated by the fact that school district budgeting processes focus on the total size of the tax levy. This

feature of the budgeting process, which is shared by many general purpose local governments, provides a natural mechanism for dealing with ups and downs in real estate markets. Note the ability to adjust rates annually might be further facilitated by property value assessment practices. When changes in assessed value lag change in market values, effective property rates can be adjusted without any explicit policy decision to change nominal tax rates.

Fluctuations in state aid, in contrast, are addressed through changes in fund balances and expenditures. The alternative of increasing or decreasing the property tax levy is likely to be a highly visible and unpopular way to respond to changes in state aid. It appears that during the 2002–2010 period, school districts in New York State relied much more heavily on changes in expenditures than changes in fund balances to address revenue volatility.

School districts in most states rely primarily on property taxes and state aid for funding, and thus, the underlying amount of volatility in school district revenue bases in other states is likely to be similar to that in New York. Whether expenditure growth tends to be as smooth in other states as it is in New York is more difficult to say. School districts in many Sun Belt states have seen rapid growth in recent years driven by migration patterns, and enrollment growth in these states may be more closely tied to economic growth. In these states, enrollment growth may well slow as economic growth slows, which could help to mitigate the budget problems caused by any revenue decreases associated with sluggish economic growth. Finally, district budgeting processes in most states focus on the prior year's property tax levy as a benchmark. Thus, it is likely that school districts in other states will also respond to volatility in real estate markets through changes in effective property tax rates. The extent to which effective tax rates will change "automatically"—that is, without explicit policy changes—may vary from state to state depending on policies governing the frequency of reassessments.

Although many of the findings in this chapter are likely applicable to school districts in many other states, they are less likely to apply to other types of special purpose governments. Many special purpose governments rely on user fees or other sources of local revenues that operate differently from the property tax. Thus, both the extent of volatility in the revenue base and the options available for mitigating that volatility in other types of special purpose governments might be much different than in school districts. Also, state aid to schools is a large proportion of any state budget, while state aid to many other special purpose governments is likely to be orders of magnitude smaller. As a result, the politics surrounding state aid funding decisions, and thus, the volatility of state aid awards, are likely to be much different for school districts than for other special purpose districts. Finally, whether service demands are procyclical, countercyclical, or acyclical is likely to depend very much on the type of service a special purpose government provides. The characteristics of revenue flows, expenditure demands, and policy options for dealing with volatility have to be investigated separately for different types of special purpose governments.

In closing, it is interesting to consider how the recent property tax cap imposed on school districts in New York might influence the way school districts deal with revenue volatility, particularly since property tax caps already constrain school

district financing in many states. By limiting growth in the property tax levy, the cap is likely to constrain districts' ability to address declines in state aid revenue by increasing the property tax levy. However, our analysis suggests that districts have not typically relied on changes in the property tax levy to offset changes in state aid, which suggests that the property tax might not influence the way districts deal with revenue volatility.

On the other hand, the property tax cap is intended to limit property tax levy growth below historic levels. During the period 2002–2010, the average annual increase in the property tax levy across all districts in our sample was 3.3 %, and the cap is intended to limit that growth to 2 % or less. If this constraint on the property tax levy reduces the rate of growth in expenditures or fund balances, it may be more difficult for districts to address revenue volatility either by appropriating reserves accumulated during times of strong growth in the property tax base or state aid, or by reducing expenditures in times of weak revenue growth. Thus, the presence of property tax caps might make it more difficult for districts to handle revenue volatility without harmful disruptions of service. Testing this hypothesis and others about the interaction of tax and expenditure limits, as well as other state policies, and district responses to revenue volatility is a potentially promising topic for future research.

References

Bifulco R, Reback R (2014) Fiscal impacts of charter schools: lessons from New York. Educ Finance Policy 9(1):86–107

Duncombe WD, Yinger JM (1998) An analysis of two educational policies in New York State: performance standards and property tax relief. In: Wyckoff JH (ed) Educational finance to support higher learning standards. New York State Board of Regents, Albany, pp 98–137

Duncombe WD, Yinger JM (2001) Alternative paths to property tax relief. In: Oates WE (ed) Property taxation and local government finance. Lincoln Institute of Land Policy, Cambridge, pp 243–294

Dye RF, McGuire TJ (1991) Growth and variability of state individual income and general sales taxes. Nat Tax J 44(1):55–66

Ehrenberg RG, Ehrenberg RA, Smith CL, Zhang L (2004) Why do school district budget referenda fail? Educ Eval Policy Anal 26(2):111–125

Hartman WT (1999) School district budgeting. Association of School Business Officials International, Reston

Mullins DR, Wallin BA (2004) Tax and expenditure limitations: introduction and overview. Pub Budget Finance 24(4):2–15

Thompson DC, Wood RC, Crampton FE (2008) Money and schools. Eye on Education, Larchmont

U.S. Census Bureau (2013) Public education finances: 2011. G11-ASPEF. U.S. Government Printing Office, Washington, DC

White FC (1983) Trade-off in growth and stability in state taxes. Nat Tax J 36(1):103–114

Chapter 4
Local Government Fiscal Condition Before and After the Great Recession

Justin Marlowe

Abstract This chapter examines the factors that shaped the fiscal condition of local governments during the "Great Recession," with emphasis on special districts. The recent recession focused new attention on local government fiscal health and its determinants. This chapter provides the most exhaustive empirical test to date of those determinants and their relative power. It first identified more than 50 variables proposed in other frameworks of the determinants of fiscal health, then employed an "Extreme Bounds Analysis" to test the robustness of each of those variables. The results suggest ten key variables drive local fiscal condition, and the magnitude of those effects vary across different types of local governments. These findings have implications for state oversight of local governments. They also have methodological implications for future work on local government fiscal condition.

4.1 Introduction

The "Great Recession" re-introduced one of the fundamental questions in local public finance: Why are some local governments better able than others to withstand major economic shocks? This question has important implications for fiscal federalism. In the aftermath of the Recession a record number of local governments have defaulted on outstanding debts, and many others may be on the brink of default in the near future. In an effort to prevent these types of severe fiscal problems, many state governments have begun to re-examine how they monitor local government financial conditions. Some states have also taken steps to provide more tools and statutory authority to intervene in local fiscal affairs to alleviate fiscal problems in advance (Coe 2008; Kloha et al. 2005; Honadle 2003).

Following these trends, this chapter asks the question: What factors drive local government financial condition? This question is central to understanding current

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local fiscal conditions, and perhaps more important, to predicting future local government fiscal stress. That is, if we are able to understand the underlying factors that shape fiscal condition, we can predict future fiscal condition. Following Hendrick (2011; also see Jacob and Hendrick 2013) and others (Berne and Schramm 1986; Honadle and Lloyd-Jones 1998; Groves et al. 2003; Maher and Deller 2012), I focus on the "wealth to need" concept in local financial condition. That is, a local governments' long-term fiscal outlook reflects the balance, or lack thereof, between the factors that drive the need for local spending and the local economy's capacity to generate revenues to meet those needs. Local governments experience fiscal stress when the drivers of spending needs outstrip the drivers of revenue growth.

To address this question this way, we must overcome a key conceptual and methodological challenge. That is, there is no cohesive framework that explains and predicts fiscal condition for all local governments. There are several well-constructed frameworks for the determinants of fiscal condition among general purpose local governments (Hendrick 2004, 2011; Clark and Ferguson 1983), but virtually none for special districts. As the recent municipal bond defaults in Wenatchee, WA and Harrisburg, PA among others have shown, fiscal stress in a special district can have material consequences on the adjacent cities, counties, and other general purpose local governments. For that reason, it is essential that we identify the factors that drive fiscal condition across all types of local governments.

To overcome this challenge, I employ the "extreme bounds" methodology (EBM) common in the corporate finance (Butler et al. 2011), economic growth (see Sala-i-Martin 1997), health policy (Sturm and Hartwig 2012), and other literatures. In an EBM analysis the dependent variable in question—in this case a measure of fiscal condition—is regressed on every possible combination of variables from an exhaustive list of potential explanatory variables. We then evaluate the coefficients from those regressions—in this case more than 117,600 different iterations—to identify those with robust explanatory power. The data for this analysis are from more than 900 units of local government in Washington State.

The main finding is that local fiscal condition is driven by a core set of factors, mainly the structure of the local economy, but those factors have different relative effects on fiscal conditions for different types of local governments. For instance, population density is a key driver of own-source revenue collections for cities, counties, towns, and transportation districts, but not for other types of special districts such as economic development authorities, libraries, or public safety districts.

4.2 Financial Condition and the Great Recession

Figures 4.1, 4.2, 4.3 present the core motivation for this analysis. Figure 4.1 shows the build-up over time of local government surplus. Surplus is defined here as current receipts–current expenditures. The solid line is the total accumulated surplus of all US local governments from 1960 to 2010. The dashed line is the annual surpluses. These data are from the National Income and Product Accounts of the US

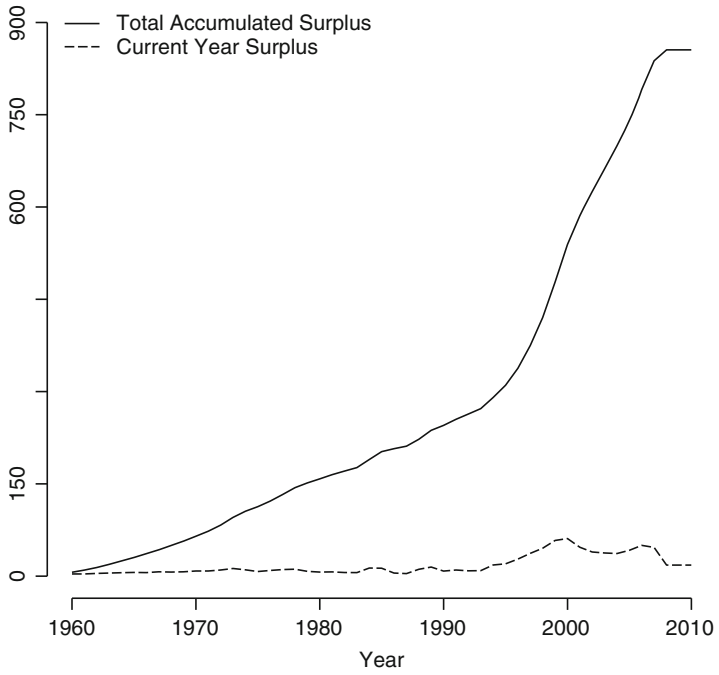

Fig. 4.1 Total Surplus of All US Local Governments, 1960–2010. This figure shows the annual total surplus of all US local governments in constant 2009 dollars. Surplus is defined here as (current receipts minus current expenditures). All data are from the National Income and Product Accounts, US Department of Commerce

Department of Commerce. This figure shows that US local governments accumulated surplus at a considerably higher rate following the recession of 1990–1991. Since then the rate of accumulation of surplus essentially doubled, such that prior to the Great Recession local governments had accumulated nearly $850 billion in surplus financial resources. At the outset of the Recession, US local governments' fiscal policy was characterized by revenues routinely in excess of expenses and a strong position of slack resources as a result.

Figure 4.2 shows the distributions of some other indicators of local government financial position immediately before and after the Great Recession. These figures are based on data from a national sample of audited financial reports from 1,869 general governments (i.e., cities, villages, towns, and counties) and 1,589 special districts such as utilities, fire districts, parks districts, and many others. This sample covers FY2005 through FY2011. These data were collected by Merritt Financial Services and are made available through Bloomberg terminals.

For the general governments, the financial position measure is unreserved general fund balance (i.e., the difference between assets and liabilities in the general fund) as a percentage of total revenues. For the special districts, the measure is total unrestricted net assets (i.e., on an accrual basis, all government assets minus all

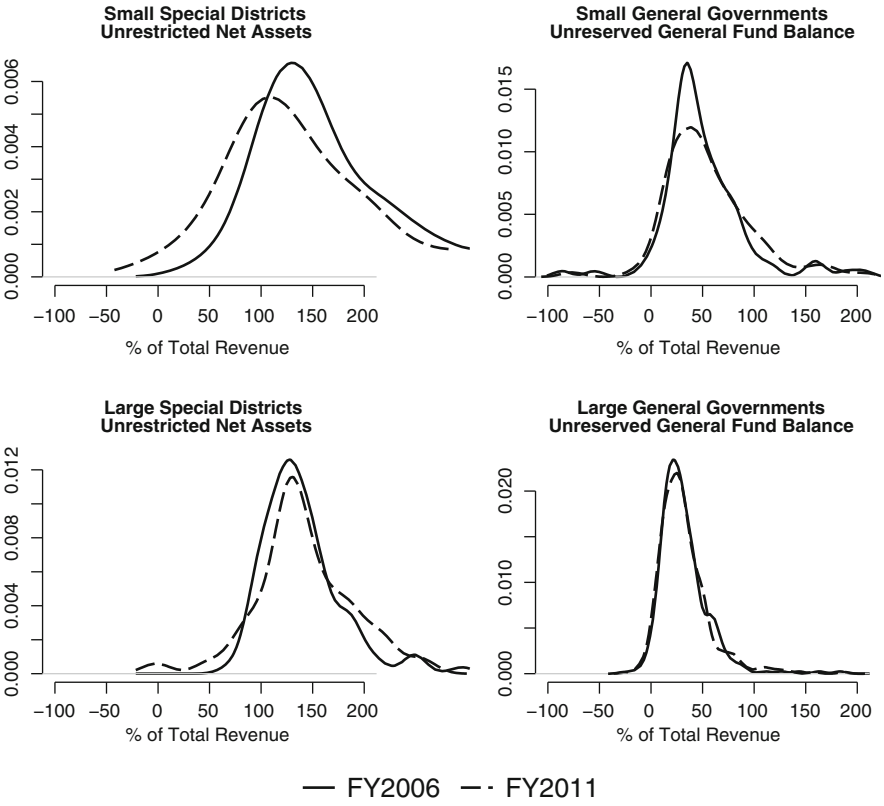

Fig. 4.2 Distributions of Financial Condition Indicators, FY2006 and FY2011. This figure shows the distributions of two key financial condition indicators immediately before the "Great Recession" in FY2006, and immediately after the Recession in FY2011. Small and large entities are in the lowest and highest quartiles by total revenue, respectively. General governments include counties, cities, villages, and towns. Special districts include utilities, fire districts, parks districts, etc. The two measures are unreserved general fund balance and total unrestricted net assets, both expressed as percentages of total revenues

government liabilities) also as a percentage of total current revenues. The left panel shows the distributions of unrestricted net assets separately for small special districts and large special districts, and the right panel shows the distributions of unreserved general fund balance separately for small and large general governments. Large entities are those in the top quartile by total revenues and small entities are those in the bottom quartile. Each quartile contains roughly 300 observations. The solid lines show the distributions for FY2006 and the dashed lines are for FY2011.

Figure 4.2 shows that, perhaps surprisingly, most local governments' overall financial positions changed little during the Recession. The peak of the distributions for unrestricted net assets in FY2006 was roughly 50 % of total revenues for both large and small special districts. For fund balance, the peak of the distributions for FY2006 was around 25 % of total revenues for both large and small governments.

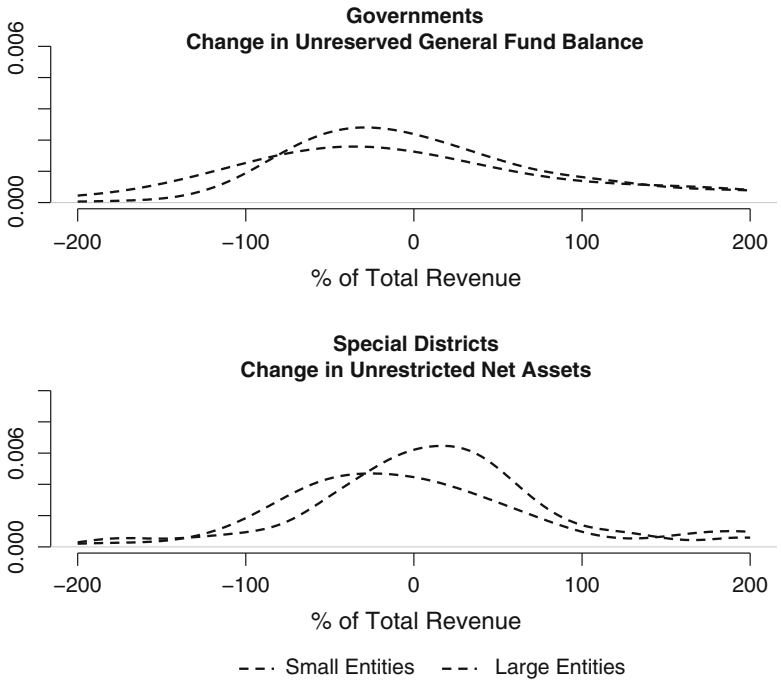

Fig. 4.3 Distributions of changes in fiscal condition indicators, FY2006 and FY2011. This figure shows the distributions of changes from FY2006 through FY2011 for two key indicators of local government financial condition. The *top panel* shows the distribution of changes—expressed as a percentage of total revenues—for unreserved general fund balance for cities, counties, villages, and towns. The *bottom panel* shows the distributions of changes in unrestricted net assets for special districts such as utilities, fire districts, parks districts, etc. The *dotted lines* show the distribution of changes—again as a percentage of total revenue—for small entities and the *dashed-and-dotted lines* show the distribution of changes for large entities, where small and large entities are those in the lowest and highest quartile, respectively, by total revenues

In FY2011, the distributions for smaller entities were slightly flatter, suggesting that a few entities had levels much higher or much lower than their FY2006 levels. But in general, overall financial position did not appear to change for these governments.

Figure 4.3 shows the distribution of the change in these levels from FY2006 to FY2011 for each jurisdiction. It provides an important contrast to Fig. 4.2. The top panel is the general governments' changes in unreserved general fund balance as a percent of total revenues, and the bottom panel is the special districts' changes in unrestricted net assets as a percent of total revenues. The dotted lines are the distributions for small entities (as defined above by total revenues) and the dot-and-dash lines are for large entities.

According to these distributions, many local governments' financial positions changed substantially during the Recession. The center of the distribution for both large and small general governments is around a 30–40 % decline in unreserved

general fund balance. For small special districts, the distribution suggests most entities' unrestricted net assets declined by 30–50 %, where for large special districts the distribution suggests a typical change was a 10–20 % increase. Also note that these distributions are quite flat, suggesting much variety in these change measures across entities.

Taken together, these figures suggest that overall local fiscal positions were quite strong and stable at the beginning and end of the Recession, but quite dynamic during the Recession for many jurisdictions. This suggests two key questions at the heart of this analysis: For what types of jurisdictions did financial position change during the Recession, and what types of jurisdictions are likely to experience similar changes during the next recession?

4.3 Drivers of Local Financial Condition

This section describes the analysis of the underlying drivers of local fiscal conditions. The first subsection defines fiscal condition and the core concepts related to measuring it. The second subsection lists and explains the variable shown so far to drive local fiscal condition. The third subsection describes the data used in this analysis. Those data are from local governments in Washington State.

4.3.1 Defining Financial Condition

Following Hendrick (2011), this analysis is based on two main assumptions about the definition and dynamics of local financial condition. First, a local government's financial condition is the state of equilibrium or disequilibrium between the demands for new spending and the ability of the local economy and local fiscal policy to generate the revenues to meet those demands. Put differently, it is the relationship of "wealth to need" (Hendrick 2011). If the underlying drivers of revenue growth are stronger than the underlying drivers of spending needs, the condition is strong. If the factors that drive spending demands overshadow the jurisdiction's ability to generate revenues, that condition will deteriorate over time.

Like any equilibrium condition, financial condition must eventually balance. If revenue collections routinely exceed spending, spending demands will presumably increase to meet the new revenues or policymakers will reduce revenue collections through tax policy changes. If spending demands exceed the ability of the "fiscal space" (Hendrick 2011; Pagano and Hoene 2010) to generate sufficient revenues, local officials can reduce spending, raise tax rates, or promote economic development efforts designed to boost economic activity and subsequent tax collections. Financial condition changes incrementally over time, but is generally stable in the near term.

Fiscal stress is a more dynamic condition where near-term spending demands exceed near-term revenue collections (Hendrick 2011:22–24). This sort of disequilibrium can

happen for a variety of reasons, including slower economic growth rates at the state or national level, changes in state or federal fiscal policies, or localized economic shocks like the departure of a large employer or a natural disaster. Local governments can and often do experience consecutive years of fiscal stress or fiscal munificence before returning to an equilibrium financial condition. Fiscal stress is often measured with near-term, current year measures such as the difference between revenues and expenditures (i.e., the operating margin). As Fig. 4.3 illustrates, during the Great Recession many jurisdictions, especially small local governments, experienced years where liabilities far exceeded assets, thus resulting in large decreases to fund balance and unrestricted net assets.

The second key assumption is that any measure of financial condition must account for both spending demands and revenue capacity. On this point there are two basic approaches. One emphasizes financial condition measures that speak to both spending needs and revenue. Perhaps the most widely cited is fund balance, or the difference between assets and liabilities in a governmental fund such as the general fund or special revenue funds (see, among others, Marlowe 2013). Fund balance is useful because it is both retrospective and prospective. A large fund balance suggests the jurisdiction has adequate financial and other assets to meet its spending needs, and, perhaps more important, that assets have exceeded liabilities in the past. Unrestricted Net Assets provide similar information about government-wide financial condition and about the financial condition of business-like entities such as utilities that use full accrual accounting.

A second approach is to model financial condition as a function of the drivers of both spending growth and revenue growth, and to identify where those drivers are out of synch. In Hendrick's recent work (2011), the basic analytical approach is to first model total spending as a function of economic and demographic factors that drive spending needs, such as an aging population or high crime rate, and of factors that proxy for higher spending in the future, such as an aging housing stock. Once the drivers of spending are established, model revenue growth as a function of wealth, such as property values, and of economic activity like taxable retail sales. With that modeling in place, the analytical goal is to identify jurisdictions where long-run spending demands are likely to outstrip the jurisdiction's long-run ability to generate revenues. In this analysis, I employ this second approach.

4.3.2 Insights from Previous Literature

The key question, then, is what factors shape local financial condition? There is a rich literature on this question.[1] Much of it is focused on the interrelated issues of how to measure fiscal condition and how to predict future fiscal conditions. This literature has grown substantially within the last few years as we sort through the

[1] See, among others, Levine et al. 1981; Hawkins 1989; Pammer 1990; Hendrick 2004; Jacob and Hendrick 2013; Justice and Scorsone 2013.

causes and effects of the Great Recession on local governments. However, it is focused almost exclusively on general purpose local governments. There has been little if any analysis on the financial condition of special districts. We know surprisingly little about the factors that drive special district financial condition, and whether those factors are similar to those for general purpose local governments. Beyond that, this literature has also shown that fiscal condition is quite difficult to measure and even more difficult to predict (Stonecash and McAfee 1981; Sharp and Elkins 1987; Chapman 1999).

Table 4.1 reports the variables included in this analysis. A full review and explanation of these variables is outside the scope of this chapter. This chapter is principally an empirical exercise to compare the relative explanatory power of these variables and to use them to predict future fiscal stress.

4.3.3 The Empirical Setting: Washington State Local Governments

This analysis is based on data from local governments in Washington State. Washington State is a good setting for this study because it has a large number and variety of local units of governments, including traditional counties and cities to conventional public authorities like library districts and ports to entities that deliver highly specialized services like dams and hydroelectric power, cable television, and mosquito abatement. Per capita, Washington State has the highest number of special districts of any state in the US. The proliferation of local units of government reflects the emphasis on local autonomy and direct citizen control over government spending that are common themes in the state's political culture (see Lundin 2007).

The Washington State Office of Financial Management (OFM, a division of the elected State Treasurer) categorizes these districts according to the following basic typology of type of district and services provided: (1) Economic Development—community facilities, arts and culture, ports, stadiums; (2) Environmental Protection—air pollution control, conservation; (3) Library Districts—libraries, multi-county libraries; (4) Public Safety—fire protection, emergency service communication; and (5) Transportation—airports, rail, ferries, regional transit, transportation improvement districts, roads, and bridges.

Most or all of the fiscal structure variables described above were available for these categories of special districts. OFM's typology includes nine other categories not included in this analysis because these entities employ a different financial reporting structure: agricultural, flood control, health related, housing, irrigation and reclamation, parks and recreation, public utilities, schools, and "other" types of districts.

These units have a variety of taxing and other statutory powers. In some geographic areas, there are multiple jurisdictions performing relatively similar functions. For instance, Snohomish County (north of the City of Seattle) has 18

Table 4.1 Variable descriptions and descriptive statistics

Variable	Description	Source	Mean	SD	Min	Max
Panel A: Demographic Characteristics						
Crime rate	Total violent and property crimes per 1,000 population	WA PCA	351	346	6	1,853
Jurisdiction's density	Number of government units within the county	MRSC	0.77	0.78	0.06	5.16
Percent income maintenance	% of population that receives food assistance, refugee assistance, etc.	WA OFM	0.53	0.27	0.12	1.69
Percent under 18	% of population under age 18	Census	27.69	5.32	17.3	47.3
Percent over 65	% of population over age 65	Census	13.91	3.89	7.5	25.1
Percent pensions	% of population that receives pension income	WA OFM	2.25	1.05	0.59	5.31
Percent social insurance	% of population that receives Medicaid or SSI	WA OFM	1.36	0.59	0.46	3.25
Per capita income	Average income per resident	WA OFM	$30,635	$4,354	$16,689	$38,211
Per capita income change	Annual change in per capita income	WA OFM	0	0.02	−0.21	0.11
Population	County population (estimate) (000 s)	Census	321	504	2	1,937
Population change	Annual change in population	WA OFM	0.01	0.01	−0.02	0.06
Population density	Population/square miles	Census	194	262	3	916
Roads per square mile	Miles of paved roads/ square mile	WA CRAB	1,012	618	143	2,541
Proprietor earnings per capita	Proprietor earnings/ population	Census	0.4	0.58	0.02	6.5
Square miles	Total square miles in county	Census	1,974	1,043	174	5,268
Within MSA	County contains at least one metropolitan statistical area	Census	0.59		0	1
Within MicSA	County contains at least one micropolitan statistical area	Census	0.23		0	1
Panel B: Fiscal Structure						
B and O % revenue	% of total revenue from the WA business and occupations tax	WA SAO	0.03	0.04	0	0.77
IGR % revenue	% of total revenue from federal and state revenues	WA SAO	0.17	0.28	−1.49	15.32

(continued)

Table 4.1 (continued)

Variable	Description	Source	Mean	SD	Min	Max
IGR change	Annual change in intergovernmental revenues received (%)	WA SAO	3	87	−159	7,236
IGR wealth	Annual change in intergovernmental revenues X % of revenue from intergovernmental sources	WA SAO	0.41	3.24	−29.05	115.68
Operational spending per capita	(Total expenditures—capital outlays)/ population	WA SAO	65	223	0	3,323
Other revenue % revenue	% of total revenue from other sources including fees, user charges, interest earnings, etc.	WA SAO	0.39	0.37	−23.9	1.05
Own source revenues change	Annual change in own source revenues	WA SAO	0.05	2.95	−2.01	259.39
Property tax collections change	Annual change in property tax collections (%)	WA SAO	15	43	−100	3,709
Property tax % revenue	% of revenues from property taxes (%)	WA SAO	29	32	0	95
Property tax wealth	Annual change in property tax collections X % of total revenues from property taxes (%)	WA SAO	0	0.03	−0.18	0.11
Property wealth density	Property tax collections/ square miles	WA SAO	0.04	0.07	−0.14	0.37
Revenue elasticity	Standardized coefficient from regressing annual changes in total revenue on annual changes in personal income	WA SAO	0.2	2.92	−18.63	87.35
Revenue HHI	Hirschman-Hirfindahl Index with categories for property tax, sales tax, B&O, IGR, and other revenues; 1 = perfect diversification	WA SAO	0.5	0.13	0.05	0.98
Sales tax change	Annual change in sales tax collections (%)	WA SAO	0.03	0.49	−1	24.54
Sales tax % revenue	% of total revenues from sales taxes	WA SAO	0.08	0.13	0	1

(continued)

Table 4.1 (continued)

Variable	Description	Source	Mean	SD	Min	Max
Sales tax wealth	Annual change in sales tax collections X % of total revenues from sales taxes (%)	WA SAO	0	0.01	−0.1	0.09
Panel C: Local Economic Structure						
Earnings per job	Total wage earnings/ total employment ($000)	BEA	38.6	8.8	19.5	66.4
Industry HHI	Hirschman-Hirfindahl Index with categories for construction; farms and forestry; Finance, insurance, and real estate; government; mining and manufacturing; trade; services; transportation and utilities; 1 = perfect diversification	BEA	0.54	0.05	0.23	0.97
Percent construction	% of total employment in construction	BEA	0.06	0.02	0	0.14
Percent farms and forestry	% of total employment in farms and forestry	BEA	0.08	0.08	0	0.32
Percent FIRE	% of employment in finance, insurance, and real estate	BEA	0.02	0.02	0	0.11
Percent government	% of employment in government	BEA	0.2	0.08	0.1	0.45
Percent mining and manufacturing	% of employment in mining and manufacturing	BEA	0.08	0.04	0	0.3
Percent services	% of employment in services	BEA	0.07	0.07	0	0.42
Percent trade	% of employment in trade	BEA	0.14	0.03	0	0.26
Taxable retail sales change	Annual change in taxable retail sales	WA OFM	0	0.06	−0.42	0.4
Unemployment rate	Unemployment rate (%)	BEA	7.23	2.29	1.6	14.6
Panel D: Local Housing Market						
Housing % post-1990	% of housing stock constructed after 1990	ACS	30.59	6.94	14.4	46.2
Housing % post-2000	% of housing stock constructed after 2000	ACS	12.9	4.28	1.9	30.1
Housing % pre-1940	% of housing stock constructed before 1940	ACS	18.73	7.49	7.7	54.6

(continued)

Table 4.1 (continued)

Variable	Description	Source	Mean	SD	Min	Max
Housing permits change	Annual change in housing permits granted (%)	UWRCRS	0.03	0.34	−1	18
Housing prices change	Annual change in median home price (%)	UWRCRS	0.01	0.06	−0.18	0.25
Housing sales change	Annual change in total housing sales (%)	UWRCRS	0.1	0.18	−0.29	2.96

The first three columns report the variable name, description, and data source. *WAPCA* Washington State Police Chiefs Association, *MRSC* WA Municipal Research and Services Commission; *WAOFM* Washington State Office of Financial Management, a division of the WA State Treasurer; *Census* US Census; *WA SAO* Washington State Auditor's Office, *BEA* US Census, Bureau of Economic Analysis, *AS* US Census American Communities Survey, *UWRCRS* University of Washington Runstad Center for Real Estate Research. All variables are 3 year moving averages except Jurisdictions Density, Square Miles, and Roads per Square Mile. All these variables are based on 2011 data only. All except the Fiscal Structure variables are reported at the county level, where the fiscal structure variables are reported at the entity level. All variables are reported as percentages unless otherwise noted

active fire districts that perform essentially the same function across similarly sized geographic areas. By contrast, many rural counties have a single fire district that performs that same function over a much broader geographic area. Entities also vary by age of incorporation. For instance, the state of Washington authorized the creation of Transportation Benefit Districts in 2007. By contrast, the state statute authorizing the formation of diking and drainage districts was passed in 1895.

Another key advantage of Washington State is that all local governments, including special districts, report annual financial information consistent with generally accepted accounting principles (GAAP) or some close variation of GAAP. Those data are available to the public through the Local Government Financial Reporting System (LGFRS) database maintained by the State Auditor's Office.

To begin this analysis, I collected all the data available on the LGFRS needed to compute the fiscal structure variables reported in Table 4.1. I then collected—from the Municipal Research and Services Committee (MRSC) of Washington—the county where each jurisdiction is located. Entities were excluded if their service area covers multiple counties, if the service area could not be identified, or if their legal name had changed and rendered them unmatchable across the entire sample. I then matched the financial data to data on county-level demographic, economic, and other variables described in the previous section. These data were gathered from a variety of sources described in the previous section. The final dataset included complete information on all 39 counties, all 210 cities, and 70 of 73 towns. For the special districts, the sample coverage is not as comprehensive but is acceptable. It includes 114 of 120 economic development districts, 53 of 70 environmental districts, 42 of 50 library districts, 365 of 374 public safety districts, and 18 of 45 transportation districts.

4.4 Empirical Estimates of Local Financial Condition

This section presents the empirical findings on the determinants of local financial conditions. Section 4.4.1 explains the extreme bounds methodology used to identify the main determinants. And Section 4.4.2 explains and reports the findings from additional modeling based on the restricted model identified by the EBM.

4.4.1 Extreme Bounds Methodology and Findings

The intuition behind the extreme bounds methodology is simple: Test the effect of each potential explanatory variable on the dependent variable in the presence of every other potential explanatory variable. This method is particularly useful when there is no clear theoretical explanation for why some explanatory variables would be robust while others would not. The method is also useful when the independent variables in question correlate with each other, thus causing potential multicolinearity problems. EBM addresses this problem by assuming that multicolinearity might cause robust variables to appear not statistically significant in some iterations of the regression model. To address this problem, we assume that variables with robust explanatory power will be statistically significant in some, but not necessarily all the model iterations.

The key challenge to EBM is computational power. Testing every possible combination of all the explanatory variables in this case would require $3.06 \times 1{,}064$ regressions. Even a much smaller set of five variables (i.e., 50!4) would require more than 11 billion regressions, far more than is feasible with standard computing methods. As a result, following past practice in other fields, I focus on combinations of three variables. This requires 117,600 regressions, a large but nevertheless manageable number.

To employ EBM for this analysis, I first specified all 117,600 possible combinations of any three of the variables from variables listed in Table 4.1. I then ran separate ordinary least squares regression with operating margin as the dependent variable and each combination of independent variables, along with fixed effects for each year. Then I repeated this process with total own source revenues per capita as the dependent variable, and then again for operational spending per capita as the dependent variable. The result of this process is a set of 352,800 regression coefficients on the independent variables.

Following past work, I apply two criteria to identify the independent variables that have a robust effect. First is the percentage of the distribution of the coefficients greater than or less than 0. The intuition here is that if a variable's impact is not robust, if its sign is sometimes positive and sometimes negative. As such, I consider a variable robust if at least 90 % of its coefficients are greater than or less than 0 according to its conditional distribution function (CDF). The second criterion is the percentage of the coefficients with *t*-test scores greater than 2 or less than −2. I consider a variable robust if at least 90 % of its *t*-test scores fall above or below 2 or −2, respectively.

Table 4.2 reports the results of this exercise. The column CDF (0) is the percentage of the coefficients above or below the mid-point on the cumulative distribution function. The column *T*-test (0) is the percentage of coefficients with a *t*-test score less than −2 or greater than 2. The third column is the mean coefficient across all 5,252 regressions that included that variable.

Two key findings emerge from this analysis. First, all three dependent variables are affected by a core set of revenue structure and economic characteristics. Key among them are population and population change, dependence on intergovernmental revenues and property taxes, and dependence on cyclical industries like agriculture/forestry, mining/manufacturing, and construction. Perhaps most surprising is the variables that did not have robust effects, such as personal income, revenue diversification, diversity of local industry, and the unemployment. The latter two are commonly cited measures by local and regional economists, but this analysis suggests those variables are less important than many others.

The net effect of this exercise is to cut the initial list of 50 independent variables down to a list of 10 that were robust determinants of at least two of the three dependent variables: population change, population density, annual change in housing permits, % employed in farming and forestry, % employed in mining and manufacturing, % employed in construction, property tax wealth, intergovernmental revenue wealth, revenue elasticity, and the crime rate.

4.4.2 Estimates by Type of Entity

I then re-estimate the equations using only the 10 variables identified by the EBA. I estimate those equations separately for each type of entity. All regressions include year-fixed effects not reported here for brevity, and the standard errors were corrected for heteroskedasticity and autocorrelation (i.e., by clustering across entities over time). Estimates are reported above the *t*-tests in parentheses. The bottom two rows of each panel also include the $R2$ and number of observations in each regression.

First, note the differences in explanatory power across the different types of entities. This model is clearly more effective at predicting financial position, revenue collections, and spending for counties, towns, environmental districts, and transportation districts than it is for cities, economic development districts, libraries, and public safety entities. The basic explanation for this is that the entities where the model performs well have access to fewer types of own-source revenues. Most transportation districts, for instance, rely on a single earmarked local sales tax. Most counties depend almost entirely on property taxes, with some limited assistance from sales taxes and intergovernmental revenues. Cities, by contrast, access property taxes, sales taxes, business and occupations taxes, various user fees and charges, and many other types of revenues. Second, revenue structure seems to affect special districts' near-term solvency (as measured by the operating margin) more than long-term financial condition, but it affects general

Table 4.2 Extreme bounds analysis

Operating margin				Own-source revenue per capita				Operations spending per capita			
	CDF	*T* Test	Mean		CDF	*T* Test	Mean		CDF	*T* Test	Mean
	(0)	(0)	Coefficient		(0)	(2)	Coefficient		(0)	(2)	Coefficient
Revenue elasticity	100.00	100.00	0.05	**Proprietor earnings**	100.00	100.00	59.53	**Proprietor earnings**	100.00	100.00	166.36
Population change	100.00	100.00	4.69	% **Mining and manuf.**	100.00	100.00	−372.83	**IGR change**	100.00	100.00	−0.93
% **Ag and forestry**	100.00	100.00	0.74	**Total crime rate**	100.00	100.00	−0.07	% **Mining and manuf**	100.00	99.28	−691.56
B and O %	100.00	100.00	−1.44	**IGR change**	100.00	99.71	−0.65	**IGR wealth**	100.00	95.31	−5.20
IGR wealth	100.00	100.00	0.05	**IGR wealth**	100.00	95.31	−3.49	**Total crime rate**	100.00	92.61	−0.10
Population density	100.00	99.71	0.00	Revenue elasticity	100.00	0.00	−0.86	Revenue HHI	100.00	26.42	0.03
Personal income	100.00	84.92	0.00	% Income maintenance	99.71	70.54	−43.05	Revenue elasticity	100.00	0.00	−1.02
Sales tax wealth	100.00	84.07	4.12	**Earnings per job**	99.57	95.30	0.00	**Property tax wealth**	99.43	89.62	−587.76
Personal income change	100.00	49.22	1.23	% **Construction**	99.15	97.15	502.36	**Population change**	99.04	89.47	−2,253.72
Housing prices change	100.00	14.56	0.42	Industry HHI	99.15	74.50	239.90	% Income maintenance	98.44	58.63	−67.43
% Pensions	99.85	89.47	−0.05	**Property tax** %	97.36	100.00	−94.29	**Property tax percent**	97.36	100.00	−131.02
Housing permits change	99.24	1.00	−0.05	**Jurisdictions density**	96.01	94.48	39.40	**IGR** %	97.23	95.15	69.17
% **Mining and manuf.**	98.98	93.60	0.32	**Housing permits change**	94.52	90.10	42.84	**Jurisdictions density**	95.60	94.45	109.15
IGR %	98.54	97.50	0.14	**Population**	94.03	88.15	0.00	Housing permits change	94.23	94.31	137.37

(continued)

Table 4.2 (continued)

Operating margin				Own-source revenue per capita				Operations spending per capita			
Jurisdictions density	98.45	36.42	0.04	**Percent trade**	94.03	90.41	−486.95	**Earnings per job**	91.61	93.69	−0.01
Revenue HHI	98.29	37.50	0.00	**Property tax wealth**	92.46	89.92	−391.59	% **Trade**	89.61	97.15	−976.18
Property tax wealth	98.13	2.50	0.32	**Other revenue** %	91.95	89.74	41.21	**Other revenue** %	89.60	92.15	25.34
Housing sales change	97.45	0.00	0.08	B and O %	90.01	80.48	134.55	% Ag and forestry	89.20	95.15	248.67
% Income maintenance	96.24	38.40	0.11	Population change	88.34	8.69	−373.50	B and O %	88.47	37.15	−176.83
Industry HHI	95.45	25.89	−0.41	Housing prices change	87.43	0.00	22.27	% Construction	85.63	49.35	−275.93
Population	95.16	85.21	0.00	Sales tax wealth	85.75	0.00	−285.93	Roads per square mile	85.34	65.29	−14.65
IGR change	94.64	94.83	0.00	Population density	85.04	77.46	−0.04	Population	85.06	84.48	0.00
% Services	91.32	57.61	−0.59	Percent pensions	84.64	67.15	−8.41	% Social insurance	85.03	91.25	−35.60
Total crime rate	90.90	53.77	0.00	Personal income change	83.54	0.00	82.87	% Services	84.07	79.15	−340.01
Roads per square mile	90.46	12.94	−0.03	% Social insurance	81.36	72.19	−17.09	Unemployment rate	83.80	61.25	6.24
% Construction	88.76	3.27	−0.44	Roads per square mile	76.53	10.19	−2.74	% Government	83.70	66.85	60.85
% FIRE	88.34	65.72	−1.60	Housing sales change	75.67	0.50	−7.90	Population density	83.64	85.85	−0.06
Property tax %	86.25	94.35	0.02	% Government	74.53	39.45	−32.42	Personal income change	82.65	6.15	122.77
% Trade	84.92	0.43	−0.24	Revenue HHI	73.30	20.19	−0.26	Sales tax wealth	82.50	0.00	−230.57
% Social insurance	80.81	65.15	−0.03	Unemployment rate	68.42	12.26	0.98	% Pensions	80.36	67.42	−12.95

Other revenue %	80.23	5.33	−0.02	IGR %	68.21	18.46	0.88	Housing prices change	73.40	5.68	22.76
Earnings per job	79.94	63.16	0.00	% Ag and forestry	67.15	57.48	14.74	Industry HHI	73.23	38.35	−53.20
Proprietor earnings	70.48	4.84	0.01	% FIRE	63.72	74.46	−118.40	% FIRE	71.72	67.22	−584.09
Unemployment rate	63.18	94.31	0.00	% Services	62.01	48.15	−16.68	Housing sales change	56.23	3.15	4.77
% Government	61.32	3.20	0.02	Personal income	37.41	59.23	0.00	Personal income	49.30	69.15	0.00

Figures reported are proportions of coefficients from regressions with combinations of any three from the list of independent variables, a total of 117,600 regressions for each dependent variable. The left columns are the coefficients from regressions where operating margin was the dependent variable. The middle columns are the coefficients from regressions where total own-source revenue per capita was the dependent variable. The right columns are the coefficients from regressions where per capita spending on operations was the dependent variable. CDF(0) is the percentage of coefficients on one side (either above or below) the midpoint (0) on the conditional distribution function for all the coefficients on each respective dependent variable. *T*-test (2) is the percentage of the coefficients with *t*-test scores greater than 2 or less than negative 2. Variables in bold have at least 90 % of their coefficients on one side of the distribution and at least 90 % of their *t* tests above 2 or below −2

governments' long-term financial condition much more than their near-term solvency. This is also likely related to the diversity of revenue sources available to different types of districts. Third, intergovernmental revenues affect different types of entities in very different ways. Some of this is by design, as certain state grants and other shared revenues are explicitly designed to improve financial condition of certain entities and not others.

4.5 Conclusion

The objective of this chapter was to provide an integrated, parsimonious framework of the determinants of local government financial condition. Unlike previous work, this analysis includes both general purpose local governments and special purpose governments. The results suggest a core group of 10 variables shape local government near-term solvency and long-term spending and revenue patterns. Most of those variables are related to fiscal structure and to the structure of the local economy. A follow-up analysis suggests these factors matter in different ways and at different magnitudes on different types of local governments. The findings also underscore the finding from previous literature that financial condition is difficult to predict, especially for general purpose cities and traditional special purpose districts in service areas like public safety.

These findings suggest several directions for future research. First, a follow-up to this analysis will use the estimates presented in Table 4.3 to predict future fiscal stress. By examining the predicted levels of both revenues and spending, we can identify local governments where revenues and spending are likely to have disequilibrium in the event of another recession or other macroeconomic shock. These findings also have implications for our understanding of state-local fiscal federalism (see Oates 1972). The key finding here is that many of the current state monitoring systems to prevent local government fiscal stress are either too complex given that only ten variables seem to affect financial condition, or too uniform given that different factors seem to affect financial condition differently for different types of governments. In the future, the findings presented here could help recalibrate these state oversight systems.

Table 4.3 Estimates of financial condition indicators, restricted models

	Cities	Counties	Towns	Economic development	Environment	Library	Public safety	Transportation
Panel A: Operating Margin								
Intercept	0.96	1.16	1.13	0.14	0.84	0.92	1.12	0.22
	(1.07)	(21.39)	(2.72)	(0.02)	(6.86)	(1.06)	(4.43)	(0.61)
Population change	3.80	1.19	2.50	9.02	−3.25	6.60	−0.36	−2.32
	(3.95)	(2.07)	(0.61)	(0.11)	(−2.46)	(0.55)	(−0.11)	(−0.56)
Population density	0.00	0.00	0.00	−0.01	0.00	0.00	0.00	0.00
	(2.01)	(0.74)	(−0.17)	(−0.86)	(−0.30)	(2.14)	(−2.98)	(−1.22)
Housing permits change	0.04	−0.02	0.02	−0.53	−0.01	−0.29	−0.11	0.00
	(1.01)	(−3.36)	(0.46)	(−0.20)	(−0.22)	(−0.58)	(−0.67)	(−0.03)
% Farm and forestry	0.84	−0.12	0.48	−4.43	0.23	2.01	0.64	1.98
	(4.95)	(−1.27)	(0.88)	(−0.24)	(1.19)	(0.79)	(1.33)	(2.16)
% Mining and manufacturing	−0.09	0.02	1.05	6.08	0.48	2.41	−1.55	−0.79
	(−0.48)	(0.18)	(1.39)	(0.27)	(1.33)	(1.05)	(−2.27)	(−1.47)
% Construction	0.42	1.13	1.46	−1.05	−0.10	4.49	0.35	8.44
	(0.66)	(3.93)	(0.83)	(−0.02)	(−0.16)	(0.98)	(0.25)	(2.86)
Property tax wealth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(−3.61)	(−0.91)	(−1.25)	(−0.08)		(−0.82)	(0.70)	.
Inter-governmental revenue wealth	0.16	−0.01	0.09	0.09	−0.03	−0.03	0.02	−0.32
	(19.71)	(−0.25)	(14.48)	(0.15)	(−0.79)	(−0.65)	(5.10)	(−1.79)
Revenue elasticity	−0.02	0.02	−0.11	13.21	0.02	−0.03	0.05	−0.02
	(−0.77)	(1.39)	(−0.63)	(4.88)	(1.50)	(−0.98)	(10.02)	(−0.46)
Crime rate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(−1.82)	(0.34)	(−1.30)	(−0.19)	(−3.29)	(−0.22)	(−0.60)	(1.46)

(continued)

Table 4.3 (continued)

	Cities	Counties	Towns	Economic development	Environment	Library	Public safety	Transportation
R^2	0.15	0.51	0.21	0.05	0.05	0.09	0.11	0.51
N	3,261	655	1,125	770	445	211	1,759	179
Panel B: Own-Source Revenue Per Capita								
Intercept	194.53	109.69	−39.36	55.54	2.43	37.17	10.58	105.94
	(8.27)	(2.83)	(−5.27)	(3.42)	(2.86)	(4.27)	(4.46)	(7.77)
Population change	857.71	−2,151.80	169.46	367.61	−6.09	−43.32	−182.83	427.19
	(2.15)	(−3.15)	(0.88)	(1.66)	(−0.34)	(−0.19)	(−3.44)	(1.58)
Population density	19.45	−61.62	−33.96	−32.09	0.08	0.17	−0.18	10.56
	(1.95)	(−4.25)	(−4.14)	(−4.22)	(0.53)	(0.22)	(−2.11)	(1.97)
Housing permits change	75.50	94.49	46.14	41.26	3.28	−5.08	8.36	−69.97
	(9.31)	(10.82)	(15.95)	(10.16)	(12.40)	(−1.31)	(7.90)	(−3.43)
% Farm and forestry	22.87	18.18	6.55	−10.88	0.87	−5.82	9.15	23.89
	(1.31)	(2.41)	(3.12)	(−1.39)	(1.36)	(−0.60)	(3.17)	(1.76)
% Mining and manufacturing	−479.40	346.65	−34.98	−306.30	−7.92	69.89	−36.05	−290.63
	−6.75	2.99	−1.44	−6.14	−2.94	1.53	−4.19	−4.08
% Construction	−321.83	406.99	−326.70	192.81	−4.69	−150.76	−72.32	−236.06
	(−4.04)	(2.89)	(−9.52)	(3.00)	(−0.98)	(−3.47)	(−6.29)	(−4.16)
Property tax wealth	−390.33	4,657.89	1,458.78	69.29	−35.12	55.62	169.80	61.50
	(−1.45)	(13.98)	(19.38)	(0.56)	(−4.61)	(0.80)	(7.36)	(0.33)
Inter-governmental revenue wealth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(−2.49)	(4.73)	(1.83)	(−5.72)		(2.50)	(0.09)	
Revenue elasticity	−17.05	−108.45	−0.54	−2.55	−0.48	0.44	−0.08	−1.83
	(−4.96)	(−3.43)	(−1.87)	(−1.62)	(−1.09)	(0.49)	(−0.99)	(−0.75)
Crime rate	−0.03	0.01	0.00	0.03	0.00	−0.01	−0.01	0.00
	(−2.41)	(0.42)	(−0.11)	(2.38)	(0.86)	(−1.01)	(−3.12)	(0.18)

R^2	0.09	0.41	0.44	0.23	0.44	0.17	0.16	0.58
N	3,261	655	1,125	806	445	214	1,760	179
Panel C: Operational Spending Per Capita								
Intercept	210.63	368.42	−38.52	−15.79	9.44	39.71	11.03	13.96
	(8.31)	(5.46)	(−5.28)	(−1.10)	(1.53)	(4.62)	(4.57)	(1.59)
Population change	479.60	−4,997.27	63.06	264.97	−48.93	74.77	−152.07	147.09
	(1.12)	(−4.20)	(0.34)	(1.35)	(−0.38)	(0.34)	(−2.81)	(0.85)
Population density	25.60	−134.61	−30.97	−24.66	1.28	0.18	−0.19	−3.98
	(2.38)	(−5.33)	(−3.87)	(−3.66)	(1.14)	(0.23)	(−2.12)	(−1.15)
Housing permits change	97.98	430.94	47.66	35.78	37.25	−5.66	5.33	−20.64
	(11.21)	(28.33)	(16.86)	(9.92)	(19.37)	(−1.48)	(4.95)	(−1.57)
% Farm and forestry	25.86	1.77	6.80	−15.20	−0.71	−6.41	8.99	25.55
	(1.37)	(0.14)	(3.32)	(−2.19)	(−0.15)	(−0.67)	(3.07)	(2.93)
% Mining and manufacturing	−519.52	631.48	−15.47	−261.40	−44.87	55.00	−36.07	−47.61
	(−6.79)	(3.13)	(−0.65)	(−5.91)	(−2.29)	(1.22)	(−4.12)	(−1.04)
% Construction	−290.98	639.07	−288.47	147.67	−32.29	−170.80	−71.18	−8.96
	(−3.39)	(2.61)	(−8.60)	(2.59)	(−0.93)	(−3.98)	(−6.09)	(−0.25)
Property tax wealth	−426.10	2,544.76	1,327.06	139.51	−106.99	23.24	169.26	−95.43
	(−1.47)	(4.39)	(18.05)	(1.26)	(−1.93)	(0.34)	(7.22)	(−0.79)
Inter-governmental revenue wealth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(−2.83)	(2.14)	(1.42)	(−4.86)		(1.46)	(−0.76)	
Revenue elasticity	−14.71	−181.86	−0.52	0.11	3.67	0.75	−0.08	−1.09
	(−3.97)	(−3.31)	(−1.83)	(0.08)	(1.14)	(0.86)	(−0.95)	(−0.69)

(continued)

Table 4.3 (continued)

	Cities	Counties	Towns	Economic development	Environment	Library	Public safety	Transportation
Crime rate	–0.02	–0.03	0.00	0.03	0.01	0.00	–0.01	–0.01
	(–2.20)	(–0.66)	(–0.35)	(2.37)	(1.32)	(–0.67)	(–3.36)	(–0.71)
R^2	0.09	0.71	0.44	0.23	0.62	0.16	0.13	0.90
N	3,261	655	1,125	806	445	214	1,760	179

Figures reported are the coefficients from regressions of operating margin, per capita own-source revenue, and per capita operations spending on the independent variables identified in the left column. *T*-tests are in parentheses. Each set of estimates is for a subset of entities. All regressions are panel data estimates that include year fixed effects (not reported here) and *t*-tests based on standard errors corrected for autocorrelation and heteroskedasticity

References

Berne R, Schramm R (1986) The financial analysis of governments. Prentice-Hall, Englewood Cliffs

Butler AW, Keefe MO, Kieschnick RL (2011) The robust determinants of initial IPO returns and their implications for IPO cycles. Available at SSRN: http://ssrn.com/abstract=1361314

Chapman J (1999) Local government fiscal autonomy and fiscal stress: the case of California. Lincoln Institute of Land Policy, Cambridge, WP99JC1

Clark TN, Ferguson LC (1983) City money: political processes, fiscal strain, and retrenchment. Columbia University Press, New York

Coe CK (2008) Preventing local government fiscal crises: emerging best practices. Public Adm Rev 68(4):759–767

Groves SM, Godsey M, Nollenberger RK (2003) Evaluating financial condition: a handbook for local government, 4th edn. International City/County Management Association, Washington, DC

Hawkins BW (1989) A comparison of local and external influences on city strategies for coping with fiscal stress. In: Clark T, Fitzgerald R (eds) Decisions on urban dollars, research in urban policy, vol 3. JAI, Greenwich, pp 73–90

Hendrick R (2004) Assessing and measuring the fiscal health of local governments: focus on Chicago suburban municipalities. Urban Aff Rev 40(1):78–114

Hendrick R (2011) Managing the fiscal metropolis: the financial policies, practices, and health of suburban municipalities. Georgetown University Press, Washington, DC

Honadle BW (2003) The states' role in US local government fiscal crises: a theoretical model and results of a national survey. Int J Pub Adm 26(13):1431–1472

Honadle BW, Lloyd-Jones M (1998) Analyzing rural local governments' financial condition: an exploratory application of three tools. Pub Budget Finance 18(2):69–82

Jacob B, Hendrick R (2013) Assessing the financial condition of local governments: what is financial condition and how is it measured? In: Levine H, Justice J, Scorsone E (eds) Handbook of local government fiscal health. Jones & Bartlett, Burlington

Justice JB, Scorsone EA (2013) Measuring and predicting local government fiscal stress. In: Levine H, Justice J, Scorsone E, Levine H, Justice J, Scorsone E (eds) Handbook of local government fiscal health. Jones & Bartlett, Burlington

Kloha P, Weissert CS, Kleine R (2005) Developing and testing a composite model to predict local fiscal distress. Public Adm Rev 65(3):313–323

Levine CH, Irene R, George GW (1981) The politics of retrenchment: how local governments manage fiscal stress. Sage Publications, Beverly Hills

Lundin S (2007) The closest governments to the people: a complete reference guide to local governments in Washington state. Washington State University Press, Pullman

Maher C, Deller SC (2012) Measuring municipal fiscal condition: do objective measures of fiscal health relate to subjective measures? J Pub Budg Account Financ Manag 23(3):427–450

Marlowe J (2013) Fiscal slack, reserves, and rainy day funds. In: Levine H, Justice J, Scorsone Burlington E (eds) Handbook of local government fiscal health. Jones & Bartlett, Burlington

Oates WE (1972) Fiscal federalism. Harcourt Brace Jovanovich, New York

Pagano MA, Hoene C (2010) States and the fiscal policy space of cities. In: Bell M, Brunori D, Youngman J (eds) The property tax and local autonomy. Lincoln Institute of Land Policy, Cambridge

Pammer WJ (1990) Managing fiscal strain in major American cities: under- standing retrenchment in the public sector. Greenwood, New York

Sala-i-Martin XX (1997) I just ran two million regressions. Am Econ Rev 87(2):178–190

Sharp EB, Elkins D (1987) The impact of fiscal limitations: a tale of seven cities. Public Adm Rev 47(5):387–392

Stonecash J, McAfee P (1981) Ambiguities and limits of fiscal strain indicators. Pol Stud J 10:379–395

Sturm J-E, Hartwig J (2012) An outlier-robust extreme bounds analysis of the determinants of health-care expenditure growth. KOF working papers no. 307. Available at SSRN: http://ssrn.com/abstract=2122412

Chapter 5
Local Government Pension Fund Management and Budget Stability

Jun Peng

Abstract Fluctuations in the financial market have introduced tremendous volatility into the financing of public pension plans, which in turn have a destabilizing effect on local government general fund budgets. In this chapter, we explore the reasons behind the volatility in pension financing and its countercyclical effect on local general fund budgets. More specifically, we examine three factors that jointly determine public pension financing: pension benefit design, pension contributions, and investment returns. Most importantly, we look at the effect of investment returns on employer pension contributions—which are financed by local government budgets. Solutions are then suggested as to how to mitigate this volatility in pension financing and its destabilizing effect on local government budgets.

5.1 Introduction

Ever since the inception of financial crisis in 2008, public pension world has seen a great deal of turmoil. Hardly a day goes by without some media coverage of public pension problems, at both the state and local levels, in terms of both their affordability and impact on government budgets. At the state level, Illinois, with unfunded pension liabilities of about $100 billion, has become the poster child of public pension problems. At the local level, several cities, such as Vallejo and San Bernardino, California, Central Falls, Rhode Island, and Detroit, filed for bankruptcy, partly due to public pension woes. They highlight the damage public pension problems, when left unchecked, can do to local government finance. There are many more local governments, such as Chicago and many cities in California, struggling under the weight of unfunded pension liability and increasing pension contributions. For example, in San Jose, California, pension contributions accounted for 31 % of the general fund in 2012, and Oakland, California had 29 % of its general fund going to pay for pension contributions (Peters 2013).

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In this chapter, we examine the causes of public pension problems and explore potential solutions to these problems. While examining the causes and exploring solutions, we pay particular attention to the volatility in the financing of pension benefits. While this volatility is not the source of all troubles for public pensions, many pension financing issues can be traced to volatility. Thus, solutions to pension problems also center on the theme of stabilization in pension finance. A full understanding of the issues and solutions also requires having some basic understanding of the technical aspects of actuarial valuation. For the rest of the chapter, we first provide a quick overview of the public pension world. Then we explain the basic foundations of actuarial valuation of a pension plan. After that we examine the causes of pension problems and then explore the solutions to pension problems. We conclude with some general thoughts.

5.2 Overview of Public Pension Plans

In this section, we provide an overview of the public pension world, distinguishing between state pension plans and local pension plans. Despite their separation, we have to discuss state and local pension plans together, because local governments' pension benefits are inextricably linked with state pension plans, as a vast majority of local government employees are on state pension plans.

5.2.1 Pension Systems and Their Size

Table 5.1 shows the number of pension systems at the state and local level and their membership in fiscal year 2011. Altogether, there are 3,418 public pension systems in the U.S. Of these, only 222 are state-level systems, meaning over 90 % of all pension systems are operated at the local level. However, the number of pension systems is misleading with regard to the overall scope of their operation. This is shown in the number of members covered. Of the 19.5 million members covered by public pension systems, 90 % are in state pension systems. However, most of these members are local government employees. According to the U.S. Census Bureau, in 2011, there were 3.8 million full-time equivalent state employees and 10.8 million local employees. Therefore, only a fraction of local employees are actually covered by pension plans run at the local level, and local government pension financing is thus also largely determined by state-level pension policies and management. Further, even these aggregate figures mask huge variation among states. For example, in Vermont all local employees participate in local pension plans, whereas in Hawaii, Maine, Mississippi, Nevada, New Mexico, and Wyoming, there is only one state pension plan that covers all state and local employee in that state. In Pennsylvania, there are 1,422 local plans and only 3 state plans. Notably, three states, Florida, Illinois, and Pennsylvania, account for 68 % of all locally run pension plans (U.S. Census Bureau 2012).

Table 5.1 A snapshot of the public pension world in FY 2011 (assets in $thousands)

Type of government	Number of systems	Membership			Total assets (millions)
		Total	Active members	Inactive members	
United States	3,418	19,472,304	14,526,547	4,945,757	$3,026,660
State	222	17,473,569	12,831,418	4,642,151	$2,542,727
Local	3,196	1,998,735	1,695,129	303,606	$483,933
County	168	564,391	479,006	85,385	
Municipality	2,176	1,205,794	1,022,464	183,330	
Township	634	47,525	40,663	6,862	
Special district	206	113,571	99,355	14,216	
School district	12	67,454	53,641	13,813	

Source: U.S. Census Bureau's 2011 Annual Survey of Public Pensions

Public pension plans, whether state or local, also vary by the type of employees covered. The three broad types are general employees, teachers, and public safety personnel (such as police, firefighters, and correctional officers). Typically, police and firefighters are in their own pension plans separate from other categories of employees, because their pension benefits are different from other employees due to the hazardous nature of their occupation. Teachers are sometimes in their own pension plans as well, because in some states, teachers are not covered by Social Security (as their pension plans were established prior to Social Security), and therefore their pension benefits are also different from other general employees.

5.2.2 Assets and Funded Ratios

Table 5.1 also shows the value of assets held by public pension plans as well as a breakdown between state and local plans. Total value at the end of fiscal year 2011 was about $3 trillion. Not surprisingly, 84 % of the assets were held in state pension plans, another indication of the dominance of state plans, and of the interconnectedness of local and state pension financing issues.

The value of assets, however, only tells one side of the story of pension plan finance. The other side is pension liability. Pension liability is tied to pension benefits, as the sum of employees' future pension benefits make up the employers' pension liability. Together, these two numbers tell us how healthy public pension plans are. This is usually expressed as "funded ratio," or the ratio of pension assets over pension liabilities. Although there are no national data for liabilities of all state and local pension plans, a survey of many large state and local pension plans shows that in 2011, the average funded ratio nationwide was somewhere between 75 and 80 % (National Association of State Retirement Administrators 2012;

Wilshire Consulting 2012). Based on the pension asset value of $3 trillion in 2011, the overall pension liability then should be about $4 trillion in 2011. In other words, there was about a $1 trillion funding gap for public pension plans. Given the split of state and local pension plan membership, much of this $1 trillion gap is borne by local governments.

5.3 Understanding the Financing of Public Pensions

The financing of public pension benefits is epitomized by two figures: pension contribution and the pension funded ratio. To understand how these figures are determined, we need to have some basic understanding of actuarial valuation of a pension plan. Actuarial valuation aims to determine the future liability of the promised pension benefit, how much should be set aside periodically so that sufficient assets can be accumulated to pay off the future pension liability when it is due, and whether progress is being made towards that goal in terms of the funded ratio and amortization of any unfunded liability.[1]

5.3.1 Determining Pension Liabilities

Generally, pension benefits include normal service benefits, cost of living adjustments (COLAs), disability benefits, and death benefits. Of these, by far the most important and the largest is the normal service benefit related to the normal service provided by an employee. It is based on the following formula:

$$\text{Normal service benefit} = \text{years of service} \times \text{final average salary} \times \text{benefit multiplier}$$

Years of service refers to the number of years an employee has worked prior to retirement. Final average salary is the average salary of the last few years (typically last 3 years) prior to retirement. Benefit multiplier (BM) is a percentage, typically 2 %. For example, if an employee has worked for 30 years and the BM is 2 %, his pension benefit is equal to 60 % of his final average salary. In order to receive this benefit, he also has to meet two other requirements. One is the age requirement. An employee has to reach a certain age, often 65, to receive the normal pension benefit. There are also two alternatives to the age requirement. One is years of service requirement, meaning you can retire after working for so many years, such as 30 years, regardless of age. The second is a combination of age and years of years, commonly called the "rule of XX". For example, rule of 90 means that the sum of age and years of service has to be 90 before you can retire and receive the normal pension benefit. The second requirement is a vesting period, meaning you have to

[1] For a more detailed discussion of actuarial valuation, please see Peng (2008).

work for a certain number of years before you can qualify for pension benefits. The typical vesting period is 5 years.

The other major pension benefit related to normal service benefit is the COLA, which provides an increase to pension benefits during retirement due to inflation. COLAs can be structured in many ways. It can be automatic or ad hoc. An automatic COLA means that the benefit will increase every year by a set percentage, say 3 %. Ad hoc means that the plan sponsor determines when a COLA should be granted. A typical condition for granting an ad hoc COLA is when a pension fund's investment returns exceed expectations.

With the pension benefit defined by the formula, it is then possible to determine what the employer's pension liability is at the time of employee's retirement. Since pension liabilities are prefunded, the employer needs to set aside enough assets to cover this liability at the time of retirement. To make this calculation, we need to make assumptions about future inflation, salary growth, retirement age, life expectancy and discount rate, etc. First, we estimate the annual pension benefit at the time of retirement. Then, by applying a certain discount rate, we can calculate the present value (PV) of his future pension benefit at the time of retirement, which is the amount that needs to be accumulated.

5.3.2 Funding Pension Liabilities

Once the pension liabilities have been determined, the next step is to figure out an amount that needs to be set aside every year, so that this annual amount plus the investment earnings on such amounts every year will be sufficient to pay future pension benefits at the time of retirement. To ensure stability and affordability, the amount set aside every year is usually expressed as a set percentage of payroll. Thus, this amount starts out relatively small and increases when the employee's salary increases. The amount thus determined is also called the normal cost of pension benefit. It is the cost associated with the pension benefit incurred due to the service provided in a year. This level percentage of payroll is also called "normal cost rate." This rate is typically shared between the employer and the employee.

The next step in actuarial valuation is to calculate the funded ratio in any given year. To do this, we need to determine the value of pension liability and asset in any given year. The value of liability in any given year is calculated as follows:

$$\text{Pension liability} = \text{PV of future pension liability} - \text{PV of future normal cost}$$

where PV stands for present value. Pension liability calculated this way is also called "accrued actuarial liability" (AAL). AAL is then compared to assets in the pension fund, which results in a funded ratio. If the ratio is more (less) than one, that means there are more (less) assets available when compared to projected pension liability. If AAL is more than pension assets, then an unfunded AAL (UAAL) occurs. When that happens, UAAL has to be amortized over a period of time,

usually no more than 30 years. The annual payment, also called amortization cost, is added to the normal cost to form that year's total pension contribution. The part paid by the employer is called "annual required contribution," or ARC.

Since the normal cost tends to be fairly stable over time, the change in employer ARC is primarily associated with the amortization cost. As pension fund assets are invested in the financial market, especially the equity market, the value of assets can go up and down significantly from year to year. UAAL can behave erratically from year to year, leading to volatility in amortization cost, and thus volatility in employer's pension contribution and its general fund budget. To minimize such volatility, pension assets are not calculated using their market value, which is quite volatile, but rather actuarial value, which is more stable. Actuarial value is determined by spreading out the ups and downs in asset values over a longer period. A typical smoothing period is 4 years, meaning that in any given year, only a quarter of that year's gain or loss in asset value is recognized. Actuarial value of asset thus leads to smaller change in UAAL, and most importantly, more stable pension contribution rates for employers and thus more predictable impact on government operating budgets.

5.3.3 Investment Return

The most important assumption underpinning an actuarial valuation is the discount rate. Since the pension liability is discounted over a long period, any small change in the discount rate can have a significant impact on the size of the PV of future pension liability and the amount of periodic pension contributions needed. Because pension contributions are invested for the long term, the expected long-term rate of return on pension asset investments is chosen as the discount rate. The average expected return for state and local plans is 8 %. This return assumption is important because it determines how fast assets should grow in order to fully fund pension liability accumulated at any given time. Whether an actual investment return is deemed adequate or not, it has to be compared to the assumed rate of return. If the actual investment return falls short of the assumed rate, that will result in an UAAL that needs to be amortized, increasing the pension contribution. If the actual return exceeds the assumed rate, it can lead to a pension fund surplus (or negative UAAL) which can also be amortized, potentially leading to a lower pension contribution.

The assumed return also determines how large the PV of pension liability is. There is an inverse relationship between the assumed discount rate and the PV of pension liability. A higher discount rate leads to a smaller present value and thus smaller pension contribution, and vice versa.

5.4 Causes of Pension Problems

To understand why public pensions have become a serious drag on state and local government finance, especially its destabilizing effect on government budget, we have to look at both sides that determine the fiscal health of a pension plan—the

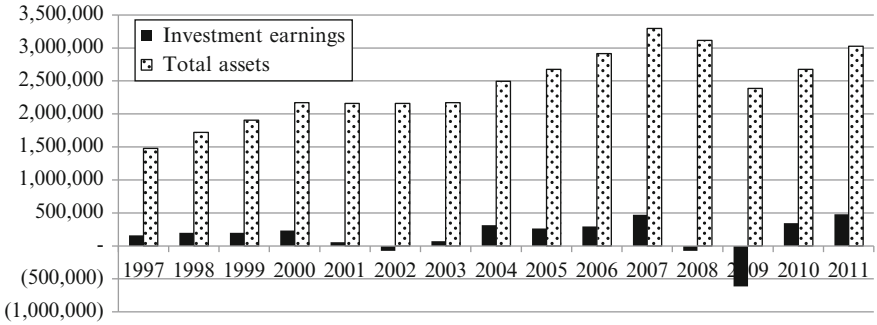

Fig. 5.1 Annual total pension assets and investment earnings, 1997–2011 (in $Millions). *Source: U.S. Census Bureau*

asset side and the liability side alike. The asset side consists of pension contributions and investment earnings, and the liability side deals with pension benefit design and how fast liability grows.

5.4.1 Investment Earnings

By far the most important contributing factor to pension problems is lower-than-expected investment returns. Given the very long investment horizon, investment earnings have an outsize impact on the accumulation of pension assets. In the long run, investment earnings account for two thirds of total assets accumulated to pay for pension benefits (Peng 2008), meaning only about a third actually comes from both employer and employee pension contributions. If a long-term average return, say over 10 years, is below expectations, it can lead to a significant drop in the funded ratio, even if required contributions have been met every year. Making matters worse, investment earnings are not only crucial, but also volatile. The combination of these two factors produces destabilizing effects on local government budgets through changes in pension contribution and pension benefit design.

In the early 1980s, the stock market began a long "bull" run that ended in 2000. After the tech bubble burst in 2000, the stock market took a dive and so did public pension plans' assets. The stock market went up again soon after that. Then the financial crisis hit in 2008 and 2009. For fiscal years ending June 30, pension investments saw a median drop of 5 % in 2008 and 18 % in 2009, followed by median gains of nearly 13 % in 2010 and 22 % in 2011 (Pew Charitable Trust 2013). Figure 5.1 shows the historical trend of asset value from 1997 through 2011.

From 1997 through 2000, the asset value increased steadily, and there was a slight dip for the next 2 years. Then it steadily increased again until it reached a peak value of $3.3 trillion in 2007. It then suffered a precipitous drop of almost $900 billion in value over the next 2 years, although it recovered two thirds of that loss by 2011.

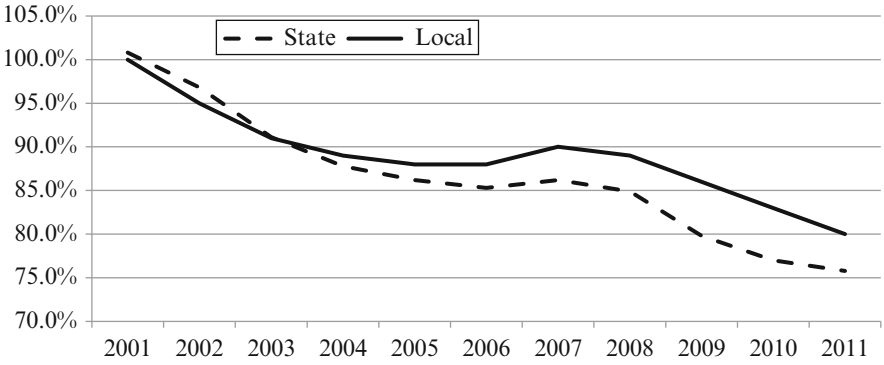

Fig. 5.2 Public pension plan funded ratio trend, 2001–2011. *Source: National Association of State Retirement Administrators (2012), Wilshire Consulting (2012)*

The effect of the ups and downs in the stock market is most clearly seen in the trend of funded ratios. Figure 5.2 shows the average funded ratio for state and local pension plans.[2]

We can see that state and local funded ratios are fairly similar, and they track each other fairly closely, meaning they rise or fall by about the same magnitude at the same time. In 2000, state and local pension plans on average were fully funded. However by 2011, the ratio had steadily decreased to 76 % at the state level and 80 % at the local level, the lowest level since 2000.

Between 2000 and 2011, total pension assets grew by less than $900 billion, or about 42 %. However, pension liability increased every year steadily by more or less 7–8 %, depending on the underlying discount rate and other factors. This difference between investment return and pension liability growth rate over an 11-year period is the main reason why public pension benefits have become increasingly more controversial.

5.4.2 Pension Contributions

As mentioned earlier, the accumulation of assets is affected by two factors, investment earnings and pension contributions. We should expect an inverse relationship between investment returns and pension contributions. When investment earnings

[2] There is no data on the funded ratio for all public pension plans. However, since only a hundred or so state pension plans control vast majority of public pension assets, the attention is mostly focused on the funded ratio of these plan, as the data collection is much easier. National Association of State Retirement Administrators conducts annual survey of large state level pension plans, and the state level funded ratio is from their survey. Wilshire Associates is the only organization that has conducted annual survey of local pension plans since 2000. Each year it examines 106 large local pension plans, and the ratio in this figure is from this survey (Wilshire Consulting 2012).

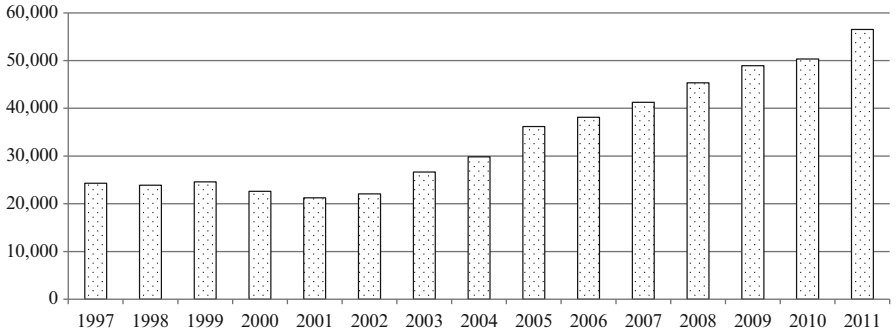

Fig. 5.3 Annual local government pension contributions, 1997–2011 (in $Millions). *Source: U.S. Census Bureau*

are significantly above expectation, pension contributions can go down. Likewise, when investment returns are below expectation, pension contributions must go up. Thus, the volatility in investment earnings introduces volatility in government pension contributions. This can be found in Fig. 5.3.

Using local government contributions as an example, we can see that leading up to the first stock market decline in 2001, contributions were generally declining. This trend gradually reversed, and contributions increased by the largest amount in 2011. The trend is even clearer when viewed in percentage terms. Government contributions primarily come out of their general fund; general taxes, consisting of property tax, sales tax, and personal income tax, are the main sources of revenue for local government general fund. Therefore, the overall amount of general taxes can serve as a proxy for the overall size of general funds for all local government in the U.S. Local government pension contributions as a percentage of total local general taxes give us a better idea of the financial burden of pension contributions. Figure 5.4 shows this trend.

We can see that between 1997 and 2002, this percentage gradually declined from 8.5 % to just about 6 %. Then it went back to 8 % in 2005 and decreased slightly in 2006 and 2007. After the 2008 and 2009 stock market crash, this percentage shot up and reached almost 10 % in 2011.[3] In other words, this percentage increased by almost 4 % points between 2002 and 2011. That is a very significant increase in just 10 years, meaning that 4 % points of general fund has to be shifted from other vital

[3] It should be noted that the percentage calculated this way is quite similar to the results obtained when comparing pension contribution to the actual general fund. In 2013, Merritt Research Services LLC did a study on the finance of 250 largest cities in the U.S., and found that the median ratio of pension contribution over general fund was 10 % in 2012, up from 7.75 % in 2007 (Peters 2013). These are very similar to 9.78 % in 2011 and 7.85 % in 2007 obtained by using the method described in this chapter.

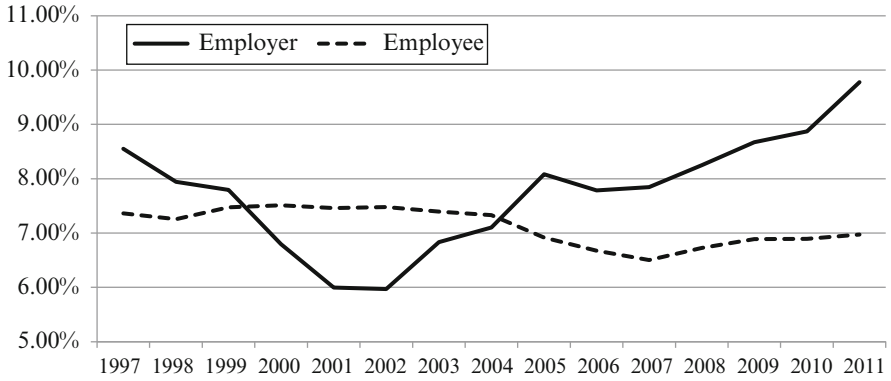

Fig. 5.4 Local employer and employee contribution as a percentage of local general taxes. *Source: U.S. Census Bureau*

public services in the budget to support public pension benefits, exerting pressure on local budgets.

It is also clear that there is an inverse relationship between the funded ratio and this percentage. This percentage was at its lowest in 2001 when the funded ratio was at its highest, and then reached its highest level in 2011 when the funded ratio also reached its lowest level since 2000. Making matters worse, this increase in pension contributions happens at a time when local governments can least afford it due to the aftermath of the financial crisis and economic recession. Public pension contributions are now not only at a historical high, but are actively destabilizing local government budgets.

It should also be noted that despite the volatility in employer contribution rates, employee contributions, as a percentage of general taxes, remained fairly steady during this period, between 7 and 7.5 %, as can be seen in Fig. 5.4. The volatility in pension contribution rate thus mostly falls on local governments (because they reduced their own pension contribution rates earlier.)

Because of the countercyclical nature of employer pension contributions, there is always the potential for pension systems to be underfunded when the government budget is tight. Although some states and local governments are required by statute to pay the full amount of annual required contribution (ARC) each year, others do not have such a stringent requirement. In such cases, when they face budget deficits during economic downturns, one option has always been not to pay the full amount of the ARC, as such action carries no immediate negative consequences. Unless it is paid back in full soon afterwards, such delaying tactics carries long-term consequences. Any amount not paid carries interest costs (equal to the pension plan's discount rate). Thus in the long run, it costs the government more money. This is similar to government delaying infrastructure maintenance. Even though it saves the government some money in the meantime, eventually the government cannot avoid such maintenance and it will cost more in the future. One study found that in 2006,

only 56 % of public pension plans paid 100 % of ARC, and 15 % contributed less than 60 % of ARC—more notable given that 2006 was a relatively good budget year overall (Munnell et al. 2008).

In the worst case scenario, some governments may chronically underfund ARC, in times of good and bad. Such chronic underfunding typically is a sign that either the government has some structural budget issues or the pension benefits are too generous and not sustainable. And this will lead to very low funded ratio and large unfunded pension liability, making the solution much more challenging. The state of Illinois and the city of Chicago are good examples of such chronic underfunding.

5.4.3 Pension Benefit Increases

On the liability side, pension benefits can be another potential source for instability. There are at least four ways for this instability to occur. First has to do with the overall level of pension benefits. It is possible that the overall level of pension benefits may be higher than what a city can sustain. Such levels of benefits might have seemed quite affordable in the past when the investment was doing better than expected, but in the new era of reduced expectation of investment return in the future (evidence of this is in the reduction in assumed rate of return for many public pension plans), such level of pension benefits can be more difficult to sustain, as higher pension contribution puts more pressure on government budgets.

Related to the first point, a booming stock market over a number of years can significantly lift the value of pension assets, sometimes leading to funded ratio over 100 %. The pension surplus can create demand for pension benefit increases. While benefit enhancement will increase the normal cost and thus the employer pension contribution, such increases can be offset by the amortization of pension fund surplus, at least in the short run, thus creating the illusion that benefit enhancement is cost free. Although large-scale benefit enhancement happened mostly in the late 1990s, the last time when many pension plans were overfunded, we are still paying for the full impact of these enhancements. Even though they seemed affordable when plans were overfunded and the stock market was racking up huge returns, such enhancements seem more onerous when the pension plan is underfunded and investment return is not as robust. One good example is California. The California Public Employees Retirement System (CalPERS) is the largest state pension plan that covers many local government employees. In 1999, when its funded ratio reached 128 %, the state government granted benefit increases to everyone covered by the CalPERS.[4] It shortened the period to calculate the final average salary from 3 years to just 1 year and lowered the retirement age from 60 to 55.[5] In response, overall pension liability increased from $115 billion to $135 billion. That was an increase of more than 17 % from 1999 to 2000, far above the normal growth rate.

[4] Data in this paragraph on CalPERS can be found in CalPERS (2005).

[5] In 2008, the period to calculate final average salary was reverted back to 3 years, although the normal retirement age is still kept at 55.

Over the next few years, the pension liability continued to increase by about 10 % a year. Not surprisingly, accompanied by low investment return during this period, the funded ratio dropped precipitously to 87 % by 2004. Such enhancements seemed quite affordable when granted. As a matter of fact, the pension contribution immediately afterwards decreased instead of going up. In 1999, the pension contribution was $1.6 billion, and it was only $362 million in 2000. It then quickly marched up. By 2005, it was at $5.77 billion, during a period when California state and local government budgets were already under pressure due to the effects of economic recession.

Third, granting of ad hoc COLAs can also introduce instability. Usually granting of ad hoc COLAs is tied to investment returns. When the investment return is better than expected, a COLA can be granted. However, this practice ignores one fundamental principle of long-term pension plan investment. This principle is based on the long-term average rate of return, meaning some years of higher return will be offset by some years of lower return. So if higher returns in some years are used to pay for ad hoc COLAs, there will be less money left to cushion the lower returns of other years, leading to lower funded ratio and higher contribution rates. Detroit and San Diego are two good examples. While these two cities' pension problems are caused by many factors, the regular granting of 13th checks is one very important factor. In both cities, excess investment returns were frequently used to pay for the 13th check, significantly draining pension fund resources, thus making the impact of downturns in the financial market much worse than otherwise.

Fourth, pension spiking can also add instability to pension financing. Some local governments have allowed employees to include overtime, unused sick leave, or unused vacation time to boost or "spike" their final average salary, one of the three variables used to determine the level of benefits. This can cause an unexpected increase in pension liability and thus future pension contributions, because the normal cost rate is based on an anticipated final salary. If this final salary is much higher than anticipated due to spiking, that means not enough has been set aside when the employee is working, creating an unfunded liability that has to be amortized by the employer and contributing employees in the future. The shorter the period used to determine final salary, the more dramatic the impact will be. While the extent of pension spiking nationwide is not known, even a small number of cases made known to the public can change its perception of public pension.

5.5 Solutions to Local Government Pension Problems

Any solution to public pension problems will inevitably deal with the causes of the above-mentioned problems. The two main issues with pension problems are affordability and volatility, which are also related to each other to some extent. Solutions to problems are grouped into three main categories. They are: (1) changes to pension benefits; (2) changes to pension contributions; and (3) changes to investment, corresponding to the three causes of pension problems.

5.5.1 Changes to Pension Benefits

If pension benefits are higher than what is affordable to public employers, modifications need to be made to public pensions to make them affordable. Such changes fall into two broad categories: incremental changes and more fundamental changes. Incremental changes involve making changes to the current definition of pension benefits on the margin, whereas fundamental changes mean switching from the defined benefit type to other types of pension benefit. Whether incremental or fundamental, one major problem with changes to pension benefits is that such changes do not apply to current workers and retirees, due to the constitutional and statutory guarantee of contractual rights. When an employee enters into employment and signs a contract that promises certain pension benefit, such benefits can no longer be changed as long as the employee remains employed. Such strong protections mean that any pension benefit changes only apply to new workers as of the date of the policy change. This also means that pension contribution reductions from changes to pension benefit will not be realized for years or decades to come, when current retirees and workers are gradually replaced by new workers. Despite the slow pace, changes are still necessary.

5.5.1.1 Incremental Changes

Since there are so many variables that jointly determine pension benefits, any one of these variables can be changed to reduce overall pension benefits.

The first is *retirement age*. Many pension systems set the normal retirement age below 65. Based on a survey of state pension systems by the Wisconsin Legislative Council (2011), in 2010, 83 of the 87 large state and local plans allow normal retirement at age 62 or earlier and 31 plans allow employee to retire at the age of 55 after 30 years of service. In comparison, the normal retirement age for collecting Social Security benefits used to be 65. With the increase in life expectancy, the normal retirement age for Social Security benefit will be increased to 67. The same logic also applies to public pension benefits. The purpose of increasing the retirement age is twofold. First, it increases the number of years an employee pays into the pension plan. Second, it shortens the number of years an employee collects pension benefits in retirement. So far Illinois is the only state that has raised the retirement age to 67.

The second is *final average salary*. There are two ways to reduce pension cost volatility through changes to final average salary calculation. First is to lengthen the time period for calculating final average salary from the normal 3 years to, say, 5 years. The purpose of lengthening the period is to make the final average salary more predictable, as the impact of any unpredictable spiking in salary in 1 year is more muted when it is averaged out over a longer period of time. Second is to avoid any potential for spiking in the final average salary, meaning it should not be padded by one-time compensation that is not part of the regular compensation for service. For example, in its pension reform, the city of Tucson in 2011 eliminated payment

for unused sick leave and vacation time from the calculation of final average salary. Another way to avoid spiking is to set the salary increase in the final years to no more than the average for the government employees in that year, and any increase over that limit will be disregarded when calculating the final average salary. Making final average salary more predictable makes pension liability more predictable, thereby leading to more predictability in pension contribution.

The third is the *benefit multiplier*. The most straightforward way to reduce pension benefit is to reduce the benefit multiplier, as this is one factor that is directly controlled by the government. Since 2 % is the norm among public pension plans, anything over that amount can be trimmed, except for state and local employees who are not in the federal Social Security program. For example, in its 2011 reform, the city of Tucson trimmed the multiplier from 2.25 to 2 % to reduce future pension liability cost.

The fourth is the *COLA*. COLAs are fairly expensive, especially when they automatically increase every year. This will certainly increase the pension contribution rate compared to an ad hoc COLA. If an automatic COLA is preferred, then the rate should be set at a level that makes the pension contribution rate more affordable. With an ad hoc COLA, strict conditions should be set as to when a COLA can be granted. They are usually centered on two conditions: the annual rate of return and the funded ratio of the pension plan. An ad hoc COLA should not be granted anytime when an annual return exceeds the expectation. Ideally, instead of annual return, a moving average over 3–5 years should be used to determine when a COLA should be granted. This will avoid granting COLA hastily. COLAs should also take into consideration the plan's funded ratio. The lower the funded ratio, the less generous the ad hoc COLA should be. Arizona's Public Safety Personnel Retirement System's (PSPRS) COLA policy is one good example of the conditions under which an ad hoc COLA can be granted (Gabriel Roeder Smith & Company 2012). There are three conditions. First, only investment return in excess of 10.5 % in any year can be used for a COLA. The PSPRS' assumed rate of return is 7.85 %, meaning 2.65 % of excess return over the expected return has to be kept in the pension plan. Second, the present value of the COLA cannot exceed 100 % of the return in excess of 10.5 %. What this means is that this excess return not only pays for this year's COLA, but also for all future years, because once a COLA is granted, it is granted for life. This also means the size of COLA is based on the size of excess earnings. Third, the plan also caps the size of the COLA, depending on the funded ratio of the plan. It varies from 2 % when the plan's funded ratio is 60–64 % to 4 % if the funded ratio is 80 % and above.

5.5.1.2 Fundamental Changes

The fundamental changes mean that the guarantee of pension benefits will be altered, either eliminated or reduced. These changes involve switch to defined contribution plan or hybrid plan. The purpose of fundamental changes is to make the cost of pension benefit more predictable or at least less volatile to the employers.

The first is *switch to a defined contribution* (*DC*) *plan*. In a DC plan, the employer pays a set rate of employee salary to his individual retirement account and is no longer responsible for his pension benefit in his retirement. Thus, the employer's pension liability is zero. The employee then will be responsible for the investment performance of assets in his retirement account. If he does well, he will have good retirement benefits, and if poorly, bad retirement benefits. Thus, the risk and volatility in pension liability and contribution is now completely shifted from the employer to the employee. Importantly, individuals on average do not perform as well as a pension plan run by professionals when it comes to investments, due to lack of knowledge, discipline, and higher costs. Therefore, there is strong resistance among public employees to this switch and there are only two mandatory DC plans at the state level—in Alaska and Michigan—and one at the local level, in Washington, DC. Other states like Florida, Colorado, Montana, and Ohio also have DC plan, but they are optional rather than mandatory.

The second is a *switch to hybrid pension plan.* A hybrid plan is a compromise between DB plan and DC plan. While an employer completely shoulders the risk and volatility in a DB plan, and an employee bears the risk in a DC plan, a hybrid plan splits the risk and volatility between employer and employee. There are two types of hybrid plans. The first is a combination of both DB and DC plans, and the second is a cash balance plan.

A DB/DC combination hybrid plan consists of two parts, a DB part and a DC part. The DB part is just like a regular DB plan with formula-based benefits and the DC part also works like a regular DC plan. Typically the employer's contribution goes into the DB part and the employee's contribution goes into the DC plan. Since the DB plan is no longer supported by the employee's contribution, the benefit level in the DB part of hybrid plan is lower than that in a traditional DB plan. The reduction in the benefit level is to be made up by the employee's DC portion. This is best illustrated by two pension plans offered by the Ohio state government: a traditional DB plan and a hybrid DB-DC plan. The benefit formula for the traditional DB plan is 2.2 % for the first 30 years and 2.5 % for each year in excess of 30 years. The multiplier in the DB part of the hybrid plan is 1 % for the first 30 years and 1.25 % for each year after that.

Both the employer and employee bear the risk in such an arrangement, as the employer is responsible for the risk in the DB part and the employee is responsible for the risk in the DC part. However, since the defined benefit level is reduced by half, the employer's risk and volatility is thus also reduced by half, and the other half of the risk is thus born by the employee. The employer bears the risk because it will have to increase the pension contribution to make up for the investment loss in the DB part. The employee bears the risk because volatility in the financial market will affect his DC plan balance. The employee is also protected to some extent if there is a substantial drop in the market at the time of retirement because the benefit in the DB part is not affected by such drop. There is another upside for the employee. If the market goes up, the employee shares in the gain as the value of his DC plan balance goes up. In addition to Ohio, several states have hybrid plans. Georgia and Utah are the two most recent states that switched to such hybrid plan in recent years,

and they are mandatory in both states. Georgia opened a mandatory hybrid plan for state employees hired after January 1, 2009. For the DB part, the formula is 1 % for each year of service, and the employee has to contribute 1.25 %. For the DC part, the employer matches the first 1 % of the employee contribution, and then 50 % of the employee contribution above the 1 %, up to 3 % in total.

The basic setup for a cash balance (CB) plan is a notional individual account within a group guaranteed plan. The group guaranteed plan resembles the DB plan and the notional individual account resembles the DC plan. The difference between the guarantee in a CB plan and a DB plan is that the latter guarantees pension benefits based on a formula, whereas the former guarantees a minimum investment return on the balance of notional individual account. The notional individual account part resembles a DC plan, as all employer and employee contributions go into the notional individual account. The difference between the CB and DC is that the investment in this notional individual account is managed by the employer rather than the employee himself, thus allowing the employer to guarantee a minimum investment return on the notional account balance. This minimum guaranteed rate of return is typically around 5 %. If the actual investment return for the year is higher than the guaranteed rate, the employer has the option to share the excess return with the employee by giving a one-time credit to the individual account. Although CB is quite popular in the private sector, in the public sector so far Nebraska is the only state that has a CB plan (Nebraska Public Employees Retirement System 2013). In Nebraska, an employee contributes 4.8 % and employer contributes 7.5 % to the CB plan. The interest credit rate is defined in statute as the greater of 5 %, or the applicable federal mid-term rate plus 1.5 %. The retirement system board can also award a dividend to employee based on investment performance.

This raises one question: how is the guarantee of minimum rate of return on account balance different from guarantee of the pension benefit itself? There are at least two differences, both of which reducing the risk and volatility for employers. The first difference is the rate of return. In a CB plan, the minimum guaranteed return is typically 5 %. In a DB plan, the assumed rate of return is typically 8 %. This rate can also be viewed as guaranteed by the employer and the future pension benefit is based on this guaranteed return. Thus, the first difference is the lower guaranteed return in CB, thereby reducing the risk for employers. Due to this guarantee, the employer still bears some risk if the financial market enters into a long stretch of low or negative return. However, since 5 % is much easier to achieve than 8 % over the long run, the chance of incurring unfunded liability is also much lower with CB than with DB. By guaranteeing a lower return, the employer has a much better chance of meeting the expectation and not being forced to pay a higher contribution rate in the future. The second difference is that since the guarantee is based on the account balance and not on the final salary, the employer can avoid volatility in pension liability due to spiking. As discussed earlier, one source of volatility for pension liability is the unpredictability of final salary due to spiking in the final years. CB completely takes this factor out of the equation. Because of these two differences, the cost of a CB plan is more predictable and stable to a government employer. This reduction in risk and volatility to the employer comes at the expense of employees. With a lower guaranteed rate of return, the pension benefit based on

the account balance is also expected to be lower than DB plan guaranteed by a higher expected return. However, if the long-term rate is consistently higher than the guaranteed return, the employee can still potentially enjoy a higher account balance and thus larger pension benefits. In essence, this is another form of risk sharing between the employer and employee.

Overall, both types of hybrid plans are aimed at making pension cost more stable and affordable by sharing the risk and cost with employees, who are completely shielded in a traditional DB plan.

5.5.2 Changes to Pension Contributions

The purpose of making changes to pension contribution policy is to make it more sustainable in the long run and avoid being a source of volatility for government budgets. Such changes can apply to both employer and employee contributions.

At the very minimum, state law should require that the employers' ARC has to be paid in full amount every year with no exception. It should be as sacred as paying debt service. Then the government can go beyond that and design policy to ensure more stability in pension contribution over time and investment cycles. As the volatility in the stock market leads to volatility in funded ratio and thus in employer contribution, providing some measure of stability is in government's long-term interest. This is clearly seen in the case of the California pension system. Since the late nineties, some state governments have taken steps to limit the impact of stock market volatility on pension fund. First, like in Florida, there can be a limit on how much the pension contribution can be reduced when the pension plan is overfunded. Second, there should be a minimum pension contribution rate regardless of the funding situation. At the minimum, this limit should be set at the normal cost rate. Such a policy serves another purpose. It will prevent elected officials from increasing pension benefit without increasing pension contribution. Since any benefit increase will increase the normal cost, a minimum normal cost rate makes sure that the employer pays more for the increase from the very beginning.

What about the current era in which the pension contribution rate also includes amortization cost? When the funded ratio gradually improves and the unfunded liability is reduced, the amortization cost will also be reduced leading to lower pension contributions. However, any downturn in the stock market can increase the amortization cost again in the future. Therefore, a policy can dictate that if the pension contribution related to amortization is reduced due to an increase in the funded ratio, it cannot be reduced by more than a set amount each year, say no more than half a percent from previous year's level. This will provide some cushion for rate stabilization if the stock market takes a dive and the pension contribution does not need to be increased as much.

As for employee contribution, the vast majority of public pension plans set the employee contribution at a fixed rate, thus shielding them from the volatility in the financial market as well as the increase in normal cost due to other changes. One way to reduce the risk to the employer is to have employees pay a higher rate. Instead of fixed, this rate can be variable. Employees should pay for at least half of

the normal cost rate, and then a certain percentage of the amortization cost, anywhere from 30 to 50 %. In Arizona's state pension plan, which covers most local government employees in the state, the pension contribution rate is evenly split between the employer and employee, and any increase in pension contribution rate is also split in half between the two sides. In this way, employees will bear some of the investment risk and it will reduce the financial burden on government employers. Splitting the cost between employer and employees in essence means they are sharing the risk in pension funding due to investment and other factors. In other words, we can introduce some level of risk sharing into the DB plan even without switching to a hybrid pension plan.

5.5.3 Changes to Investment Practices

There are several changes related to investment that can reduce volatility in pension contributions in the long run. They are: (1) the assumed rate of return; (2) the smoothing period; and (3) asset allocation.

5.5.3.1 Assumed Rate of Return

It is clear by now that the assumed rate of return plays a critical role in pension funding, as it determines the PV of pension liability, pension contribution rate, and funded ratio. The higher the assumed rate, the more volatile the pension contribution rate will be. This is because a higher assumed rate means a small PV of pension liability and thus lower initial normal cost rate. However, a higher rate increases the chance the actual return will fall short, thus leading to unfunded liability and a higher contribution rate. A lower assumed rate will mean a more stable contribution rate, everything else being equal. Since the financial crisis of 2008, more public pension plans are reducing their expectation of future investment returns, with an increasing number of plans using 7.75 and 7.5 % as their expected return. While this may mean higher pension contribution rates in the meantime, it will ensure more sustainability and stability for government budgets in the long run.

5.5.3.2 Smoothing Period

A longer period to smooth out the ups and downs in the investment can also lead to a more stable pension contribution rate. A longer smoothing period means that the volatility in the stock market will be factored into the value of assets more slowly, thus dampening the volatility in unfunded liability and amortization cost. It is now common to find the smoothing period longer than the typical 4-year period. The longest one is adopted by CalPERS, which uses a 15-year smoothing period. A longer period creates its own problem, as the actuarial value can substantially

deviate from the actual market value of the pension assets. To correct that, a longer period is typically accompanied by a corridor on valuation. For example, CalPERS sets the actuarial value of assets to be no less than 80 % and no more than 120 % of the market value of assets (CalPERS 2012).

5.5.3.3 Asset allocation

A change in asset allocation strategy is to make the investment less susceptible to the volatility in the stock market than in the past. That means less reliance on the traditional equity investment and more reliance on alternative investments, such as private equity, hedge funds, commodities, real estate, and infrastructure. More public pension plans are devoting more of their portfolios to some of these alternative investments. Since this is a relatively recent trend, it still remains to be seen if it can dampen volatility in pension investments in the next financial market downturn.

5.6 Conclusion

As this discussion has demonstrated, funding for public pension benefits is a very complicated issue. The main reason is that it involves projection decades into the future. In addition, it requires many things to come out right to make it work, such as the investment return, employer pension contribution, life expectancy, and final salary, among many other things. Even if investment returns turn out as expected over a very long period of time, they can still exhibit extreme volatility from time to time. Thus, volatility and some level of unpredictability is part of the DNA of financing pension benefits. Even though steps have already been taken to dampen this volatility, such as the asset smoothing method, there is still plenty volatility left to destabilize pension contribution and thus government budget. In this chapter, we have outlined some further methods that can bring more stability, with the recognition that not all volatility can be eliminated. The starting point has to be the affordability of pension benefits themselves. Once affordability is secured, we can further think about ways that will bring more stability to employer contribution and reduce its funding risk, such as the methods outlined in this chapter. In any case, these goals require long-term fiscal discipline on the part of the government.

References

CalPERS CAFR (2005) http://www.calpers.ca.gov/eip-docs/about/pubs/comprehensive-annual-fina-rept-05.pdf. Accessed 27 Dec 2013

CalPERS CAFR (2012) http://www.calpers.ca.gov/eip-docs/about/pubs/cafr-2012.pdf. Accessed 3 Jan 2014

Gabriel Roeder Smith & Company (2012) Arizona public safety personnel retirement system consolidated report June 30, 2012. http://www.psprs.com/admin_investments_and_finance/

2012%20Actuarial%20Reports%20by%20System/GRS%202012%20PSPRS%20Annual%20Valuation.pdf. Accessed 7 Nov 2013

Munnell AH, Haverstick K, Aubry J-P, Golub-Sass A (2008) Why don't some states and localities pay their required pension contributions? http://crr.bc.edu/wp-content/uploads/2008/05/slp_7-508.pdf. Accessed 8 Jan 2014

National Association of State Retirement Administrators (2012) Public fund survey: summary of findings for FY 2011. http://www.publicfundsurvey.org/publicfundsurvey/summaryoffindings.html. Accessed 29 Dec 2013

Nebraska Public Employees Retirement System (2013) Nebraska state employees retirement handbook. https://npers.ne.gov/SelfService/public/howto/handbooks/handbookState.pdf. Accessed 1 Nov 2013

Peng J (2008) State and local pension fund management. CRC, Boca Raton

Peters M (2013) Pension pinch busts city budgets. November 5, 2012, Wall Street Journal

Pew Charitable Trust (2013) A widening gap in cities: shortfalls in funding for pensions and retiree health care. http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Retirement_security/Pew_city_pensions_report.pdf. Accessed 3 Jan 2014

U.S. Census Bureau (2012) Public-employee retirement systems state- and locally-administered pensions summary report: 2010. http://www.census.gov/prod/2012pubs/g10-aret-sl.pdf. Accessed 4 Nov 2013

Wilshire Consulting (2012) 2012 Report on city & county retirement systems: funding levels and asset allocation. http://wikipension.com/images/6/6f/2012_City_%26_County_Funding_Report.pdf. Accessed 5 Nov 2013

Wisconsin Legislative Council (2011) 2010 Comparative study of major public employee retirement systems. http://legis.wisconsin.gov/lc/publications/crs/2010_retirement.pdf. Accessed 10 Nov 2013

Chapter 6
Local Government Revenue Stability and Revenue Policy over Recessions

Yilin Hou and Jason S. Seligman

Abstract In this chapter we consider the impacts of three recessions on local government revenues over the 1985–2009 period. We control for the timing of local government fiscal years and weight recession impacts accordingly. We also introduce a moving average (MA) of this weight as a substitute for traditional lags, interacting constructed weights with: (1) own source revenues and (2) other outside sources to control for feedback effects. After controlling for recessions, we find the introduction of sales taxes to be associated with increases in short-run revenue volatility. We find a smaller attenuating relationship for property taxes—millage rate increases are associated with roughly 5 % lower year-to-year volatility over periods of recession. Increases in revenue from temporary sales tax targeting capital projects are associated with both: (1) damped short-run volatility, and (2) increased long-run volatility by 2–3 % each. We also find suggestive evidence of statistical associations between revenue bond issuance over recessions, increases in lease purchase agreements, and increases in the local unemployment rate with increases in short- and longer-run revenue volatility.

6.1 Introduction

Recently, scholars and practitioners have become more aware of the value of stable tax revenues, due in large part to the havoc wrought on local government finances by the Financial Crisis and Great Recession. Our work in this area began well ahead of those unfortunate episodes and so our perspective on revenue stability is less a reaction to the circumstances of the moment and more a consideration of recessions within a longer research agenda devoted to revenue stability. We value the insights that might be gleaned from recent experiences, but we wish to generalize the

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knowledge. In particular, we take as a starting point that once certain tax policy choices are made by local communities, other choices may be constrained. In this way, we think about local government revenue portfolios holistically. We see each tax instrument conceptually in much the same way an investment manager might see the different investments in their clients' portfolios. Each tax instrument has certain characteristics and prudential management suggests that they should be chosen because of their value within the context of the rest of the portfolio's allocation.

In this chapter, we lay the groundwork for thinking broadly and systemically about local revenues from both a policy design and a policy analysis orientation. We then work with data that encompass the period of our earlier work and carry that forward to incorporate the Financial Crisis and Great Recession (2007–2009). As the title of this chapter suggests, our interest here is primarily focused on revenue stability.

6.2 Background

Here we discuss our approach and considerations broadly, in the context of related literature. We then offer the reader a brief understanding of key tax policies over the geography we study.

6.2.1 Approach, Considerations, and Related Literature

In our previous work, we have considered the impact of marginal substitutions from property to sales taxes on revenue capacity and revenue volatility (Seligman and Hou 2006; Hou and Seligman 2008, 2013). Related articles include Zhao (2005), Zhao and Hou (2008), and Zhao and Jung (2008). While we acknowledge the value of tax instrument diversification for broadening the tax base, we generally find that marginal substitutions expanded both capacity and volatility over the 1985–2006 period—ahead of the Great Recession. Other work linking revenue capacity and volatility can be found in the tax and expenditure limitations (TEL) literature; in one recent example, St. Clair (2012) studies the impacts of Colorado's 1992 TEL laws and finds evidence that those too increase revenue volatility.

State tax revenue volatility is an important topic—especially as most states are committed to balanced budgets. Georgia, the state we focus on, was ranked in the middle of the pack (23rd) in terms of revenue volatility by Kasprak and Rosso (2011); notably, Georgia's state constitution requires a balanced budget. Constitutions notwithstanding, state revenue policies do not operate entirely by fiat. As pointed out in Cornia and Nelson (2010), macroeconomic circumstances are important for revenue prospects at the state level. Related to this, and more concerning, McGranahan and Mattoon (2012) find evidence that state revenues have become

more sensitive to the economy in the years since 2000. They recommend that states might respond with policies that deposit greater upside revenue swings in budget stabilization funds (BSFs). The links between economic volatility, budget stability, and BSF design have been thoroughly examined by Hou (2013), who considers BSF dynamics in great detail, taking time to develop the public choice perspective across national and, more notably, subnational governments. Because of its *public choice* orientation, the work of Hou lays out twin motives for government: first, prudence regarding the size and growth of each governmental unit (budget stabilization) and, second, economic stabilization. In particular, a great deal of analysis and discussion is devoted to the important links between BSFs and balanced budget requirements.

Two other recent research articles driven by interest in tax revenue volatility include Kodrzycki (2014) and Bailey et al. (2014). Both focus on tax policy and experience of the U.S. at the state level. Kodrzycki's work finds that state income tax receipts have increased in volatility since the turn of the century, surpassing consumption tax revenue volatility. She finds that the surge in income tax revenue volatility is driven by capital gains. Our own work with US federal tax data validates Kodrzycki's and further shows capital income to be an increasingly important component of taxable income, from the mid-1980's forward.

These findings and Kodrzycki's related elasticity measures are useful for considering the efficacy of revenue stabilization strategies—including tax reform and BSF redesign exercises. Bailey et al. consider ways to employ upside revenue volatility to increase BSF funding, arguing that the health of BSF should be a function of revenue source volatility and cyclical economic fluctuation. Consistent with some of our earlier portfolio emphasis, these authors are emphasizing consideration of revenue policies and revenue volatility by source. Consistent with Hou (2013), these authors also consider BSF dynamics.

While the figures above employ federal data, and some of the work cited above targets state level volatility, our focus in this chapter is the *county level*, consistent with the level of analysis of this book. We do not target BSF policies explicitly but acknowledge that work on stabilization fund policies has implications for local stabilization mechanisms, as we have previously suggested in prior work (cited above). Here, we emphasize the importance of macroeconomic circumstances at the local level.

Local government finances often rely in part on the pass-through of state revenues, a direct link to state fiscal circumstances. Even when pass-through from state revenues is a relatively small share of total revenues, local revenues are still reliant on macroeconomic circumstances. Ways in which these finance interact include transmission through variations in: local consumption, interest rates for mortgages over business cycles, property tax revenue growth patterns, and external demand for locally produced products and services (which feed through to demand for local labor, capital, and natural resources). When local governments impose income taxes on residents, this creates another link to overall labor market conditions as well.

Over business cycles, the relative yields of different tax instruments change. Property taxes have one set of characteristics, sales taxes another, and so on. Speaking to our long interest in this area, we began working on the first of these

papers in 2004, and we began collaborating on the design of an institution to collect these data a year or so before that (Tax and Expenditure Data—TED—Center). Our previous work employed data over what was generally a broad expansionary period punctuated by two relatively mild recessions. As estimated by the National Bureau of Economic Research (NBER) Business Cycle Dating Committee, the 1990–1991 and 2001 recessions were each estimated to be 8 months in duration, less than half the average length (17.5 months) of the 1854–2009 period and low even by post-war standards (the 1945–2009 average duration is 11.1 months). By comparison, the Great Recession lasted 18 months, the longest of any post-war recession (NBER 2010). Adding this recession to our data helps to enhance our ability to consider impacts on the local sector over a more heterogeneous set of recessions.

Regarding revenue portfolios, we consider tax instruments in this light—with a focus solely on the stability of collections. For example, when considering consumption taxes, we are concerned with their volatility not their equity or other characteristics. Consumption taxes might be more elastic than property taxes, since it is easier to change the place you shop than it is to change the places you live or work. Thus, consumption taxes may be more volatile because when citizens disagree with the way in which the revenue is used, they can opt out of paying simply by buying things a few miles further down the road, in the nearest amenable sales tax jurisdiction. Of course, the condition just offered may be one of several factors, and may be more or less binding, based on personal and social norms. A more narrowly self-interested consumer of public goods might look to *live* in a high service (high expenditure) locality, while *shopping* in one with low sales taxes. Or, in times of personal financial distress, citizens may tend to shop in lower sales tax districts without moving, effectively changing the tax price of their preferred level of public goods. In this way, our interest in the consumption tax has to do with whether local governments expose themselves to greater revenue risks over the course of the business cycle or longer run.

To summarize, while sales taxes may be valued in the context of political freedoms, substituting these taxes for property or income taxes may: (1) functionally reduce tax capacity, and/or (2) impact the pattern of revenues collected over the business cycle. Our interest is with regard to the second issue. The inclusion of the Great Recession, a long and severe recession, should in particular offer an opportunity to consider whether consumption pattern vulnerabilities exist. This is of use for scholars, citizens and their local tax policymakers alike.

We do not take this to mean that sales taxes do not have a place in the revenue portfolio, and we note that states have long used the sales tax as a revenue source. However, we do think that increasing the portfolio weight of this tax instrument should be done with a clear understanding of risk-return tradeoffs. In a previous paper, which focused on the period ahead of the Great Recession (Seligman and Hou 2006a, b), we found strong evidence that sales tax substitution *could be* revenue-enhancing along with weak but suggestive evidence that substitution need not be considered irreversible—property taxes might increase in response to decreases in consumption tax rates. In our previous paper, we anticipated that periods in which property values did not increase could negatively affect revenues based

on particular tax substitution designs, meant to be revenue neutral over 2-year periods. Because the most recent financial crisis was triggered by a drastic decline in property values and because the Great Recession that followed the Financial Crisis challenged the finances of all levels of government, we believe that these periods offer an opportunity to enhance our understanding of how components of revenue portfolios interact.

The Great Recession is notable both for the breadth and depth of chaos it wrought on local fiscal conditions. What is more, ill effects persisted much longer in many more places than experts would have by and large predicted in the days before the Financial Crisis first emerged. Work on this chapter was begun in 2013; at that time, across the world, many governments were experiencing adversity while accommodating a weakened private sector. Deficit spending and accommodative monetary policies were far from the exception. It would be difficult to argue that a meaningful share of the world's governments were spared the ill impacts of the period, whether directly or indirectly, as impacted populations reduced spending and lending in line with their loss of command of resources.

This noted, in our previous papers we argued that NBER recession indicators were not especially meaningful for use in local analysis because relatively mild national level recessions can fail to overwhelm positive local economic factors such as industry-specific productivity booms, resource discoveries, or other positive shocks. In previous work, based on this argument, we employed more local measures of the economy: the local unemployment rate, local income measures, and changes to both, exclusively, as economic controls.

Because the Great Recession was broad, deep, and persistent our previous argument has less merit. That noted, what we seek in our work is not to color the Great Recession as simply "special." What we seek are generic methods that capture the benefits and costs of different revenue portfolios across time, including times of broad, deep and persistent hardship. Accordingly, when we discuss methods in this chapter, we will describe some current innovations we have incorporated to measure the occurrence and importance of recessions. More broadly, we are interested in describing the demand for generic methods and laying out a foundation for research for the foreseeable future.

6.2.2 Local Tax and Budget Considerations: Key Issues Across Our Research Geography

Analysis at the local level requires controlling for state level tax policy changes. One way to do this is to simply limit the geography one studies to a single state's borders—this is not only simple, it is in fact "pure," in the sense that there can be no questioning whether state-level policy changes are adequately documented and treated methodologically. One challenge to this "pure" approach, however, regards the adequacy of local level variation in policy within a single state for identifying relationships in policy and outcomes econometrically. Across the U.S., the number

of counties varies quite a bit from state to state. Georgia is an outlier with 159 counties. This is a remarkably rich state in terms of local variation, and a fine example for this study. Further, over the period we study, Georgia's local tax policies afford a rich laboratory within which to measure marginal changes in tax policy and impacts on revenue volatility as we briefly explain below.

As more fully described in Seligman and Hou (2006) and Zhao and Jung (2008), since 1975, Georgia's local governments have had the option of directly substituting a sales tax for a portion of property tax receipts estimated to be revenue equivalents. State regulation of local use has changed over time. In particular, the "Local Option Sales Tax" (LOST) has expanded several times since its introduction. In the 1990s, an additional program, the Special Purpose Local Option Sales Tax (SPLOST), was added to help local communities with capital-intensive expenditures.

Generally, the State of Georgia allows local governments to increase local sales taxes by up to three percentage points over the State's base sales tax rate through combinations of several LOST and SPLOST type programs. Unlike LOST-type programs, SPLOST-type program use does not directly reduce property taxes; rather, it is a temporary surcharge that requires voter approval. However, while the tradeoff is not direct without the SPOLST program, a counter factual is that property taxes would be higher than otherwise, either: (1) immediately to pay for the projects or, (2) over time as capital improvement bonds are repaid. In keeping with the spirit of finite capital projects, SPLOST revenues cannot be spent on projects other than what they are proposed for and can only be authorized for a limited time period, five or fewer years.

To summarize, the State of Georgia encompasses 159 counties which all have the ability to adjust their revenue reliance between sales taxes and property taxes over shorter and longer time frames. Additionally, each of these counties sets the timing of their fiscal year individually. As described in the next section, we will employ this fact to instrument the correlation between national and local economic cycles.[1]

6.3 Data and Methods

Data for this work comes from several sources. The primary source is the Tax and Expenditure Data (TED) Center at the Carl Vinson Institute of Government, housed within the University of Georgia. This Center contains data from several state agencies and augments them with researcher contributions. Most included variables from the TED Center data originate with the Georgia Department of Community Affairs (DCA), from its *Survey of Local Finance*. These data constitute an original source for the State's contribution to the U.S. Census of Governments and are thus a definitive source for population and local government finance data. Per capita

[1] The general language in the literature is "instrument," as with an IV (instrumental variables) approach. The instrument here (fiscal year) is correlated to revenues, but selection of the fiscal year is exogenous to the timing of a recession.

measures are generated using population data collected by DCA on an annual basis; these data are consistent and the most accurate available for all non-decennial census years. DCA, as a partner of the U.S. Census Bureau, takes steps to ensure the validity of the data. Finally, DCA is the source of our information on county fiscal year end. County fiscal calendars vary across the traditional 12-month calendar.

Sales tax rate data regarding the timing of LOST and SPLOST use come from Georgia's Department of Revenue. These data must be reconstructed from a historical guide. Sales tax revenue data are reconstructed from various annual publications of the *Georgia County Guide* (GCG)—a state equivalent to the Statistical Abstract of the United States—which documents local sales tax rates by county. These data include a time series of sales tax rates for all Georgia counties. The U.S. Bureau of Labor Statistics (BLS) provides two price series that we use to normalize nominal financial figure to constant 2010 dollars, the Consumer Price Index (CPI) for the Urban South which we use for measures related to income data, and the state-local government purchase deflator which we use for measures related to revenues, intergovernmental grants, and expenditures. We also obtain annual measures of county unemployment rates from the BLS. To these, we add data from the NBER Business Cycle Dating Committee. The NBER data give us our measure of recessions.

While the Financial Crisis and Great Recession spared precious few, it is still the case that their respective onset and recovery were experienced differently within each community. Measures from our previous work do a good job of capturing these differences because the income and unemployment experiences of these communities are unique. However, arguably, a large recession itself might further explain changes in own-source revenues. For example, if the federal government were to offer relatively equal grants to a set of local governments facing dissimilar challenges, communities might find the grants more or less adequate. If some were spared the ravages of recession to a large degree, these communities might temporarily cut taxes, substituting federal grant revenues. A blunt measure of recessions would have difficulty netting out differences across these communities. A research agenda for considering the impacts of recessions should be as sensitive as possible—ideally, it should be able to capture unintended consequences of the sort just described. A generic research design should accommodate certain institutional factors, which might otherwise confound impacts. To this end, we develop a set of recession weights and three ways in which we apply them: (1) directly, (2) as a two-period moving average of the weight (representing a partial lag), and (3) as interaction terms.

6.3.1 Weighting Functions

Consider again the idea that even in a relatively broad and deep recession, each community's experience is unique. One *fiscal* way in which local governments differ is with respect to fiscal year end. A recession that begins in December 2007 and lasts 18 or so months before officially ending in June 2009 will have different

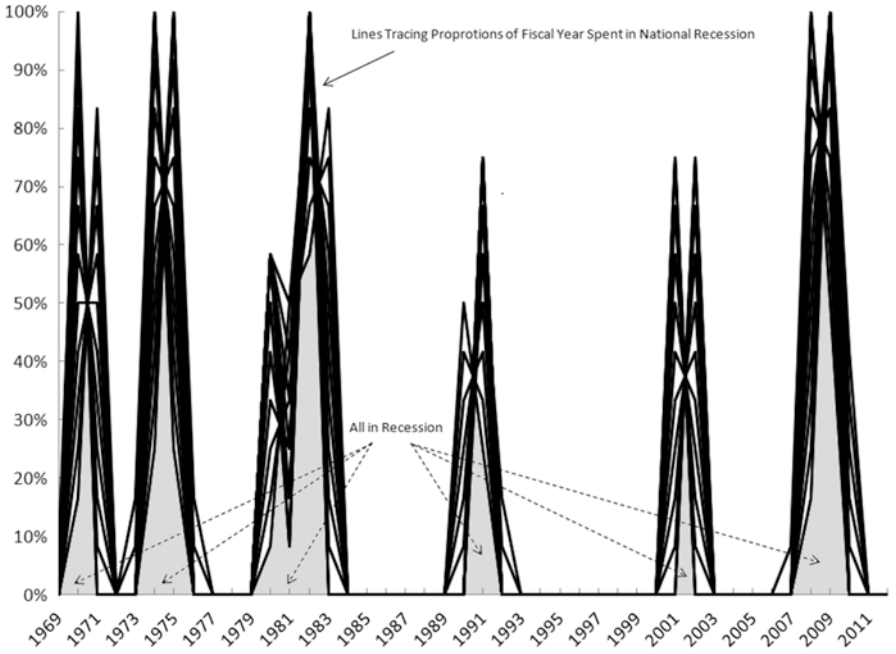

Fig. 6.1 Annual recession overlap by fiscal year starting month

measured impacts depending on whether a community's fiscal year begins in July, October, or elsewhere. A simple binary dummy recession measure based on annual records would rather bluntly measure the average impact of recession in the community. Doing a better job requires correcting for each locality's fiscal year. A less discrete set of weights can be employed to measure the percent of a fiscal year that experiences recession. Monthly weighting allows for 12 distinct gradations of a recession's impact over any one fiscal year.

$$\omega_{\text{recession}}^{\text{FY}n} = \left\{ \frac{\omega_n^{\text{FY}}}{\Omega_{\text{NBER}}^{\text{recession}}} \right\} \tag{6.1}$$

A weighting function, Omega, can be represented as in (6.1). For each local government, n, the local weight, $\omega_{\text{recession}}{}^{\text{FY}n}$, is driven by the proportion of fiscal year (FY) that is within the time spent in a national recession: $\Omega_{\text{NBER}}{}^{\text{recession}}$. Generally, we find that $\omega_{\text{recession}}{}^{\text{FY}n}$ varies quite a bit within a recession, based on when the fiscal year begins. As well of interest, we find that recessions have different characteristics with regard to how varied experience is across local governments—what matters here is when a recession begins and how long it persists. A look at the impact of this variation can help the reader to appreciate this variation within and across recessions.

Figure 6.1 employs the NBER data over the 1969–2012 period. While this time period is longer than the one we look at given limitations of the TED Center data,

the longer timeframe is helpful for seeing variation in experiences. The vertical axis describes the percentage of the year in which a government experiences an overlap with the NBER recession. Because NBER recessions can begin in different months, overlap can vary from cycle to cycle—even if the length of a recession were fixed. Some things to note are:

1. A "relatively mild recession" (such as those from the early 1990s and the early 2000s) can be distinguished here insomuch as no choice of FY would yield a full year's exposure to recession. Further, the amount of time in which all fiscal years are simultaneously in recession is relatively short.
2. Incidentally, the debate as to whether the so-called "twin recession(s)" of the 1980s was either one recession or two is interesting to reconsider given the observation that no local government's fiscal calendar granted them a year that was 100 % free of recessionary impacts over the 1981–1983 period. Yet we observe two distinct spikes within the shaded area.

Above all what Fig. 6.1 makes clear is that differences in fiscal year ends have meaningful impacts on differences in the timing of exposure to recessions. Failing to accommodate these differences may frustrate efforts to estimate recessionary impacts on tax capacity in a panel of local governments with different fiscal years. The way we construct these weights is with the DCA data. These data document the months in which each county's fiscal year ends. From these, we build a set of monthly measures of recessions from 1985 onward and synchronize them to the local government's fiscal calendar.[2] We employ this measure in addition to the local unemployment measures we traditionally have employed.

6.3.2 Lagging of Weights

Lags are often employed in panel settings measuring economic phenomena because the impacts of shocks can both take a while to manifest and to dissipate. To this point and specific to the Great Recession, in a series of reports Dadayan and Boyd (2009a, b, c, d, 2010) document record drops, persistent declines, and slow rebounds across the states in the year following the recessions end. What is more, in these reports they report not only on trend, but on variation in experiences across governments. In light of this work, a natural consideration then is to lag the constructed weight, $\omega_{\text{recession}}{}^{\text{FY}n}$ as just described. The straightforward approach would simply lag the full previous weight. However, a full lag simply extends or "echoes" the recessionary impact based on FY. Employing a simple lag would offer a model wherein

[2] For example if a local government has a fiscal year that ends in October and NBER documented a hypothetical recession starting in August, carrying through the rest of the locality's fiscal year, we estimate that the national recession overlaid {August–October} 3 of the 12 months of that particular fiscal year—a value of 0.25.

a dependent variable was a function of $\left\{\mathrm{FY}_t, \mathrm{FY}_{t-1}\right\}$.[3] An alternative approach would be to smooth the lag term by constructing a moving average across the current and previous fiscal year. The fuller general expression of a set of variable to measure $\omega_{t,t-1}^{\mathrm{FY}n}$ would be:

$$\omega_{t,t-1}^{\mathrm{FY}_n} = f\left(\omega_t^{\mathrm{FY}n}, \frac{1}{2}\sum_{t-1}^{t}\omega_t^{\mathrm{FY}n}\right) \tag{6.2}$$

(Of course any relative weighting on the smoothing of a lag is possible, but the average affords a naive balance between over- and under-weighting.) To aid in understanding how the series $\omega_{t,t-1}^{\mathrm{FY}n}$ evolves, the next figure illustrates what such smoothing would mean for our fiscal-year-dependent recession weights:

The above figure employs a single fiscal year end (December), for clarity of exposition. Both the weight (darker bar) and the smoothed lagged value of the weight (lighter bar with dashed outline) can be present in any year. The smoothed lag can be greater than or less than the contemporaneous weighted value. It can also be greater than the measure offered by a traditional lag.

While a simple (traditional) lagged value of the recession weight would yield an echo, there is a sense in which the smoothed measure captures the idea of onset—because in an initial onset year the smoothed lagged value often yields a greater value than the strictly lagged value would. Further, it has the potential to better represent a recovery inasmuch as the smoothed measure yields a value that is smaller than what a straight lag would yield.

All of this now considered, there is no particular insight that theory can offer regarding the smoothed measure. Whether a lagged weight is valuable, and then whether or not the smoothed lagged weight is valuable, are things that empirical analyses help us to determine.

6.3.3 Interaction Terms

Interaction terms can be useful whenever two or more factors work together to amplify or mitigate each other's impact. Wooldridge (2009) offers an explanation of interaction terms. Binary recession interaction terms have been employed in many other places in the literature. This can be useful when relationships are state-specific, as in whether the economy is in a state of recession. Beyond binary interactions are continuous interactions. Continuous interactions can be useful for ramping up or down the state-specific amplifying (or mitigating) factors. Within the public finance literature, Hrung and Seligman (2015) estimate the efficacy of several different supply channels of U.S. Treasury debt for enhancing liquidity in money markets, employing interactions between each Treasury supply channel and a measure of

[3] Specifically, each local government, n, would have as independent variables: $\left\{\omega_{\text{recession}}^{\mathrm{FY}n}, \omega_{\text{recession}}^{\mathrm{FY}n-1}\right\}$

liquidity stress (the spread in US Treasury General Collateral and Mortgage Backed Security repo rates). The work includes both the Treasury supplies and the interaction of supplies multiplied by the Repo spread. When the spread is low, the relative magnitude of Treasury supply is high compared to the interaction term (a normal period); when the spread widens, the interaction amplifies supplies through these channels. The interaction measures in that work help the authors find that traditional FED and Treasury channels are superior to newer Fed innovations in normal periods, whereas the Federal Reserve's recent methods for intervention are effective in times of severe spreads.

While Hrung and Seligman's interaction spread is relatively unbounded, the percent of a fiscal year that overlaps a recession cannot go higher than 100 %. A special hybrid case for interaction designs, between binary and continuous, is for more continuous interaction factors that move across the (0,1) space. Our work here treats own-source tax instruments, or the broader panoply of revenue sources, in both stand-alone and interacted recession-weighted (0,1) periods. When we work with just the own-source instruments, tax policy interactions with recession are being considered more narrowly. When employed across the broader array of revenue tools, we are considering accommodation and feedback across responses more broadly. Asking whether different tax instruments do a better job of contributing to own source revenues in recessions is useful for deconstructing volatility.

Beyond taxes, another consideration comes regarding the interaction of tax policy with bond issuance, state, and federal grants to localities. Several authors such as Feyrer and Sacerdote (2011), Seligman (2012), Chodorow-Reich et al. (2012), and Calabrese and Ely (2013) note that local governments increased their borrowing or relied on federal grant funds under the American Recovery and Reinvestment Act (ARRA) to fund activities that would have been more likely to be (fully or partially) supported by tax revenue in better years. To the extent that such substitution is: (1) unique to recessions and (2) is correlated with variation in total own-source revenues, it is important to control for. Thus, in light of earlier discussion in this piece and elsewhere, we find the argument that the interactions should be expanded beyond tax instruments to include the battery of debt and grant revenues as well to be interesting to test, and that our data can accommodate. As in our earlier work, our fundamental research question is:

I. Given their current revenue portfolio, will local governments that are adopting marginal tax policy changes enhance or reduce the stability of their revenue streams?

Since here our interest is in the impact of recessions the inquiry changes to be:

II. Given revenue portfolios, will local governments adopting marginal tax policy changes tend to enhance or reduce their revenue stability, after controlling for recessionary impacts?
III. Given revenue portfolios, will local governments adopting marginal tax policy changes tend to enhance or reduce their revenue stability, *during* recessionary periods? (This is measured by the coefficients on our weighted interaction terms.)

To answer this query, we begin, as we have done in previous work, emphasizing sales tax increases. We construct measures from a standard technique of calculating the long-run income elasticity of taxes (Fox and Campbell 1984; Friedlaender et al. 1973; Groves and Kahn 1952; Legler and Shapiro 1968). Traditionally, elasticities are measures of how percent-changes in prices impact percent-changes in quantities; the income elasticity of taxes refers to the percent change in tax revenues generated by an incremental percentage change in income. Since econometrically, log–log models estimate elasticities—percent changes in the dependent variable driven by incremental percent changes in the independent variable(s), the basic model is:

$$\ln\left(\tau_{it}\right) = \alpha + \beta_1 \ln\left(y_{it}\right) + \varepsilon_{it} \tag{6.3}$$

The log form of tax revenue, τ_{it}, is regressed against the log form of income, y_{it}, and $\hat{\beta}$ estimates long-run elasticity—a direct estimate of tax revenue increases from each percentage increase of income. Depending on the construction of tax data, estimates for particular taxes may be conducted separately or in aggregate (τ_{it}). In this study tax measures are constructed as total own-source revenue, comprised of: property taxes, local option sales tax receipts (both general LOST and SPLOST), excise taxes, license and permit fees, service charges, and "other" revenues, all in per-capita dollars. Sobel and Holcombe (1996) seminally distinguish long-run volatility from short-run cyclical variability, the former being a measure of the long-term variation and the latter the short-term or cyclical variability. They take the conventional measurement (6.3), for the long-run volatility and derive the model for short-run variability as a function of first differences:

$$\left[\ln\left(\tau_{it}\right) - \ln\left(\tau_{it-1}\right)\right] = \alpha + \beta_2\left[\ln\left(y_{it}\right) - \ln\left(y_{it-1}\right)\right] + \varepsilon_{it} \tag{6.4}$$

These two equations form our approach for modeling long-run elasticity and short-run variation; we employ them in a first stage estimating long and short-run elasticity of total own source revenues with respect to income. Because we are interested in studying what factors are related to changes in the volatility of the own source tax basket, the elasticities themselves help us build the dependent variable in our second stage regression—the vector of errors in prediction $\left[y - \hat{y}\right]$, the vector ε_{it}, from (6.3) and (6.4). Absolute deviations from predicted values—that is:

$$\left|\varepsilon_{it}\right| = \begin{Bmatrix} \varepsilon_{it}, & \forall \varepsilon_{it} > 0 \\ -(1)^{*}\varepsilon_{it}, & \forall \varepsilon_{it} < 0 \end{Bmatrix}$$

are constructed as dependents to estimate the effects of tax policy changes. Specifically, we obtain the elasticity estimate, $\hat{\beta}_1$ from (6.3) and multiply that by income, to obtain expected tax revenue, $\hat{\tau}_{1it}$. Then we derive the absolute

difference between the actual and the expected tax revenues $\tau_{it}^{'} = \left|\tau_{it} - \hat{\tau}_{it}\right|$. This error-in-prediction is our dependent variable for the long-run volatility of own source revenues:

$$\ln\left(\tau_{1it}^{'}\right) = \alpha + \beta_3 \ln\left(\tau_{it}\right) + \gamma \ln\left(X_{it}\right) + \varepsilon_{it} \tag{6.5}$$

Here, γ measures the relationship between revenue volatility and other independent variables, X_{it}. Following a similar procedure from (6.4) using $\hat{\beta}_2$, we construct a dependent variable for the short-run cyclical variability of tax revenue, τ'_{2it}. The procedure is:

$$\left[\ln\left(2_{2it}^{'}\right) - \ln\left(\tau_{2it-1}^{'}\right)\right] = \alpha + \beta_4\left[\ln\left(\tau_{kit}\right) - \ln\left(\tau_{kit-1}\right)\right] + \gamma\left(X_{it} - X_{it-1}\right) + \varepsilon_{it} \tag{6.6}$$

It is a two-step process. In (6.5) and (6.6), the constructed measures, τ_{kit}, are our variable of interest, with subscript k referencing the tax instruments of interest. Elements of X are made up of contemporaneous factors we wish to control for. They may include log transforms and/or other scaling transforms.

One factor in particular is of interest—the impact of a recession. We are interested in particular in how each of the tax instruments might contribute to revenue volatility in recession. For this reason, we construct several recession-related variables. Our dependent and independent variable characteristics are documented in Table 6.1.

Our regression sample is comprised of 3,319 observations. The dependent variables seen at the top are constructed from formulae (6.5) and (6.6). Within the independent variables, we document univariate dynamics of each variable and, where appropriate, of the variables interacted with the county-fiscal year-recession data.

We should point out that generally, the ratio of the [standard deviation: mean] is much higher in the interacted data. The county-fiscal year-recession weights themselves, as well as the lag, and smoothed two-period moving average are all described under Table 6.1's "controls" heading. They are constructed from our weights, described in formulae (6.1) and (6.2). In specifications where we employ either: (1) lags or (2) the smoothed lag term (recall that formula (6.2) employs a two-period moving average), the number of observations is reduced to 3,166. Characteristics of the smoothed lag are a slightly higher mean weight (the highest of all three weight series) and much lower standard deviation (the lowest of all three series).

To address research question (II), we first construct a bank of time- and county-specific recession indicators. From these, we next construct the set of recession-weighted fiscal year data described earlier. To address research question (III), these weights are interacted with tax instrument data to allow us to measure variation in revenues as a function of recession. We continue next with a discussion of results from our analysis.

Table 6.1 Summary statistics

	N	Mean	SD	Min	Max
Dependent variables					
Errors in prediction of own source revenues—long-run	3,319	0.1137	0.1023	0.0000	1.3789
Errors in prediction of own source revenues—short-run	3,319	0.0934	0.1182	0.0000	1.8516
Independent variables					
Local option sales tax (LOST): (*binary*)	3,319	0.9027	0.2964	0.0000	1.0000
Interacted with: county FY-recession-weight	3,319	0.0629	0.1759	0.0000	0.7500
LOST—revenues: ($ per capita)	3,319	2.4629	2.8809	0.0000	38.5602
Interacted with: county FY-recession-weight	3,319	2.2901	2.7940	0.0000	38.5602
Special purpose LOST (SPLOST): (*binary*)	3,319	0.6909	0.4622	0.0000	1.0000
Interacted with: county FY-recession-weight	3,319	0.0501	0.1588	0.0000	0.7500
SPLOST—revenues: ($ *per capita*)	3,319	2.6594	3.8857	0.0000	45.3497
Interacted with: county FY-recession-weight	3,319	0.1765	0.7527	0.0000	9.6737
Property tax millage rate: (*mills*)	3,319	23.5949	7.0329	5.6000	50.4800
Interacted with: county FY-recession-weight	3,319	1.7143	4.6535	0.0000	36.6900
Property tax revenues: ($ *per capita*)	3,319	$228	$109	$0	$1,089
Interacted with: county FY-recession-weight	3,319	$16	$46	$0	$497
GO bond: ($ per capita)	3,319	$6	$48	$0	$979
Interacted with: county FY-recession-weight	3,319	$1	$11	$0	$304
Revenue bond: ($ *per capita*)	3,319	$6	$39	$0	$709
Interacted with: county FY-recession-weight	3,319	$0	$6	$0	$205
Lease-purchase agreements: ($ *per capita*)	3,319	$7	$36	$0	$788
Interacted with: county FY-recession-weight	3,319	$1	$12	$0	$591
Inter-governmental revenue grants					
Local grants from state government	3,319	$37	$40	$0	$920
Interacted with: county FY-recession-weight	3,319	$3	$10	$0	$182
Local grants from federal government	3,319	$7	$22	$0	$598
Interacted with: county FY-recession-weight	3,319	$0	$3	$0	$133
Controls					
Percent of county fiscal year in recession (*weight*)	3,319	0.0690	0.1832	0.0000	0.7500
Lagged 1 year	*3,166*	*0.0719*	*0.1865*	*0.0000*	*0.7500*
Smoothed lag term: $(1/2 \times (t) + 1/2 \times (t-1))$	*3,166*	*0.0721*	*0.1355*	*0.0000*	*0.3750*
Population (*1,000's*)	3,319	45.46	98.79	1.79	960.01
Median income ($*1,000 nominal*)	3,319	15.222	7.125	4.22	55.30
Unemployment rate (*percent*)	3,319	5.988	2.167	1.40	19.50

6.4 Results and Discussion

Results are broken down into sets of tables that accommodate our recession measures incrementally. Tables 6.2, 6.3, 6.4, 6.5, and 6.6 offer results from our panel regressions. Table 6.2 begins with results that do not account for recessions explicitly, except by way of changes in the county-level unemployment rate. Table 6.3 adds our first new measure, the proportion of each county fiscal year spent in recession (the pattern of these weights was illustrated earlier in Fig. 6.1). Table 6.4 adds the second new measure, the 2-year moving average of this weight, in the spirit of a quasi lag (recall that Fig. 6.2 illustrated how this variable evolves). Table 6.5 adds interaction terms for own source revenues—the sales and property taxes that local governments have policy jurisdiction over. Finally, Table 6.6 includes interaction terms for all potential local government revenue sources, including debt issuance, sale-leaseback arrangements and, any intergovernmental grants.

Each table contains a set of two regressions focused on the long-run elasticity measure (6.5) and two focused on the short-run (6.6). The first set of regression measures in either column focuses on tax policy implementation, such as whether the county employs various sales taxes, and their policy choice of millage rate. The second set focuses on revenues. In previous work, we have found it easiest to describe results by framing coefficients relative to the constant in the long-run elasticity regressions in column 1. When surveying audiences we present our work to, this has been the case as well. They are easiest to interpret and map better to the way in which we describe them. In this chapter, we present our tabular results in this manner. Thus, the first column of each specification has a box around the ratio for the long-run constant's coefficient $\left(\frac{x}{x}=1\right)$, since we normalize all other results to this measure. Because measures of standard errors do not make sense out of context, and *t*-scores or *p*-values are not very interesting outside of critical values, we simply offer asterisks {***, **, *} at the {99, 95, 90} percent confidence intervals, respectively.

We are interested in the impact of recessions. Traditionally, a local measure of economic health that others and we have employed is the unemployment rate. In Table 6.2, we run a specification of this type. This specification is analogous to ones we had run in the past over more limited timeframes. While this design does not explicitly consider recessions using the measures described in (6.1) and (6.2), it does include the local unemployment rate, as reported by BLS. In this basic specification, we find a 1 % increase in LOST-type revenues is statistically correlated with a 1.6 percentage point increase in longer-run volatility (column 2). Property tax revenues have a very small but statistically significant damping impact over the long-run (column 2); amplifying the result to better interpret it, each $1,000/per-capita increase in annual collections reduces long-run volatility by 0.1 %. We also find suggestive evidence associating a 1 % increase in the unemployment rate with a 1.3 % increase in long-run volatility, relative to the long-run constant. Neither the introduction of LOST nor SPLOST is statistically correlated with increases in long-run volatility (column 1).

Table 6.2 Results that do not account for recessions explicitly

	Long-run volatility				Short-run volatility			
Variables	β:[L − R (const)]							
Local option sales tax (LOST): (*binary*)	−6.2 %				25.6 %	***		
LOST—revenues			1.6 %	**			1.7 %	*
Special purpose local option sales tax (LOST): (*binary*)	1.8 %				10.2 %	**		
SPLOST—revenues			0.5 %				−2.0 %	
Property tax millage rate: (*mills*)	0.5 %				−0.1 %			
Property tax revenues			−0.1 %	***			−0.1 %	***
GO bond	0.0 %		0.0 %		0.0 %		0.0 %	
Revenue bond	0.0 %		0.0 %		0.0 %		0.0 %	
Lease-purchase agreements	0.0 %		0.0 %		0.0 %		0.0 %	
Local grants from state government	0.0 %		0.0 %		0.0 %		0.0 %	
Local grants from federal government	0.0 %		0.0 %		0.0 %		0.0 %	
Percent of county fiscal year in recession (*weight*)	–		–		–		–	
Smoothed lag term: $(1/2 \times (t) + 1/2 \times (t-1))$	–		–		–		–	
Population	−0.1 %		−0.1 %	*	0.0 %		−0.1 %	
Median income	0.2 %		0.7 %		−0.5 %		−0.4 %	
Unemployment rate	1.1 %		1.3 %	*	0.9 %		1.0 %	
Constant	1	***	127.2 %	***	−25.4 %		9.6 %	
Observations	3,363		3,363		3,363		3,363	
R-squared	0.186		0.193		0.163		0.166	

***$p<0.01$, **$p<0.05$, *$p<0.1$

Moving to short-run considerations (columns 3 and 4), initial introduction of a LOST is associated with an increase in volatility about one fourth the size of average long-run volatility (25.6 %), in the first year of introduction. Introduction of SPLOST is associated with an increase of about one tenth of long-run trend (10.2 %). There is statistical evidence that marginal LOST revenues are associated with increases in long-run volatility (1.6 %) and weak statistical evidence of increases in short-run volatility of roughly the same magnitude (1.7 %) in columns 2 and 4. Regarding the last of these (1.7 %), revenue results for LOST with this specification are the only ones of statistical merit, suggesting that once we account for recessions more directly, by way of our measures (1), (2) and associated interactions, LOST revenues neither add or subtract from long- or short-run volatility.

We find statistically strong but low-magnitude impacts for property tax revenues, which yield a negative (attenuating) correlation with long-run and short-run volatility. These results are consistent with previous work with data that end in 2006,

Table 6.3 Results that include fiscal year—recession weights

	Long-run volatility				Short-run volatility			
Variables	β:[$L-R$ (const)]							
Local option sales tax (LOST): (*binary*)	−4.2 %				26.2 %	***		
LOST—revenues			0.0 %				0.5 %	
Special purpose local option sales tax (LOST): (*binary*)	4.3 %				11.3 %	***		
SPLOST—revenues			1.4 %	***			−1.4 %	**
Property tax millage rate: (*mills*)	0.7 %	**			0.0 %			
Property tax revenues			−0.1 %	***			−0.1 %	***
GO bond	0.0 %		0.0 %		0.0 %		0.0 %	
Revenue bond	0.0 %		0.0 %		0.0 %		0.0 %	
Lease-purchase agreements	0.0 %		0.0 %		0.0 %		0.0 %	
Local grants from state government	0.0 %		0.0 %		0.0 %		0.0 %	
Local grants from federal government	0.0 %		0.0 %		0.0 %		0.0 %	
Percent of county fiscal year in recession (*weight*)	−12.1 %		−11.2 %		−3.1 %		−3.0 %	
Smoothed lag term: $(1/2\times(t)+1/2\times(t-1))$								
Population	0.0 %		−0.1 %		0.0 %		−0.1 %	
Median income	−0.3 %		0.4 %		−0.8 %		−0.7 %	
Unemployment rate	0.9 %		1.1 %		1.0 %		1.1 %	
Constant	1	***	138.8 %	***	−26.7 %		16.7 %	
Observations	3,363		3,363		3,363		3,363	
R-squared	0.194		0.204		0.163		0.166	

***$p<0.01$, **$p<0.05$, *$p<0.1$

ahead of the Great Recession, whence we found a negative correlation between property tax revenues and both long and short-run volatility (Hou and Seligman 2013). Further evidence that this result is recession-related is found as we discuss remaining tables: while the result persists in Table 6.3, statistical significance drops below 95 % thereafter in Tables 6.4, 6.5, and 6.6.

While these initial results are interesting, the introduction of our recession measures change relationships in the data markedly. Table 6.3 introduces the $\omega_{\text{recession}}^{\text{FY}n}$ measure of the proportion each county's fiscal year spends in recession (6.1).

Beginning first with long-run measures, property tax millage rate increases are robustly associated with small increases in volatility (0.7 % on average). Revenues from SPLOST are quite robustly associated with increases of twice this magnitude (1.4 %), whereas increases in property tax revenues are estimated to correlate with very small declines in volatility (−0.1 %), in line with the result in Table 6.2.

Table 6.4 Results which include *lagged* fiscal year—recession weights

Variables	Long-run volatility				Short-run volatility			
	β:[$L-R$ (const)]							
Local option sales tax (LOST): (*binary*)	3.2 %				48.9 %	***		
LOST—revenues			−0.3 %				0.8 %	
Special purpose local option sales tax (LOST): (*binary*)	13.4 %	**			21.5 %	***		
SPLOST—revenues			2.2 %	**			−2.5 %	**
Property tax millage rate: (*mills*)	1.0 %	*			0.0 %			
Property tax revenues			0.0 %	***			0.0 %	***
GO bond	0.0 %		0.0 %		0.0 %		0.0 %	
Revenue bond	0.0 %		0.0 %		0.1 %		0.0 %	
Lease-purchase agreements	0.1 %	*	0.1 %		−0.1 %		−0.1 %	
Local grants from state government	0.0 %		0.0 %		0.0 %		0.0 %	
Local grants from federal government	0.0 %		0.0 %		0.0 %		0.0 %	
Percent of county fiscal year in recession (*weight*)	−21.6 %		−21.3 %		2.0 %		1.7 %	
Smoothed lag term: $(1/2\times(t)+1/2\times(t-1))$	0.1 %		4.2 %		−30.4 %		−28.0 %	
Population	0.1 %		0.0 %		0.0 %		−0.2 %	
Median income	−1.1 %		−0.3 %		−1.4 %		−0.9 %	
Unemployment rate	2.3 %		2.5 %	*	1.9 %		2.2 %	
Constant	1	**	149.1 %	***	245.4 %		234.9 %	***
Observations	3,166		3,166		3,166		3,166	
R-squared	0.178		0.183		0.144		0.146	

***$p<0.01$, **$p<0.05$, *$p<0.1$

Moving to short-run volatility, results are again consistent with Table 6.2, the existence of LOST and SPLOST are both robustly correlated with increases in short-run volatility. Relative to estimated long-run volatility (shown as a constant that is normalized to 1), magnitudes are relatively unchanged at 26.2 % and 11.3 % for LOST and SPLOST, respectively. Increases in SPLOST and Property Tax revenues are associated with 1.4 % and 0.1 % decreases in volatility, respectively. Table 6.4 next adds the two-period moving average of our fiscal year/recession weight.

SPLOST introduction is now associated with increases in long-run and short-run volatility, as in Table 6.2. Other short-run sales tax results roughly double previous relative magnitudes. This suggests that over repeated panel observations, introduction of LOST and SPLOST is associated with large positive contributions to volatility. This finding is consistent with Hou and Seligman (2013). The magnitude and direction

Table 6.5 Results which include interaction terms on local own source revenues *only*

	Long-run volatility				Short-run volatility			
Variables	β:[$L-R$ (const)]							
Local option sales tax (LOST): (binary)	2.3 %				43.7 %	***		
Interacted with: county FY-recession-weight	13.8 %				48.6 %			
LOST–revenues			−0.5 %				0.9 %	
Interacted with: county FY-recession-weight			1.5 %				−3.0 %	
Special purpose local option sales tax (LOST): (binary)	10.4 %				22.5 %	***		
Interacted with: county FY-recession-weight	29.4 %				−15.4 %			
SPLOST—revenues			2.2 %	**			−2.4 %	**
Interacted with: county FY-recession-weight			−0.3 %				−1.3 %	
Property tax millage rate: (mills)	0.9 %				0.3 %			
Interacted with: county FY-recession-weight	0.0 %				−4.1 %	**		
Property tax revenues			0.0 %	***			0.0 %	***
Interacted with: county FY-recession-weight			0.0 %				0.0 %	
GO bond	0.0 %		0.0 %		0.0 %		0.0 %	
Interacted with: county FY-recession-weight								
Revenue bond	0.0 %		0.0 %		0.0 %		0.0 %	
Interacted with: county FY-recession-weight								
Lease-purchase agreements	0.1 %	*	0.1 %		−0.1 %		−0.1 %	
Interacted with: county FY-recession-weight								
Local grants from state government	0.0 %		0.0 %		0.0 %		0.0 %	
Interacted with: county FY-recession-weight								
Local grants from federal government	0.0 %		0.0 %		0.0 %		0.0 %	
Interacted with: county FY-recession-weight								
Percent of county fiscal year in recession (weight)	−55.3 %		−14.5 %		68.4 %		34.6 %	
Smoothed lag term: $(1/2\times(t)+1/2\times(t-1))$	5.6 %		3.9 %		−27.2 %		−26.8 %	
Population	0.1 %		0.0 %		0.0 %		−0.2 %	
Median income	−1.1 %		−0.3 %		−1.3 %		−0.9 %	
Unemployment rate	2.2 %		2.4 %	*	1.9 %		2.1 %	
Constant	1	**	143.1 %	***	83.4 %		226.8 %	***
Observations	3,166		3,166		3,166		3,166	
R-squared	0.179		0.184		0.145		0.148	

***$p<0.01$, **$p<0.05$, *$p<0.1$

Table 6.6 Results which include *all* recession weights and interaction terms

	Long-run volatility				Short-run volatility			
Variables	β:[$L-R$ (const)]							
Local option sales tax (LOST): (binary)	1.9 %				42.1 %	***		
Interacted with: county FY-recession-weight	14.4 %				47.8 %			
LOST—revenues			−0.5 %				0.8 %	
Interacted with: county FY-recession-weight			1.6 %				−2.6 %	
Special purpose local option sales tax (LOST): (binary)	10.1 %				22.1 %	***		
Interacted with: county FY-recession-weight	32.0 %				−13.3 %			
SPLOST—revenues			2.2 %	**			−2.4 %	**
Interacted with: county FY-recession-weight			0.1 %				−0.7 %	
Property tax millage rate: (mills)	0.9 %	*			0.3 %			
Interacted with: county FY-recession-weight	0.1 %				−4.2 %	**		
Property tax revenues			0.0 %	***			0.0 %	***
Interacted with: county FY-recession-weight			0.0 %				0.0 %	
GO bond	0.0 %		0.0 %		0.0 %		0.0 %	
Interacted with: county FY-recession-weight	−0.1 %		0.0 %		0.1 %		0.1 %	
Revenue bond	0.0 %		0.0 %		0.0 %		0.0 %	
Interacted with: county FY-recession-weight	0.1 %		0.0 %		0.6 %	*	0.6 %	
Lease-purchase agreements	0.1 %		0.1 %		−0.1 %		−0.1 %	
Interacted with: county FY-recession-weight	0.1 %		0.1 %		0.1 %		0.2 %	
Local grants from state government	0.0 %		0.0 %		0.0 %		0.0 %	
Interacted with: county FY-recession-weight	0.0 %		0.0 %		0.0 %		0.0 %	
Local grants from federal government	0.0 %		0.0 %		0.0 %		0.0 %	
Interacted with: county FY-recession-weight	0.0 %		0.0 %		0.0 %		0.0 %	
Percent of county fiscal year in recession (weight)	−54.7 %		−9.7 %		78.5 %		38.0 %	
Smoothed lag term: $(1/2\times(t)+1/2\times(t-1))$	5.2 %		3.9 %		−28.0 %		−28.2 %	
Population	0.0 %		0.0 %		0.0 %		−0.2 %	
Median income	−1.1 %		−0.3 %		−1.4 %		−1.0 %	
Unemployment rate	2.2 %		2.4 %	*	1.8 %		2.0 %	
Constant	1	**	142.2 %	***	87.9 %		228.3 %	***
Observations	3,363		3,363		3,363		3,363	
R-squared	0.186		0.193		0.186		0.193	

***$p<0.01$, **$p<0.05$, *$p<0.1$

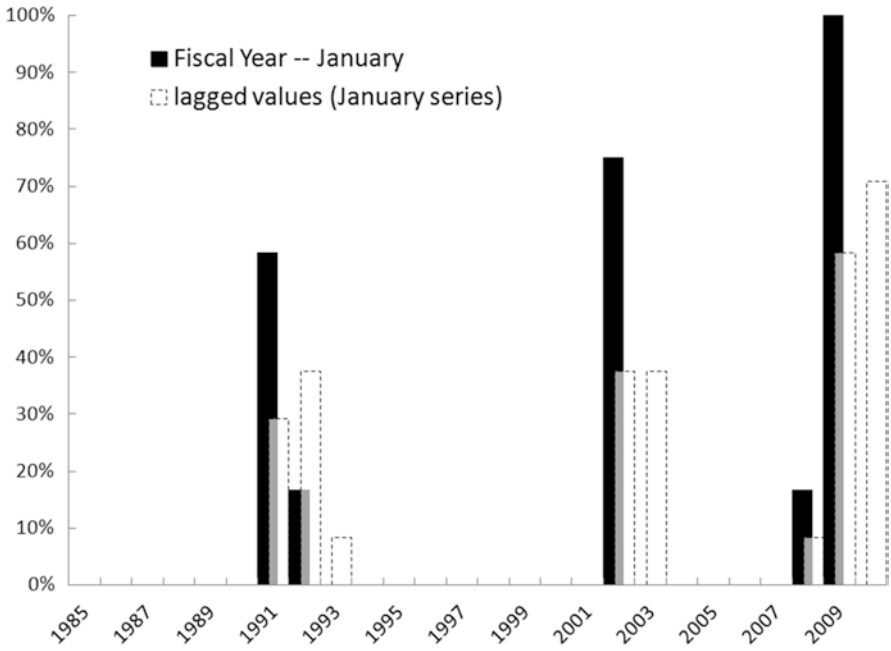

Fig. 6.2 Example of smoothed lags developed via a two-period moving average

of this finding is also consistent with alternate specifications we have run where we substitute a traditional lag term for the two-period moving average term. We interpret the combined result as signaling that citizens may be more inclined to change where they shop than where they live; perhaps especially during recessions, when budgets are tight and price sensitivity is heightened at the household level. Property tax revenues are correlated with volatility in the long run and short run. Otherwise, we find weak evidence that increases in Lease-Purchase activity are associated with small (0.1 %) increases in long-run volatility. We also observe weak statistical evidence linking increases in unemployment with increases in long-run volatility (2.5 %).

Tables 6.5 and 6.6 introduce our interaction measures. Table 6.5 only employs the interaction for own source revenues. Table 6.6 applies the interaction term more broadly.

After controlling for recessions with the help of our fiscal year weights, introductions of LOST and SPLOST are associated with increases in short-run volatility (of 43.7 % and 22.5 %, respectively). This result is again consistent with alternate specifications utilizing a straightforward lag instead of the moving average. Short-run volatility as measured by the constant is now robustly estimated to be roughly 2.3 times the long-run level. Increases in property tax revenues are estimated to have near zero correlation with volatility in either the short or long run, consistent with Table 6.4. Once interactions are included, increases in SPLOST revenues are again robustly associated with increases in long-run volatility (unchanged at 2.2 %).

As with Table 6.4, we again observe weak statistical association of increases in lease-purchase financing (0.1 %) and increases in unemployment (2.4 %) with increases in long-run volatility.

Over the short run, the finding in Table 6.4 regarding LOST and SPLOST's association with higher volatility largely holds (now 43.7 % and 22.5 % increases, respectively), as does the finding that SPLOST revenue is associated with greater short-run stability (−2.4 %). Short-run volatility as measured by the constant is again estimated to be roughly 2.3 times the long-run level. Increases in millage rates are again estimated to have near zero correlation with volatility in either the short or long run. One result here of particular note is with respect to the coefficient on interactions between millage rate increases and revenues stability. A one-mill increase in property tax rates is associated with a 4.1 % reduction in short-run revenue volatility over recessions. This result is essentially stable in Table 6.6, which we present next.

With the full interactions now included increases in SPLOST revenues are again robustly associated with increases in long-run volatility (again unchanged at 2.2 %). The weak statistical association of increases in lease-purchase activity no longer appears, but the result regarding unemployment holds at 2.4 %. Over the short-run, the finding in Table 6.4 regarding LOST and SPLOST's association with higher volatility largely holds (now 42 % and 22 % increases, respectively). As does the finding that SPLOST revenue is associated with greater short-run stability (essentially unchanged at −2.4 %). Short-run volatility as measured by the constant is now robustly estimated to be roughly 2.6 times the long-run level.

Increases in millage rates are estimated to have marginal correlation with long-run volatility and near zero correlation with short-run volatility. A one-mill increase in property tax rates is here associated with a 4.8 % reduction in short-run revenue volatility over the course of a recessionary fiscal year. The fact that results are so stable between Tables 6.5 and 6.6 suggests a lack of strategic behavior on that part of county governments over recessions, perhaps for reasons of choice, lack of consideration, or the lack of opportunity. One interaction term suggests revenue bonds issued in recession are associated with increases in short-run volatility of 0.6 %, but this is only weakly statistically significant. If it is to be taken seriously, one interpretation is that local governments may initiate projects that are revenue bond-dependent as a reaction to higher revenue volatility in recession, as discussed earlier, but the result is at best suggestive. To test the robustness of these findings, we re-ran the full specification omitting the smoothed lag term. All findings hold, though coefficients change a small amount.

6.5 Conclusions

This chapter is a continuation of our work since the early 2000s. As we noted in our 2006 paper, local sales taxes are often structured to reduce local property taxes. Since sales taxes are more elastic than property taxes, substituting away from the latter poses the threat of increased revenue volatility. Our 2008 paper focused on

revenue volatility ahead of the Great Recession, employing a panel dataset of counties in the state of Georgia to examine the effects of LOST on own-source revenue volatility. In that paper we decomposed volatility into the long run and short run, used a mean-variance approach in considering correct revenue portfolios across tax-instruments, and found that substitution towards sales taxes tends to amplify revenue volatility. Our 2008 study fills a niche in the revenue volatility literature; those results implied that sales taxes might have been overweighed in revenue portfolios.

In this chapter, we have extended our data panel to cover the Great Recession. We have added locality-specific recession controls with county-year panel interactions and a second set of interactions that recession-interact revenues and receipts from bonds and intra-governmental transfers. This second set of interactions affords us a look at how much the revenue stream adds to volatility out-of-recession as compared to in-recession.

Our findings suggest that controlling for recessions has a meaningful impact on estimation of sales tax policy's implications for revenue volatility. Tax instruments behave quite differently from each other over the course of a business cycle. Focusing on sales taxes, this last point remains relevant. The LOST and SPLOST instruments behave differently over the course of a cycle. Results for LOST are in line with a sales tax that by design acts as a substitute for property taxes; one that is not designed to be revenue-enhancing as SPLOST taxes are. Once recessions are accounted for, LOST implementation is associated with large relative increases in short-run volatility. The result for interactions is also quite large, but is not statistically valid—this is likely due to a relatively low number of LOST sales tax introductions during recessionary periods. In terms of marginal revenue impacts, after controlling for recessions, LOST results are no longer statistically valid and magnitudes are relatively small.

Regarding SPLOST—implementation is again associated with a large increase in volatility, while marginal revenue collections are strongly correlated with lesser volatility. Estimates of the relationship suggest from mild to moderate reductions in volatility may result from employment of temporary sales taxes devoted to capital projects. The idea to tax and spend on capital improvements in recession is encouraged by balanced budget multiplier effects. Outside of recessions however, introduction of SPLOST is correlated with higher overall revenue volatility. Increases in millage rates are sometimes associated with small increases in long-run volatility. This result is interesting in as much as one might expect larger coefficients for these measures given the severity of the change in housing markets since the Financial Crisis.

In our last sets of estimates, interacting recession controls and revenues allows us to see whether the changes we are observing are driven predominantly by changes in recessionary tax receipts, bond issuance, or intra-governmental transfers. Results with the interactions are quite consistent with those in earlier specifications, but afford the opportunity to better apportion coefficients across the business cycle.

In light of these results, we are a bit surprised to see a lack of strategic behavior across the debt and grant channels, though it is quite possible that states generally faced meaningful constraints regarding bond channels over the Great Recession.

This is more likely than otherwise given the generally tight credit conditions following the financial crisis and the particular challenges following the collapse of the municipal bond insurance market over late 2007 and 2008 (as discussed in Denison 2009, and addressed in Seligman 2012). Government statistics show that the ARRA did not yield very large direct impacts in terms of job growth for the state of Georgia and these impacts do not begin to accrue until sometime in 2009, near the end of the recession (U.S. Government 2013). What is more, inspection of contract, grant, and loan data reveals that a great clustering of ARRA projects accrued to Atlanta, with minimal value for counties any distance from the state capital.

In light of this work, we suggest that local governments take time considering the impact of tax policy choices for volatility over a business cycle. Choices that are associated with decreases in revenue stability during recessions are less desirable, all else equal. When such choices are made, planning for larger BSFs or other protections against shocks to the functioning of local services should be engaged as part of the tax policy process.

References

Bailey S, Brockmyer B, Davis AR, Erford B, Gross L, Huh K, Murphy M, Zahradnik R (2014) Building state rainy day funds: policies to harness revenue volatility, stabilize budgets and strengthen reserves. The Pew Charitable Trusts

Calabrese TD, Ely TL (2013) Pension obligation bonds and government spending. Public Budg Finance 33(4):43–65

Chodorow-Reich G, Feiveson L, Liscow Z, Woolston WG (2012) Does state fiscal relief during recessions increase employment? Evidence from the American Recovery and Reinvestment Act. Am Econ J Econ Policy 4(3):118–145

Cornia GC, Nelson RD (2010) State tax revenue growth and volatility. Reg Econ Dev 6(1):23–58

Dadayan L, Boyd DJ (2009a) State revenue report #77: state tax revenues show record drop, for second consecutive quarter. State Revenue Report. Nelson A Rockefeller Institute of Government, Albany

Dadayan L, Boyd DJ (2009b) Old news is bad news: third quarter brings more decline in tax revenues. State Revenue Report. Nelson A Rockefeller Institute of Government, Albany

Dadayan L, Boyd DJ (2009c) State revenue report #78: recession or no recession, state tax revenues remain negative. State Revenue Report. Nelson A Rockefeller Institute of Government, Albany

Dadayan L, Boyd DJ (2009d) Final quarter of 2009 brought still more declines in state tax revenue. State Revenue Report. Nelson A Rockefeller Institute of Government, Albany

Dadayan L, Boyd DJ (2010) Overall state tax revenue is up, but losers still outnumber gainers. State Revenue Report. Nelson A Rockefeller Institute of Government, Albany

Denison DV (2009) What happens when municipal bond insurance companies lose credit?". Munic Finance J 29(4):37–47

Department of Community Affairs State of Georgia (2012) 2012 local government finance highlights report—appendix E-1. http://www.dca.state.ga.us/development/research/programs/documents/2012HNHighlightsFinal_3-20-13.pdf

Feyrer J, Sacerdote B (2011) Did the stimulus stimulate? Real time estimates of the effects of the American Recovery and Reinvestment Act. NBER working paper series #16759, Cambridge, MA, February 2011

Fox WF, Campbell C (1984) Stability of the state sales tax income elasticity. Natl Tax J 37(2):201–12

Friedlaender AF, Swanson GJ, Due JF (1973) Estimating sales tax revenue changes in response to changes in personal and income tax rates. Natl Tax J 26(1):103–113
U.S. Government (2013) Recipient projects: The American Recovery and Reinvestment Act. www.recovery.gov/arra/
Groves HM, Kahn CH (1952) The stability of state and local tax yields. Am Econ Rev 42(2):87–102
Hou Y (2013) State government budget stabilization: policy, tools, and impacts. Springer, New York
Hou Y, Seligman JS (2008) LOST stability? Consumption taxes and the cyclical variability of state and local revenues. In: Proceedings 100th annual meeting of the National Tax Association, University of Georgia
Hou Y, Seligman JS (2013) Local sales tax and revenue volatility. J Public Finance Public Choice 29(1–3):167–180
Hrung WB, Seligman JS (2015) Responses to the financial crisis, treasury debt, & the impact on short-term money markets. Int J Cent Bank 11(1):151–190
Kasprak N, Rosso R (2011) Monday map: state revenue volatility. Maps, Tax Foundation. http://taxfoundation.org/blog/monday-map-state-revenue-volatility. Accessed 20 June 2011
Kodrzycki YK (2014) Smoothing state revenues over the business cycle: gauging fiscal needs and opportunities. New England Policy Center Working Paper Series No. 14-X. Federal Reserve Bank of Boston
Legler JB, Shapiro P (1968) The responsiveness of state tax revenue to economic growth. Natl Tax J 21(1):46–56
McGranahan L, Mattoon RH (2012) State tax revenues over the business cycle: patterns and policy responses. Essays on issues, The Federal Reserve Bank of Chicago, No. 2999
NBER's Business Cycle Dating Committee (2010) Announcement (of trough in June 2009). US Business Cycle Expansions and Contractions, National Bureau of Economic Research. http://www.nber.org/cycles/sept2010.html. Accessed 20 Sept 2010
NBER's Business Cycle Dating Committee (2013) Business cycle reference dates. Public Information Office, National Bureau of Economic Research. http://www.nber.org/cycles.html
Seligman JS (2012) Options for federal support of state and local finance in an era of persistent deficits. Int Adv Econ Res 18(4):383–395
Seligman JS, Hou Y (2006) LOST revenue? Local fiscal capacity, property taxes and sales tax substitution. In: Proceedings 98th annual meeting of the National Tax Association, University of Georgia
Seligman JS, Hou Y (2006) LOST revenue? Local fiscal capacity, property taxes and sales tax substitution. In: Proceedings 98th annual meeting of the National Tax Association, vol 98, pp 171–180
Sobel RS, Holcombe RG (1996) Measuring the growth and variability of tax bases over the business cycle. Natl Tax J 49(4):535–552
St. Clair T (2012) The effect of tax and expenditure limitations on revenue volatility: evidence from Colorado. Public Budg Finance 32(3):61–78
Tax and Expenditure Data Center (TED Center) Public use tax and expenditure data for the state of Georgia, housed with Carl Vinson Institute of Government, University of Georgia, Athens. Including original data contributions by Jason S. Seligman and Yilin Hou 2003, 2004, 2005, 2006, 2007, 2008, 2009
Wooldridge JM (2009) Introductory econometrics: a modern approach. South-Western Cengage Learning, Mason
Zhao Z (2005) Motivations, obstacles, and resources: the adoption of the general purpose local option sales tax in Georgia counties. Public Finance Rev 33:721–746
Zhao Z, Hou Y (2008) Local option sales taxes and fiscal disparity: the case of Georgia counties. Public Budg Finance 28(1):39–57
Zhao Z, Jung C (2008) Does earmarked revenue provide property tax relief? long-term budgetary effects of Georgia's local option sales tax. Public Budg Finance 28(4):52–70

Chapter 7
Local Government Debt Management and Budget Stabilization

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Abstract Debt can be friend or foe when it comes to budget stabilization. While short-term debt may be used to bridge temporary cash shortfalls that arise from incongruent timing of revenue receipts and expenditure payments, most state and local governments have balanced budget requirements that restrict the use of short-term debt for current (or operating) budget expenditures. Long-term debt may be used to leverage operating resources to enhance infrastructure and long-term projects. Nevertheless, excessive amounts of long-term debt will increase the fixed costs associated with debt payments, which could reduce the stability of non-debt-related expenditures. This chapter focuses predominantly on the interaction of state and local long-term debt and budget expenditures. First, we discuss historical trends in the use of long-term debt by state and local governments. We then examine aggregate fiscal data from local governments by state to demonstrate the correlation of expenditure volatility with outstanding debt balances. We find that in 20 % of the states, expenditure volatility increases as debt increases.

7.1 Background and Fundamentals of Debt Management

Debt management is a vital function in the fiscal administration of state and local governments. Most state and local governments are under strict legal requirements to balance operating budgets, but they may issue debt for capital expenditures. Debt commits future taxes or fees in order to make financial resources available in the present. Debt issued by state and local governments is a limited resource, and city officials are under obligation to manage debt in a way that is fiscally prudent and politically responsible. One objective of this chapter is to examine the

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relationship between debt utilization and volatility in budget expenditures so that public managers are better equipped to understand the interaction of debt levels on the operating budget.

The conventional wisdom of local government finance is that current revenues should finance current expenditures, and that capital expenditures may be financed through appropriate levels of debt. The use of debt financing is justified for capital or infrastructure projects by the "benefits received" principle—that is, capital expenditures for roads and highways, public buildings, and other infrastructure will benefit both current and future taxpayers. Government officials can ensure that future taxpayers bear their "fair share" of the cost of public facilities by using a portion of their taxes to amortize the debt needed to finance capital projects. Bonds may be used to match a project's benefit stream or usable life with the debt service and maturity of the bond issue.

Local governments essentially have two methods to finance capital projects: (1) a "pay-as-you-go" strategy with the use of current revenues or (2) a debt financing strategy with the use of borrowed funds. A pay-as-you-go capital project funding strategy places tremendous strain on the operating budget because expensive capital projects are financed through current budget resources or accumulated savings. Large capital expenditures in the current budget may consume substantial resources, leaving less for noncapital expenditures such as education, health services, and public safety. Governments that save for capital expenditures will protect financial resources for current expenditures, but they may have to postpone capital investments for an inordinate amount of time. Another disadvantage of the "saving" approach is that the historical population bears the financial burden for capital projects that may be consumed by future residents. A debt-financing strategy may lessen the burden on current budget expenditures, but debt also commits future tax revenue to meet debt service obligations.

7.1.1 State and Local Long-Term Debt

Tax-exempt bonds, commonly called municipal bonds, are now widely used to finance education, utilities, public buildings, hospitals, and transportation. Both state and local governments may issue tax-exempt municipal bonds. Of the $334 billion of debt issued by state and local governments in 2013, about 40 % was issued by states, 20 % was issued by cities and counties, and the remaining 40 % was issued by local special districts and authorities.[1] The volume of outstanding state and local debt exceeded $2.9 trillion at the end of the first quarter in 2013.[2]

[1] Source: Thomson Reuters (based on data available on April 8, 2014).

[2] Source: Board of Governors of the Federal Reserve System, Statistical Supplement to the Federal Reserve Bulletin, monthly. Z.1 report Table 104 (accessed online May 2014).

Municipal bonds are issued as general obligation (GO) debt or revenue-backed debt. GO bonds are backed by the full faith and credit of the issuing government, which means that the general tax revenues of the government are obligated to pay the bonds. Revenue-backed, or nonguaranteed, debt is supported by dedicated fees or other earmarked sources of revenue. Bond issues for education, hospitals, and transportation toll projects are often revenue bonds. Investors generally perceive revenue bonds as investments carrying higher risk and thus require higher interest rates from issuing governments. The volume of new issue municipal bonds is shown in Table 7.1. The proportion of revenue bonds has increased relative to GO bonds during recent years. In 2013, GO bonds comprised only 38 % of the total municipal bonds issued; revenue bonds accounted for 62 %. Except for the significant decline in municipal bonds issued in 2011, the level of issuance has trended upward over this period.

Municipal bonds can be used to fund a variety of capital projects. The most common purpose for which municipal bonds are issued is education; this includes primary and secondary education, higher education, and student loans. In 2013, more than 27 % of municipal bonds issued were for educational purposes including new construction, improvements, and repairs. About 24 % of the bonds issued that same year were issued for the broad category of general-purpose projects. Transportation is the next common category (16 %), followed by utilities (10 %) and healthcare (9 %) (Table 7.2).

7.1.2 Literature Review on Budgets and Debt

The academic literature primarily focuses on three aspects of the debt and budget relationship. The first is debt affordability, or how much debt a jurisdiction may issue before driving interest costs too high. Second, what are the factors that motivate a jurisdiction to issue debt? Third, what is the impact of public debt on budget expenditures? These three perspectives will be highlighted in this section; in the next section, debt leverage will be discussed and illustrated examining the relationship between debt and budget volatility.

7.1.2.1 Debt Management and Affordability

The escalating debt of state and local jurisdictions has caused the topic of debt affordability to be a growing concern that has been largely investigated since last century. Most of the studies addressing this question focus on evaluating the ability to timely repay the debts issued by the state, and furthermore, assessing the debt management ability that constrains the debt level within the "debt capacity" (The Advisory Commission on Intergovernmental Relations [ACIR] 1962; Capital Debt Affordability Committee State of Maryland 1996; Denison et al. 2006; Hackbart and Leigland 1990; Larkin and Joseph 1996; Nice 1991; Pogue 1970; Robbins and

Table 7.1 Statistics for municipal bond market 2005–2013

	Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
	Total	$408,283	$388,838	$429,894	$389,632	$409,689	$433,269	$287,718	$379,609	$333,664
Debt by method of sale	Negotiated	$330,393	$313,536	$351,669	$333,088	$348,834	$357,338	$218,526	$293,069	$242,476
	Competitive	$76,081	$69,551	$72,818	$53,391	$57,977	$73,166	$59,568	$74,109	$69,387
	Private placements	$1,808	$5,752	$5,406	$3,153	$2,878	$2,766	$9,625	$12,431	$21,802
Debt by backing	Revenue	$264,263	$273,994	$299,065	$278,783	$254,711	$285,836	$182,328	$243,622	$205,851
	General obligation	$144,020	$114,844	$130,829	$110,849	$154,978	$147,433	$105,391	$135,987	$127,813
Debt by issuers	State governments	$31,788	$28,383	$35,376	$31,479	$61,409	$52,595	$35,784	$39,258	$38,573
	State authorities	$129,449	$127,764	$141,914	$136,877	$120,395	$125,936	$84,949	$114,052	$95,044
	Counties and parishes	$22,528	$23,694	$25,151	$21,390	$71,216	$29,047	$16,452	$23,208	$21,258
	Cities and towns	$56,678	$44,561	$50,676	$50,400	$29,012	$56,420	$40,953	$58,689	$44,921
	Districts	$76,090	$67,467	$71,075	$55,697	$50,146	$63,156	$45,116	$63,548	$56,526
	Local authorities	$76,555	$77,754	$88,981	$79,138	$59,921	$86,584	$53,360	$63,913	$60,473
	Other local	$15,195	$19,217	$16,721	$14,651	$17,590	$19,530	$11,105	$16,942	$16,869

All dollars in millions

Source: Thomson Reuters (based on data available on April 8, 2014)

Table 7.2 Municipal bond utilization by market sector 2005–2013

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	$408,283	$388,838	$429,894	$389,632	$409,689	$433,269	$287,718	$379,609	$333,664
Development	9,410	4,823	8,605	8,696	7,242	10,954	12,040	8,851	10,969
Education	124,323	106,241	107,257	89,942	91,470	100,802	74,470	93,679	90,726
Electric power	14,365	23,036	22,727	21,877	16,126	30,162	11,335	14,596	11,815
Environmental facilities	7,201	6,791	4,915	8,115	7,924	7,785	2,750	2,522	2,644
Health care	38,797	40,347	49,821	61,094	46,152	31,441	26,764	37,333	28,887
Housing	22,112	30,794	30,656	18,007	10,241	9,909	9,143	10,850	14,107
Public facilities	15,228	14,807	13,204	15,222	12,913	11,282	7,246	10,100	8,381
Transportation	45,246	42,362	41,946	47,560	48,775	66,895	32,932	55,363	53,385
Utilities	31,159	33,189	36,013	37,595	40,038	44,619	31,738	45,510	32,973
General purpose	100,442	86,650	114,751	81,724	128,806	119,422	79,301	100,805	79,776

All dollars in millions
Source: Thomson Reuters (based on data available on April 8, 2014)

Dungan 2001; Simonson et al. 2002; Smith 1998). The debt capacity of a state refers to "the level of debt and/or debt service relative to current revenues (or debt ceiling) that an issuing entity could support without creating undue budgetary constraints that might impair the ability of the issuer to repay outstanding bonds or make timely debt service payments" (Denison et al. 2009:271). The debt capacity of a state is determined and constrained by its economy, tax and revenue structure, and its "willingness to incur debt obligations" (Denison et al. 2009:271).

Since debt burden negatively influences credit quality of the debt-issuer (Larkin and Joseph 1996), and interest costs are closely associated with the credit rating, it is critical to effectively assess the debt capacity, although it is difficult to intuitively estimate it. Instead, various studies use proxy measures of a state's fiscal capacity such as economy and wealth variables to evaluate the debt affordability (Denison et al. 2006; Hackbart and Ramsey 1990). In consequence, most states impose debt restrictions on both GO debt and nonguaranteed debt (Kiewiet and Szakaly 1996; Ratchford 1938; Denison et al. 2009).

However, government officials have used special districts to issue nonguaranteed debt to circumvent debt limits (Bunch 1991). Therefore, these geographic overlapping jurisdictions would share overlapping resource bases. This should be taken into account, making the evaluation of debt affordability more complex (Bahl and Duncombe 1993; Hildreth and Miller 2002). Martell's study filled this gap and suggests that the fragmentation of multiple overlapping jurisdictions restricts debt growth, and that metropolitan districts tend to bear greater debt (Martell 2007). Furthermore, because of the debt restrictions, "states may be required to make trade-offs among the competing demands for debt financing similar to the trade-offs they must make for operating program expenditures." (Denison et al. 2006:269) Further, the empirical analysis reveals that in states with umbrella debt limits, there are the trade-offs between highway project-related debt and other debt; while no evidence of such trade-offs has been indicated in other states without such limits (Denison et al. 2009).

7.1.2.2 Determinants

Another important component of the literature mainly investigates the level of state debt and the factors that motivate a jurisdiction to issue debt. Bahl and Duncombe (1993) examined state and local governments' debt level and the determinants of debt issuance during the 1980s. In the 1980s, major changes to the fiscal environment, such as tax and expenditure limitations, declining federal aid, and changes in federal tax policy, affected state and local government fiscal decision makers and nonguaranteed debt grew rapidly until implementation of the Tax Reform Act of 1986. Bahl and Duncombe measured the level by debt burden—total debt outstanding divided by personal income. They suggested that "changes in the level of debt burden in the 1980s can be partially attributable to increases in the demand for capital intensive services, and the preference of a state for a generally larger role for its governments"(Bahl and Duncombe 1993). In addition, Clingermayer and Wood argued that both economic conditions and political factors affect state debt. The

broad factors that may affect subnational government borrowing are fiscal capacity, economic necessity, and political circumstances ("political business cycle"), political conflict within and among political institutions, interest rates, federal tax policy, and intergovernmental aid (mainly federal grants) (Clingermayer and Wood 1995; McCubbins 1991; McCubbins and Kiewiet 1991; Zimmerman 1991). Less understood is the effect that debt levels have on government expenditures.

7.1.2.3 Debt and Budget Expenditures

The impact of public debt on budget expenditures also attracts the attention of a few scholars. Various studies explored this question from different perspectives. Lora and Olivera (2007) argued that over-indebtedness should be avoided because based on data from 50 countries in Latin America during 1985–2003, "higher debt ratios do reduce social expenditures." Fosu's findings are generally consistent with those of Lora and Olivera. Fosu (2010) investigated the relationship between external debt service and public expenditures and found that debt burden reduced public expenditures, especially in the health and education sectors.

Other scholars investigated the problem from different perspectives. Greiner (2007) indicated the trade-offs of public spending categories associated with public debt when the stock of public debt reaches a certain threshold. Herrera (2007) examined the relationship between debt and expenditure volatility and found that "public spending is more volatile in highly indebted less developed economies." Gabriel and Marian (2012) analyzed the impact of public debt on the structure of expenditures in Romania during the period 1995–2010. The empirical results suggest that the increased public debt alters the composition of public expenditures from "productive to unproductive categories."

7.1.3 Debt Leverage Defined and Illustrated

Financial leverage is typically defined as the conditions where small changes in revenues produce changes of greater magnitude in income. Financial leverage is attributed generally to an organization's use of debt to finance assets and operations. Debt imposes a fixed cost that must be paid regardless of the level of revenues. This principle is widely discussed in the corporate setting, where debt is used to maximize the return on equity to owners or stockholders (Brealy and Myers 1996). When a firm does well and generates excess revenues, profits and return on equity also increase as finance costs remain constant. Leverage also cuts the other direction. When revenues are less than expected, then the decrease in profits is even more than expected because again the finance costs remain constant and must be paid even though revenues have decreased.

The concept of financial leverage is less frequently applied to state and local governments because governments do not have owners, nor do they strive to

maximize profit. However, the same principle of financial leverage may be useful in describing the association of debt and budget volatility in a government setting. First, assume that local governments must balance their operating budget. For purpose of the illustration, we assume that a local government will strictly balance its budget by spending all revenues on expenditures and debt service charges when applicable. This relationship is explained by the following formula:

$$\text{Budget revenues} = \text{debt service} + \text{all other budget expenditures} \tag{7.1}$$

We also assume that budget revenues are vulnerable to forecast risk or volatility. Forecast volatility implies there is some likelihood that budget revenues will fall short or exceed the expected value budgeted for the current year. The forecast volatility on debt service is presumed to be zero because debt service is based on contract agreements known at the beginning of the year.[3] The volatility of budget expenditures will be linked to revenue forecast volatility and conditional upon the amount of debt service.

The eighth column of Table 7.3 illustrates that the forecast volatility of revenue and expenditures is equal for a government with no debt service (no debt). Note that a 10 % revenue shortfall is associated with a 10 % change in all other expenditures, while a 5 % increase is associated with a 5 % increase to expenditures, assuming no savings. The standard deviation is a measure of volatility, and in this scenario with no debt, the standard deviations of revenue fluctuations and expenditure fluctuations are equal.[4]

The ninth column of Table 7.3 illustrates that volatility of expenditures is greater than revenue forecast volatility when the government has debt. A local government with 10 % debt service will spend 10 cents of every dollar of revenues on debt service and the remaining 90 cents on budget expenditures. Jurisdictions of different sizes will have different levels of aggregate revenues, expenditures, and debt. Therefore, it is important to make comparisons among jurisdictions using the percent change in revenues and expenditures, comparing debt service as a percentage of total expenditures. A 10 % revenue shortfall results in an 11.11 % decrease in budget expenditures. A 5 % increase results in a 5.56 % increase in budget expenditures. The standard deviation of the projected expenditures is larger than the standard deviation of the budget revenues. This observation holds for the other two scenarios that are presented in the tenth and eleventh columns. However, we observe that the standard deviation of the budget expenditures increases as the debt service requirement increases.

The scenarios presented in Table 7.3 suggest that budget volatility of expenditures (net of debt service) increases as a local government takes additional debt. This rationally leads to the hypothesis that for local governments with debt, volatility in

[3] The forecast volatility of debt service would be zero under the typical condition that interest rates on municipal securities are fixed by contract. Forecasting volatility on variable-rate debt is not zero, but comprises a relatively small portion of the market.

[4] For detailed calculation steps please see the Appendix.

Table 7.3 Illustration of the effects of debt on budget expenditure volatility of local governments

Debt service	Revenue shortfall/ increase (%)	Revenue impact per dollar	Net expenditures impact per dollar by debt service				Percent change in net expenditures by debt service			
			No debt	0.10	0.25	0.50	No debt (%)	0.10 (%)	0.25 (%)	0.50 (%)
Expected revenue	0.00	1.00	1.00	0.90	0.75	0.50	0.00	0.00	0.00 %	0.00
	−10.00	0.90	0.90	0.80	0.65	0.40	−10.00	−11.11	−13.33	−20.00
	−5.00	0.95	0.95	0.85	0.70	0.45	−5.00	−5.56	−6.67	0.00
	5.00	1.05	1.05	0.95	0.80	0.55	5.00	5.56	6.67	10.00
	10.00	1.10	1.10	1.00	0.85	0.60	10.00	11.11	13.33	20.00
Standard deviation	7.91	0.08	0.08	0.08	0.08	0.08	7.91	8.78	10.54	15.81
Average	0.00	1.00	1.00	0.90	0.75	0.50	0.00	0.00	0.00	0.00

Standard deviation and average calculations assume an equal likelihood of each revenue scenario. Debt service is shown as cents per dollar of revenue and is assumed to be constant for the year given the contractual nature of debt. Net expenditures are defined as revenue less debt service under a strict balance budget requirement. Percent change in net expenditures is the change from the expected net expenditures and the net expenditures for a revenue scenario. See Appendix for more details on calculations

budget expenditures will be greater than the volatility of budget revenues. Over repeated years, we would expect the standard deviation of total revenues to be less than the standard deviation of net budget expenditures. The second hypothesis is that the standard deviation of a local government's expenditures will increase proportionately to the amount of debt outstanding held by the local government. A local jurisdiction with more debt would have a higher portion of total expenditures dedicated to debt service, suggesting that the volatility of revenues would be less than the volatility of expenditures net of debt service. The two hypotheses are examined empirically in the next section.

7.2 Empirical Analysis of the Effect of Debt on Budgets

7.2.1 Data and Methods

In this section we examine the relationship between aggregate local revenues and expenditures and debt levels. This data was obtained from the U.S. Census of Governments.[5] The data for local governments is estimated by the U.S. Census on a state-by-state basis utilizing survey responses from a sample of cities within each state. The data is available yearly beginning in 1993 and extending through 2011. The aggregate local government dollar amounts for revenues, expenditures, and debt outstanding are presented in the figure below (Fig. 7.1).

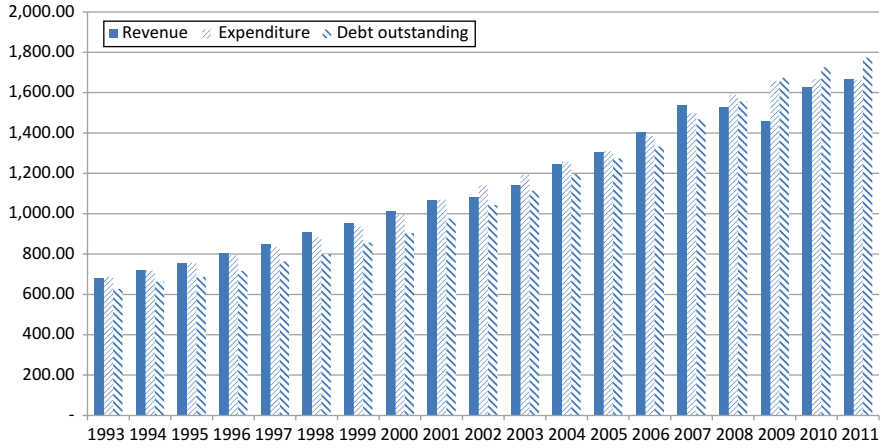

Fig. 7.1 Aggregate local government revenue, expenditure, and debt outstanding (all dollars in billions)

[5] See http://www.census.gov/govs/state/index.html.

Table 7.4 Ratio analysis of aggregate expenditures, revenues, and outstanding debts

Year	Aggregate local revenue	Aggregate local expenditure	Aggregate local debt outstanding	Expenditure ratio[a]	Debt ratio[a]
1993	681.78	688.28	627.97	1.01	0.92
1994	720.84	719.14	663.66	1.00	0.92
1995	757.40	759.37	688.13	1.00	0.91
1996	803.74	794.32	717.32	0.99	0.89
1997	847.77	836.58	764.84	0.99	0.90
1998	909.66	884.76	800.44	0.97	0.88
1999	952.33	938.64	858.77	0.99	0.90
2000	1,013.82	996.27	903.94	0.98	0.89
2001	1,068.15	1,070.08	977.52	1.00	0.92
2002	1,083.07	1,140.40	1,044.58	1.05	0.96
2003	1,140.63	1,194.93	1,114.74	1.05	0.98
2004	1,247.71	1,259.08	1,197.05	1.01	0.96
2005	1,307.41	1,310.75	1,274.17	1.00	0.97
2006	1,407.36	1,386.60	1,333.98	0.99	0.95
2007	1,539.05	1,498.69	1,468.69	0.97	0.95
2008	1,530.59	1,590.33	1,558.03	1.04	1.02
2009	1,458.35	1,659.89	1,674.19	1.14	1.15
2010	1,628.61	1,667.91	1,726.62	1.02	1.06
2011	1,669.42	1,664.49	1,774.94	1.00	1.06
Average	1,145.668	1,161.08	1,114.19	1.01	0.96

All dollars in billions

[a]Expenditure ratio is total aggregate local expenditures over total aggregate local revenues. Debt ratio is total aggregate local debt outstanding over total aggregate local revenues

Ratio analysis is a useful way to identify trends and associations between local revenues and expenditures and public debt outstanding. The ratios are presented in Table 7.4. In the aggregate, local revenue and expenditure are largely equal with the average expenditure to revenue ratio equal to 1.01 for the period. This confirms our assumption that local governments generally are maintaining a balanced budget in the aggregate. There are some fluctuations—the expenditure ratio drops as low as 0.97 in 1998 and 2007 and as high as 1.14 in 2009. A ratio less than one implies governments are spending less than the revenues they brought in that fiscal year. A ratio of greater than one implies governments are spending more than the revenues they generated in a fiscal year by drawing down savings or budget reserve ("rainy day") funds.

The debt ratio provides a quick comparison of outstanding debt to annual revenue collections. Total debt outstanding averages $0.96 per dollar of annual revenue. The debt ratio surpassed 1.00 in fiscal year 2008 and currently hovers above that level. The volatility of revenues, expenditures, and debt are highly correlated with correlation coefficients approximately equal to 0.99. This means changes in local government revenue are mirrored in the changes in expenditures and total debt outstanding.

- Correlation coefficient on revenues and expenditures: 0.989
- Correlation coefficient on revenues and debt outstanding: 0.985
- Correlation coefficient on expenditures and debt outstanding: 0.995

7.2.2 *Local Analysis by State*

We now shift our focus to associations between aggregate local revenues, expenditures, and debt outstanding at the state level. We employ a basic trend regression similar to White (1983) to calculate a quantitative measure of revenue and expenditure fluctuations (White 1983).

$$\text{Revenue Volatility}_{it} = \left(\text{Revenue}_{it} - \widehat{\text{Revenue}_{it}}\right)^2 \tag{7.2}$$

$$\widehat{\text{Re venue}_{it}} = \beta_{0i} + \beta_{1i}\text{TREND}_{it} \tag{7.3}$$

Revenue volatility for state i at period t is given by the squared difference of actual revenues minus predicted revenues for state i at period t. The residual is squared to eliminate the negative values and give more weight to large deviations. The predicted revenues are estimated using the trend regression coefficients and the trend value at period t. For example, suppose a state had actual revenues that were $10 million less than the projected revenues as predicted by the time trend model. The deviation for that state at that year would be $100 million. The variance of the non-debt expenditures is found in a similar method. First, the interest costs are deducted from total expenditures. It would be desirable to subtract debt service rather than just interest costs, but debt service is not available for the time period. The predicted net expenditures are estimated using the appropriate trend regression coefficients and the trend values at period t. If the example state had actual non-debt-related expenditures that were $9 million less than the projected expenditures, then the expenditure deviation for that state at that year would be $81 million.

The variance calculations are easily illustrated in Fig. 7.2 using revenue and expenditure data from Indiana. The solid bars show the actual revenue collections and the striped bars represent the expenditures incurred during the indicated year. The solid line plots the values of the predicted revenues based on the trend regression. The difference between the solid bar and the solid line is squared, representing the revenue volatility measure in a given year. The same process is used to calculate expenditure volatility. The difference between the striped bar and the dashed line is squared, representing expenditure volatility for the year.

The next step in the analysis is to compare the revenue deviations to expenditure deviations for each state over the time period. Our research objective is to compare the magnitude of the expenditure deviations with revenue deviations. Regression analysis is used to examine the association between revenue volatility and expenditure volatility and the impact that outstanding debt has on budget volatility.

$$\text{Expenditure Volatility}_{\text{i}} = \beta_{0i} + \beta_{1i}\text{Revenue Volatility}_{\text{i}} + \beta_{2i}\text{Debt Outstanding}_{\text{i}} + e_i \tag{7.4}$$

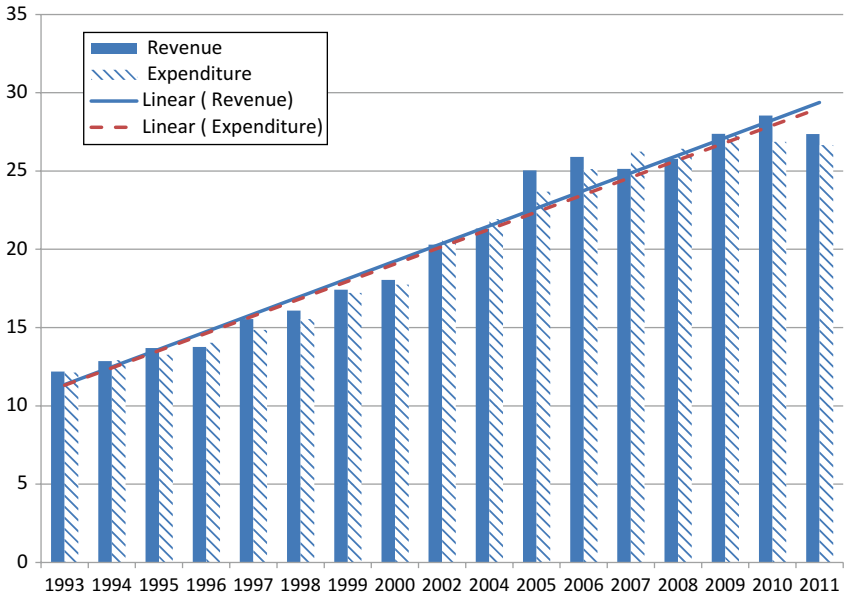

Fig. 7.2 Illustration of revenue and expenditure volatility computations using Indiana data (all dollars in billions)

Expenditure and revenue volatility are calculated from (7.2) for each state *i*. Debt outstanding is the aggregate debt outstanding by state, and *e* is the random error term. If β_{1i} is greater than 1, then a small increase in a revenue deviation is associated with a larger increase in the expenditure deviation. If β_{2i} is positive and statistically significant, then increasing debt levels are associated with an increase in the volatility of expenditures. Note that we use regression in this study in a more traditional application to examine the correlation between two variables. We are not testing theoretical determinants of expenditure volatility that require careful attention to potential bias resulting from endogeneity, instrumental variables, and omitted variables. The theory and proposed hypotheses require a test of correlation, not causality.

The results of the regression coefficients are shown in the Table 7.5 below. The second column labeled *Debt burden rank* provides a number corresponding with a state's relative position to the debt burden of other states. Debt burden is measured as total aggregate local debt divided by the state's gross domestic product. A ranking equal to one means that state has more debt outstanding per dollar of state GDP compared to other states. The relative position of the debt burden of the 50 states, District of Columbia, and US average is illustrated in Fig. 7.3. Kentucky, Nevada, and Pennsylvania are states with the most debt burden relative to state GDP. The states with the least amount of debt burden per dollar of state GPD include Connecticut, Delaware, and Idaho.

Table 7.5 Regression of budget volatility on revenue volatility and debt outstanding by state

State	Debt burden rank	Revenue volatility	Debt outstanding	Constant	*R*-squared
AK	13	0.649	−707.3	3.565e+07	0.495
AL	18	0.608**	−17.89	1.001e+07	0.632
AR	31	0.307***	5.335	1.283e+06	0.229
AZ	7	1.811***	2,379	−6.273e+08	0.872
CA	15	−0.0469***	11,335**	−1.242e+10	0.250
CO	10	0.534	−573.9	2.155e+08**	0.189
CT	49	−0.117***	−165.1	2.756e+07	0.067
DC	20	0.107***	545.3	2.474e+07	0.032
DE	50	1.013	−90.75	2.286e+06	0.573
FL	4	0.544***	−451.0	8.070e+08	0.838
GA	23	2.613*	−247.2	−2.036e+07	0.607
HI	39	0.0733***	−0.0331	3.941e+06	0.008
IA	40	1.223	63.63	−2.696e+06	0.677
ID	51	1.123	−143.8	2.193e+06	0.738
IL	22	−0.0105***	1,049	−2.691e+08	0.128
IN	33	0.662**	809.0	−1.127e+08	0.661
KS	12	−0.713*	277.3**	−2.033e+07	0.267
KY	1	0.467***	−15.27	4.027e+06	0.592
LA	29	0.112***	407.2	−3.958e+07	0.151
MA	41	0.130***	−403.7	1.411e+08	0.075
MD	34	0.177***	1,726	−2.472e+08	0.357
ME	42	0.204***	−78.94*	2.076e+06*	0.572
MI	19	−0.0698***	724.8	4.834e+08	0.031
MN	11	1.221	959.6*	−2.521e+08*	0.324
MO	36	0.104**	484.9*	−4.392e+07	0.251
MS	30	0.154***	320.4	−1.226e+07	0.108
MT	44	1.059	13.86	452,978	0.284
NC	28	0.532	2,083*	−4.930e+08	0.286
ND	37	0.544**	123.8	−1.366e+06	0.578
NE	17	0.324	−105.5	1.672e+07	0.054
NH	48	0.551	152.2**	−2.412e+06*	0.454
NJ	35	1.224	716.9	−1.464e+08	0.317
NM	24	−0.336***	173.1**	−5.914e+06	0.271
NV	2	0.586***	−363.7*	4.119e+07	0.891
NY	5	0.0289***	−707.9	2.364e+09	0.090
OH	32	0.862	41.35	−2.224e+07	0.642
OK	38	1.34	1,584**	−1.160e+08**	0.633
OR	21	1.247	199.0	−1.992e+07	0.684
PA	3	0.00948***	−588.0	5.383e+08	0.081
RI	46	0.188**	142.1	−1.175e+06	0.188
SC	14	1.263	189.4	−2.274e+07	0.649

(continued)

Table 7.5 (continued)

State	Debt burden rank	Revenue volatility	Debt outstanding	Constant	*R*-squared
SD	45	0.162*	49.90	39,309	0.063
TN	16	0.478	934.0	−1.358e+08	0.210
TX	8	0.460**	1,469***	−1.327e+09**	0.673
UT	6	1.056	−535.2	6.785e+07	0.515
VA	27	−0.243***	2,365**	−5.031e+08*	0.324
VT	47	0.147***	−25.31	332,218*	0.168
WA	9	0.276	122.0	6.419e+07	0.031
WI	25	−0.0925***	364.2	−5.229e+06	0.039
WV	26	−0.201***	−98.97*	5.952e+06**	0.243
WY	43	0.677	−421.2	8.709e+06	0.421
US	52	−0.0447***	44,274**	−4.503e+11*	0.291

All dollar values were converted to 2009 dollars prior to regression analysis
*Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level

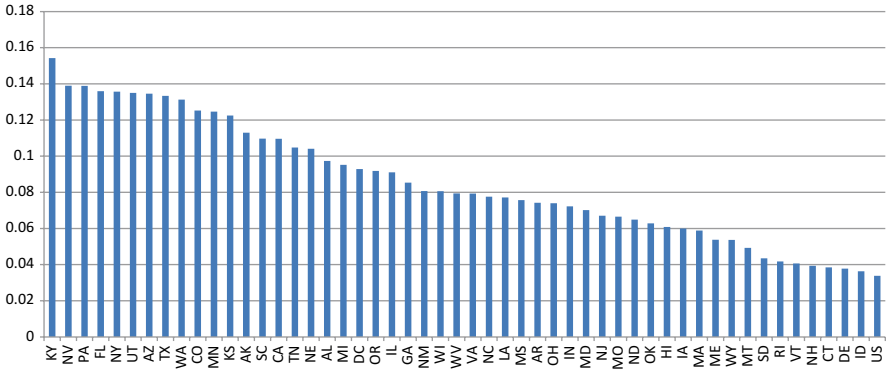

Fig. 7.3 Average debt outstanding per dollar of average state GDP

Some of the results of the state regressions are consistent with a debt leverage effect. The estimated coefficients of β_1 and β_2 are shown in columns 3 and 4 of Table 7.5. The statistical significance of the coefficients and robust standard errors are indicated by the asterisks. The coefficients of β_1 in column 3 test the degree of correlation among revenue and expenditure volatility. The reported significance of the *t*-test is whether β_1 is statistically different from one. This means 19 states (AK, CO, DE, IA, ID, MN, MT, and NC, NE, NH, NJ, OH, OK, OR, SC, TN, UT, WA, and WY) have revenue volatility that is essentially equal to the expenditure volatility. There are 23 states with statistically significant positive coefficients on revenue volatility. Twenty-one of the states with positive coefficients have coefficients that are less than one (AL, AR, DC, FL, HI, IN, KY, LA, MA, MD, ME, MO, MS, ND, NV,

NY, PA, RI, SD, TX, VT). This means that the magnitude of revenue deviations is larger relative to deviations in net expenditures. Only two states, AZ and GA, have statistically significant coefficients greater than one. All things equal, it appears that revenue and expenditure volatility are about equal for 37 % of the states. In another 41 % of the states, expenditure volatility is slightly less than revenue volatility. The remaining nine states have statistically significant coefficients on revenue volatility that are negative. A negative coefficient means expenditure volatility moves in the opposite direction from revenue volatility on average and suggests that a state utilizes a rainy day fund or other savings to reduce the volatility of expenditures. The statistical evidence suggests that states are adhering to balanced-budget requirements.

More interesting is whether the coefficients on debt outstanding are statistically significant. Ten of the coefficients (20 %) on debt outstanding are statistically significant and positive (CA, KS, MN, MO, NC, NH, NM, OK, TX, and VA). For these states, the deviation in the net expenditures gets larger as debt levels increase, which is consistent with the scenarios described in Table 7.3. There are three states (ME, NV, WV) where increases in debt levels are associated with a decrease in the volatility of net expenditures. Financial managers in these three states may have found a way to utilize capital budgets and debt to actually decrease expenditure volatility. The debt burden ranking is not directly associated with coefficient values and statistical significance on revenue volatility and debt outstanding.

7.3 Discussion and Conclusions

A perpetual challenge to policymakers and budget officers is understanding and coping with budget expenditure volatility. The actual revenues will differ from budgeted revenues, and the amount of state revenue volatility will determine the strategies and options available to the state to smooth budget expenditures. This chapter has examined the role of debt leverage on budget expenditure volatility of local governments aggregated by state. There are significant differences among the states regarding debt leverage and budget expenditure volatility. Debt is shown to statistically impact budget expenditure volatility for 13 states. Three states are able to use debt or other savings options to reduce budget expenditure volatility. This research provides evidence that high levels of debt are associated with greater expenditure volatility of ten states. Nevertheless, there are many more factors to incorporate into the expenditure volatility model. Budget volatility also is influenced by political and institutional factors that vary by state, county, and local jurisdictions.

7.4 Appendix

Calculations for scenarios in Table 7.3

	Revenue shortfall/ increase	Revenue impact per dollar	Debt service	Net expenditures	Percent change in net expenditures
A. Revenue and expenditure volatility with no debt					
Expected revenue	0.00 %	1.00	–	1.00	0.00 %
	−10.00 %	0.90	–	0.90	−10.00 %
	−5.00 %	0.95	–	0.95	−5.00 %
	5.00 %	1.05	–	1.05	5.00 %
	10.00 %	1.10	–	1.10	10.00 %
Standard deviation	7.91 %	0.08	–	0.08	7.91 %
Average	0.00 %	1.00	–	1.00	0.00 %
B. Revenue and expenditure volatility with 10 % debt service					
Expected revenue	0.00 %	1.00	0.10	0.90	0.00 %
	−10.00 %	0.90	0.10	0.80	−11.11 %
	−5.00 %	0.95	0.10	0.85	−5.56 %
	5.00 %	1.05	0.10	0.95	5.56 %
	10.00 %	1.10	0.10	1.00	11.11 %
Standard deviation	7.91 %	0.08	0	0.08	8.78 %
Average	0.00 %	1.00	0.10	0.90	0.00 %
C. Revenue and expenditure volatility with 25 % debt service					
Expected revenue	0.00 %	1.00	0.25	0.75	0.00 %
	−10.00 %	0.90	0.25	0.65	−13.33 %
	−5.00 %	0.95	0.25	0.70	−6.67 %
	5.00 %	1.05	0.25	0.80	6.67 %
	10.00 %	1.10	0.25	0.85	13.33 %
Standard deviation	7.91 %	0.08	0	0.08	10.54 %
Average	0.00 %	1.00	0.25	0.75	0.00 %
D. Revenue and expenditure volatility with 50 % debt service					
Expected revenue	0.00 %	1.00	0.50	0.50	0.00 %
	−10.00 %	0.90	0.50	0.40	−20.00 %
	−5.00 %	0.95	0.50	0.45	−10.00 %
	5.00 %	1.05	0.50	0.55	10.00 %
	10.00 %	1.10	0.50	0.60	20.00 %
Standard deviation	7.91 %	0.08	0	0.08	15.81 %
Average	0.00 %	1.00	0.50	0.50	0.00 %

Standard deviation and average calculations assume an equal likelihood of each revenue scenario. Debt service is assumed constant for the year given the contractual nature of debt. Net expenditures are defined as revenue less debt service under a strict balance budget requirement. Percent change in net expenditures is the change from the expected net expenditures and the net expenditures for a revenue scenario. Variants for the assumptions are discussed in the text.

References

Bahl R, Duncombe W (1993) State and local debt burdens in the 1980s: a study in contrast. Public Adm Rev 53(1):31–40

Brealy RA, Myers SC (1996) Principles of corporate finance. McGraw-Hills, New York

Bunch BS (1991) The effect of constitutional debt limits on state governments use of public authorities. Public Choice 68(1–3):57–69

Capital Debt Affordability Committee State of Maryland (1996) Understanding and forecasting condition or ability to repay debt: report of the Capital Debt Affordability Committee on recommended debt authorizations for fiscal year 1993. In: Miller G (ed) Debt management. Marcel Dekker, New York, pp 283–322

Clingermayer JC, Wood BD (1995) Disentangling patterns of state debt financing. Am Polit Sci Rev 89(1):108–120. doi:10.2307/2083078

Denison DV, Hackbart M, Moody M (2006) State debt limits how many are enough? Public Budg Finance 26(4):22–39

Denison DV, Hackbart M, Moody M. (2009) Intrastate Competition for Debt Resources. Public Finance Review 37(3):269–288

Fosu AK (2010) The external debt-servicing constraint and public-expenditure composition in Sub-Saharan Africa. Afr Dev Rev 22(3):378–393

Gabriel ZB, Marian D (2012) Public debt service and its impact on public expenditures. Rev Econ 4:655–664

Greiner A (2007) An endogenous growth model with public capital and sustainable government debt. Jpn Econ Rev 58(3):345–361

Hackbart MM, Leigland J (1990) State debt management policy: a national survey. Public Budg Finance 10(1):37–54

Hackbart M, Ramsey JR (1990) State debt level management: a stable credit rating model. Munic Finance J 11(1):79–96

Herrera S (2007) Public expenditure and growth. World Bank Publications, 4372. Washington

Hildreth WB, Miller GJ (2002) Debt and the local economy problems in benchmarking local government debt affordability. Public Budg Finance 22(4):99–113

Kiewiet DR, Szakaly K (1996) Constitutional limitations on borrowing: an analysis of state bonded indebtedness. J Law Econ Organ 12(1):62–97

Larkin R, Joseph JC (1996) Developing formal debt policies. In: Miller G (ed) Debt management. Marcel Dekker, New York, pp 277–282

Lora E, Olivera M (2007) Public debt and social expenditure: friends or foes? Emerg Mark Rev 8(4):299–310

Martell CR (2007) Debt burdens of overlapping jurisdictions. Munic Finance J 28(2):1–23

McCubbins MD (1991) Party governance and US budget deficits: divided government and fiscal stalemate. In: Alesina A, Carliner G (eds) Politics and economics in the eighties. University of Chicago Press, Chicago

McCubbins MD, Kiewiet R (1991) The logic of delegation: congressional parties and the appropriations process. University of Chicago Press, Chicago

Nice DC (1991) The impact of state policies to limit debt financing. Publius 21(1):69–82

Pogue TF (1970) The effect of debt limits: some new evidence. Natl Tax J 23(1):36–49

Ratchford BU (1938) American government and politics: constitutional provisions governing state borrowing. Am Polit Sci Rev 32(4):694–707

Robbins MD, Dungan C (2001) Debt diligence: how states manage the borrowing function. Public Budg Finance 21(2):88–105

Simonson B, Robbins MD, Brown R (2002) Debt affordability. In: Rabin J (ed) Encyclopedia of public administration and public policy. Marcel Dekker, New York, p 308

Smith C (1998) Measuring and forecasting debt capacity: the state of Oregon experience. Gov Finance Rev 14(6):52–55

The Advisory Commission on Intergovernmental Relations (1962) Measures of state and local tax capacity, vol. Report M-16. Government Printing Office, Washington
White FC (1983) Trade-off in growth and stability in state taxes. Natl Tax J 36(1):103–114
Zimmerman D (1991) Private use of tax-exempt bonds: the controlling public subsidy of private activity. In: Readings in state and local public finance. The Urban Institute, Washington

Chapter 8
Impact of Tax and Expenditure Limitations on Local Government Savings

Sharon N. Kioko

Abstract Local governments serve a pivotal role in the delivery of public services. However, since the late 1970s, their ability to deliver essential public services has been curtailed by widespread adoption of limits on taxing and/or spending authority. Studies show these limits fundamentally altered the fiscal landscape of municipal governments. Using data on county governments for the period 1970–2004, this analysis shows TELs had a negative impact on unrestricted cash reserves. This has wide-ranging implications on fiscal performance including the government's ability to cope with negative revenue and expenditure shocks and their ability to retain resources for strategic purposes.

8.1 Introduction

While the modern property tax revolt began when California voters approved the Jarvis–Gann Amendment (or Proposition 13), initiatives to limit taxing authority, particularly at the local level, began as early as the 1870s. Popularity of tax and expenditure limits (or TELs) was largely driven by a surge in property tax revenues followed by a significant decline in economic activity. It's in this recessionary period that a vast majority of homeowners found their tax liabilities were disproportionally greater than their ability to pay (Brennan and Buchanan 1979; Rubin 1998). Voters therefore sought restrictions on taxing authority that would provide assurances that their taxes would not grow unpredictably.

Proposition 13 was the first of many measures proposed in the 1970s—what is often termed as the start of the Tax Revolt movement. A wave of TEL measures were approved in other states including Massachusetts (Proposition 21/2), Oregon (Measure 5), and Colorado (Taxpayers Bill of Rights or TABOR). To date, virtually every state has placed limitations on their local government's taxing and/or spending

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authority (Anderson 2006; Mullins and Wallin 2004).[1] These measures continue to be popular to this day. Indiana, for example, amended its property tax levy limit in 2010, following a series of court-ordered and statutorily mandated reassessments (Thaiprasert et al. 2010). In 2012, New York amended its existing TEL laws and set a cap on growth in property tax revenues at the rate of inflation or 2 %, whichever was less.[2]

Studies show TELs had little effect on the overall size of the public sector (Mullins and Joyce 1996; Shadbegian 1999; Sun 2012). They, however, fundamentally changed the composition of revenues (Bradbury et al. 2001; Dye et al. 2005; Hoene 2004; McCubbins and Moule 2010). Using data for the period 1977 through 2007, Gordon and Rueben (2010) show the precipitous decline in property tax revenues as a share of own-source revenues. In a number of states (e.g., California, Massachusetts, and Oregon), that share declined more than 15 % (Gordon and Rueben 2010). For a number of governments, the share of non-property tax revenues (as a share of own-source revenues) far exceeds the share of property tax revenues.

Studies also find TELs led to significant loss of fiscal autonomy and a more expanded role for states (Saxton et al. 2001; Skidmore 1999; Sokolow 2000; Thompson and Green 2004). While there were changes in the level of state aid following the adoption of TELs, research shows state aid did not replace lost tax revenues (Wildasin 2010). What's more, these transfers have remained constant since the mid-80s and are often susceptible to cuts as states attempt to balance their own budgets.

The accumulation of slack resources therefore becomes an important part of the budgetary process for any local government. Slack resources include undesignated and/or unrestricted fund balances, particularly those reported in the general fund (Marlowe 2013). They represent an accumulation of resources net of commitments. Governments will often use these resources to buffer against shocks from the economy and maintain liquidity when drawdowns become inevitable (Hendrick 2006; Rose and Smith 2012). Internally, slack resources eliminate the need for borrowing for cash flow purposes (Moody's 2004). Externally, slack resources are viewed favorably by credit rating agencies and investors in municipal securities (Marlowe 2011; Moody's 2014; S&P 2013).

A number of studies have addressed the impact of slack resources on local government spending (Gianakis and Snow 2007; Gore 2009; Hendrick 2006; Marlowe 2005, 2011; Shelton and Tyer 2000; Stewart 2009; Wang and Hou 2012). This study contributes to this literature by addressing the impact of TELs on the government's ability to

[1] Of the 50 states, six do not report any limits on local government taxing or spending authority. They include Maine, New Hampshire, Tennessee, Virginia and Vermont (Anderson 2006; Mullins and Wallin 2004). Utah has the least stringent TEL—that is the full disclosure or truth in taxation requirement. Research shows the full disclosure requirement has resulted in uniformity in assessed values in Utah (Cornia and Walters 2005).

[2] Municipal governments in New York may override their expenditure caps for one-time needs (e.g., legal settlements, limited pension growth) with a 60 % majority vote. For more, see: http://governor.ny.gov/citizenconnects/reforminggovernment/guide-to-the-property-tax (accessed July 28, 2014).

retain slack resources. As hypothesized in this chapter, if TELs are real constraints on local government's revenues, one should observe lower levels of slack. That being said, local governments have a greater incentive to maintain slack given existing limits on taxing authority, volatility in non-property tax revenues, and exposure to potentially large cuts in state-aid (McCubbins and Moule 2010). What's more, non-property tax revenues provide governments with a resource that could be used to generate slack, particularly if the scope of the TEL was limited to property tax revenues.

Given the existing definition of slack, the existing empirical work is largely limited to studies where general fund data are publicly available.[3] This study uses an alternate measure—unrestricted cash, to empirically test the impact of TELs on local government savings behavior.[4] Results from the analysis show TELs have a negative impact on cash reserves. For example, governments subject to rate limits (i.e., overall or specific property tax rate limits) reported significantly lower cash reserves, while those subject to limits on growth in assessed valuation reported marginally lower reserves. Surprisingly, local governments subject to property tax levy limits reported marginally higher cash reserves. However, if the TELs were potentially binding limits, cash reserves were lower. That being said, local governments subject to TELs reported meaningful levels of cash reserves that would likely cover at least 2 months of expenditures.

Notwithstanding, lower levels of cash reserves hamper the government's ability to cope with negative shocks which are more likely to occur as a result of changes in composition of local government revenues (McCubbins and Moule 2010). Lower levels of cash reserves will also limit the government's ability to retain resources for strategic purposes including pay-as-you-go capital spending (Marlowe 2005; Gianakis and Snow 2007). This may result in higher debt burdens, a shift in responsibility to special purpose governments, and a larger share of non-guaranteed debt (Bennett and DiLorenzo 1982; Carr 2006; Clingermayer and Dan Wood 1995; Kioko and Zhang 2014). What's more, TELs (Johnson and Kriz 2005), combined with lower levels of cash reserves (Marlowe 2011), could result in a lower rating as rating agencies factor in the rating process the revenue-raising flexibility of the government. This likely translates to higher interest costs on all its long-term obligations (Benson and Marks 2010; Poterba and Rueben 2001; Wagner 2004).

The study proceeds as follows. Section 8.2 provides a review of literature on reserve funds, with an emphasis on local government savings behavior. Section 8.3 presents the empirical model. I discuss the results of the analysis in Sect. 8.4. In Sect. 8.5, I offer some concluding remarks and questions for future research.

[3] See summary of scope of data in the existing literature in Sect. 8.2.3.

[4] In its annual survey of government finances, the Census Bureau collects data on cash and security holdings held for debt service purposes, as proceeds of bond issues, as liquid assets in trust systems, and unrestricted cash holdings. In this study, I have developed a proxy measure of reserves using the unrestricted cash holdings together with the proceeds of a bond issue (pending disbursement).The measure, previously explored in Gore (2009), has been found to be correlated with widely used measures of slack resources.

8.2 Local Government Savings Behavior

8.2.1 What Are Slack Resources?

Slack resources, often defined as fund balance, represent the cumulative effects of a government's financial history.[5] Fund balances are reported in the fund statements as restricted, designated, or unrestricted fund balance.[6] Governments generally restrict or designate reserve funds for legal, contractual, or managerial purposes (GASB 2009). Restricted funds include amounts that can be spent on legally stipulated activities (i.e., constitutional, statutory, or contractual). Designated fund balance may include funds for specific purposes (either committed or assigned). However, unlike restricted funds, designated funds can be spent on other purposes, if the governing body approves change in use of resources (Marlowe 2013). Because there are no restrictions or designations on the unassigned or unrestricted fund balance, scholars generally consider the unrestricted fund balance as a primary source of slack.

In assigning ratings, credit rating agencies will consider fungibility of balances reported in the governmental fund—especially those reported in the general fund. Standard and Poor's (hereafter S&P), for example, estimates fund balance as the sum of assigned and unassigned balance and any committed funds if commitments were intended to support operations and/or emergencies (S&P 2013). Moody's Investor Services (hereafter Moody's) considers balances reported in the general fund, as well as balances reported in other funds that could be readily reassigned to the general fund to meet current expenditure needs (Moody's 2014).

8.2.2 A Summary of the Existing Literature

The Government Finance Officers Association (GFOA) recommends governments maintain an unrestricted general fund balance of no less than 2 months of regular general fund operating revenues or regular general fund operating expenditures. The

[5] In the fund statements, fund balance represents the difference in reported assets and liabilities. Fund assets generally include cash, short-term investments, receivables, inventory, and prepaid expenses. Fund liabilities include accounts payable, employee compensation payable, any deferred revenue, short-term loans and long-term obligations due in the next 12 months. If assets exceed liabilities, the government will report a positive fund balance. If assets are less than reported liabilities, the government will report a negative fund balance and is generally considered to be cash insolvent. Fund balance is also a long-term measure of budget solvency. Governments reporting revenues that exceed expenditures for prior budget periods generally report a positive fund balance, particularly if their liabilities do not relate to short-term borrowing for cash flow purposes.

[6] The Governmental Accounting Standards Board (GASB) recently amended fund balance categories to include non-spendable, restricted, committed, assigned, and unassigned. Non-spendable fund balances include assets that are precluded from conversion to cash (e.g., inventories, permanent funds). Restricted includes funds restricted by enabling legislation. Committed includes funds restricted by those with the highest level of decision-making authority. Assigned represents current commitments already made by management while unassigned includes amounts available for *any* purpose (GASB 2009).

level of slack is dependent upon a number of other factors, including predictability of its revenues, volatility in its expenditures, perceived exposure to significant one-time outlays (e.g., natural disasters, state budget cuts), availability of resources in funds other than the general fund, and the government's liquidity position.[7]

The accumulation of slack is both formal and informal (Hou 2003; Wagner 2004). Formal savings, including the use of budget stabilization funds (BSFs) or rainy day funds (RDFs), are a function of political actions that designate the allocation and use of accumulated reserve funds (Hou 2003, 2004; Wagner 2004). At the local level, the evidence points to informal mechanisms of savings (Marlowe 2013; Wolkoff 1987) where smaller governments are more likely to rely upon written policies to guide officials on the appropriate use of fund balances (Fitch 2002). While not legally binding, a written policy is a strong indicator that government officials recognize the need to accumulate resources (e.g., pay-go capital-related spending), the significance of making timely payments to stakeholders (e.g., bondholders, vendors, employees), and the negative repercussions of low fund balances (e.g., lower rating and higher interest costs).

The literature on local government savings behavior has focused on two basic research questions—(1) what are the determinants of local government savings and (2) what is the impact of local government savings on a variety of outcome measures, including revenue and expenditure shocks (Hendrick 2006; Marlowe 2005; Wang and Hou 2012), financial condition (Gianakis and Snow 2007; Hendrick 2006), and credit quality (Marlowe 2011).

This research has found own-source revenues to be major contributors to local government fund balances (Hendrick 2006; Wang and Hou 2012), while those reporting a higher share of state aid were more likely to report lower fund balances (Gore 2009; Stewart 2009; Wang and Hou 2012). Large governments, including those reporting a significant growth in population and higher levels of personal income, were more likely to report lower fund balances (Gore 2009; Hendrick 2006; Wang and Hou 2012), while those reporting volatility in revenues were more likely to report higher levels of cash reserves (Gore 2009). A number of other factors limit the government's ability to save, including high unemployment rates, current period deficits, and long-term debt (Hendrick 2006; Stewart 2009; Wang and Hou 2012).

While governments reported high fund balances, slack resources provided only marginal counter-cyclical effects (Marlowe 2005; Wang and Hou 2012). This is an indicator that local governments are more likely to accumulate reserve funds for broader strategic uses. There are diminishing marginal returns for accumulating large fund balances. Marlowe (2011), for example, shows modest levels of fund balances were better than no reserves; however, the benefits were marginal at best if the government reported large fund balances. These findings are consistent with Moody's assessment on the role of fund balances. The rating agency notes "Larger balances may be warranted if budgeted revenues are economically sensitive and therefore not easily forecasted … [M]unicipalities with substantial revenue-raising

[7] Liquidity here includes the proportion of fund balance reported as cash and cash equivalents. For a full discussion of GFOA recommendations see http://www.gfoa.org/determining-appropriate-level-unrestricted-fund-balance-general-fund (accessed July 28, 2014).

flexibility may carry smaller balances without detracting from their credit strength" (Moody's 2014:13).

In summary, studies on savings behavior show modalities for saving differ by level of government. For larger governments (e.g., states), accumulation of reserve funds is often formal, and generally driven by a political processes (e.g., appropriation). For municipal governments, reserve funds are an accumulation of resources (net of obligations) for which the government has yet to adopt formal policies that impose restrictions. Notwithstanding, the use of these resources likely requires formal approval process, which makes them an important part of the budget process.

8.2.3 Unrestricted Cash and Security Holdings: A Proxy Measure of Slack Resources

The existing literature identifies slack resources as those reported formally (e.g., designated fund balance including BSFs or RDFs) or informally (e.g., unrestricted general fund balance). Because the largest centralized source of data (Census Bureau) does not collect any fund balance data, the existing literature has largely been limited to studies on state governments (see Hou 2003, 2005; Wagner and Elder 2005) or studies of local governments where fund balance data is publicly available (see Gianakis and Snow 2007; Hendrick 2006; Marlowe 2005, 2011; Plummer et al. 2007; Pridgen and Wilder 2013; Shelton and Tyer 2000; Stewart 2009; Wang and Hou 2012).

To expand on this work, I rely on an alternative measure of slack resources introduced in Gore (2009) in which she identified reserves as unrestricted cash and security holdings as reported by governments to the Census Bureau in the Annual Survey of State and Local Government Finances.[8] The Bureau collects data on cash and security holdings held for debt service purposes, as proceeds of bond issues, as assets in trust systems, and as unrestricted cash holdings. The proxy measure used in this study is the sum of unrestricted cash holdings and proceeds of a bond issue.[9]

Cash and cash equivalents are integral to assessing the government's liquidity position. Moody's (2014) factors in its rating process the government's unrestricted general fund balance (i.e., reserves), as well as the government's reported cash balances (i.e., liquidity). The rating criteria report noted "[W]hile fund balance and cash are usually correlated, accruals can often lead to divergence between the two.

[8] See https://www.census.gov/econ/overview/go0400.html (accessed October 31, 2014). Specifically (also see http://www2.census.gov/govs/class06/ch_7.pdf accessed July 18, 2014).

[9] Unlike Gore (2009), proceeds of bond issues pending disbursement are included in the measure of cash reserves. Data shows bond proceeds were limited to a small portion of the sample. Excluding bond proceeds, cash reserves as a percent of total expenditures were 35.82 %. Including bond proceeds, cash reserves were 39.26 %. Since funds would inevitably be available for operating purposes (e.g., capital outlays) they were included in all the analyses. Capital outlays were included in the model as an explanatory variable.

A large receivable for delinquent taxes, for instance, can lead to an ostensibly high fund balance position and a weaker cash position; yet in this case, the fund balance position is less indicative of credit quality than the cash position … we believe evaluating cash and fund balance in tandem is more informative than evaluating either in isolation" (p. 14).

If unrestricted cash holdings are a proximate measure of slack resources, I propose using this measure to empirically test the impact of TELs on local government savings behavior.[10] In making this assumption, I am able to collate data from 47 of the 50 states for the period 1970 through 2004—a period that includes years prior to the adoption of a number of local government TELs.[11,12]

How does this measure compare to existing research? On average, county governments reported $147 per capita of unrestricted cash for the period (see Table 8.1). This represented approximately 39.7 % of total expenditures or 4.77 months of cash reserves.[13] In 1972, governments reported an average of 34.3 % of expenditures in cash reserves. These reserves peaked in 1974 at 41.7 %—notably prior to the Tax Revolt. The data also shows county governments began to report consistent growth in cash reserves in 1994. By the end of 2004, county governments reported an average of 47.9 % of expenditures or 5.75 months of cash. There were significant changes in per capita cash holdings in the first decade. Cash holding rose from $87 per capita to $108 per capita in 1980. The savings rate, on a per capita basis, continued to rise throughout the 1980s and 1990s with county governments reporting an average of $248 per capita in cash and security holdings in 2004.

[10] Gianakis and Snow (2007) found free cash flows were correlated with budget stabilization funds. However, in an economic downturn, governments were more likely to draw on their free cash flows first, before (re)allocating resources in their budget stabilization funds.

[11] Data used in this study is that of county governments. Of all general purpose governments, county governments are the fastest growing (Lobao and Kraybill 2005). They have long been an important administrative arm of state governments responsible for essential services including public assistance, law enforcement, court systems, voter registration, etc. (Benton et al. 2007). They have also been assigned discretion over the administration of essential programs (Lobao and Kraybill 2005). Counties have also evolved to provide a wider menu of services that were traditionally the responsibility of smaller governments (Benton et al. 2007). Given the dynamic nature of their responsibility and the static nature of the geographical boundaries, county governments offer an interesting environment to test the impact of TELs on cash reserves. Excluded from the sample are county governments in Connecticut and Rhode Island which exist strictly for statistical and geographical purposes. Counties in Alaska were excluded because the state is generally considered to be an outlier.

[12] Because the Census Bureau does not collect any data on liabilities, I define this measure as a *gross* measure of free cash flows. In other words, the measure is net of restrictions (i.e., sinking funds or trust funds) but would likely include cash flows designated for budget period liability payments (e.g., accounts payable) or designated for certain activities (e.g., pay-as-you-go spending). The measure is also more limited than the traditional measure of fund balance as it excludes receivables due from other funds, other governments, and taxpayers.

[13] Months of cash is a measure often used to assess duration of operations if all sources of revenue were delayed, exhausted, or currently unavailable and all expected expenditures were incurred as budgeted.

Table 8.1 Unrestricted cash and securities holdings of county governments (1970–2004)

	Cash per capita (adjusted for inflation)		Cash as a % of total expenditures		Months of cash[a]		
	Mean	Median	Mean	Median	Mean	Median	*N*
By year							
1970	87.53	53.62	34.0 %	24.8 %	4.08	2.98	1,806
1971	92.24	59.49	32.8 %	24.3 %	3.94	2.91	1,812
1972[b]	*91.05*	*58.72*	*34.3 %*	*25.2 %*	*4.12*	*3.02*	*2,970*
1973	113.46	82.94	40.8 %	30.8 %	4.89	3.70	1,823
1974	116.81	84.16	41.7 %	33.2 %	5.00	3.99	1,680
1975	115.70	85.26	39.0 %	31.5 %	4.68	3.78	1,680
1976	109.25	80.29	34.9 %	27.6 %	4.18	3.32	1,680
1977[b]	*116.60*	*79.41*	*37.5 %*	*29.7 %*	*4.50*	*3.57*	*2,969*
1978	121.08	88.56	36.6 %	28.8 %	4.39	3.46	1,680
1979	124.50	81.74	39.8 %	30.5 %	4.78	3.66	2,945
1980	107.88	76.66	34.6 %	26.7 %	4.15	3.20	2,059
1981	113.29	68.65	37.2 %	27.6 %	4.46	3.31	2,893
1982[b]	*117.65*	*69.32*	*37.2 %*	*28.3 %*	*4.47*	*3.40*	*2,957*
1983	119.56	77.36	36.6 %	28.3 %	4.39	3.40	2,367
1984	129.38	80.36	38.6 %	30.7 %	4.64	3.69	2,910
1985	138.03	85.58	39.8 %	30.8 %	4.78	3.70	2,941
1986	145.50	90.66	41.2 %	31.3 %	4.94	3.75	2,838
1987[b]	*146.27*	*92.77*	*40.4 %*	*31.7 %*	*4.85*	*3.80*	*2,995*
1988	155.87	91.56	41.0 %	29.3 %	4.92	3.51	2,319
1989	142.63	95.62	38.0 %	29.7 %	4.56	3.56	2,215
1990	149.21	100.06	38.2 %	29.7 %	4.59	3.56	2,179
1991	155.71	104.45	39.0 %	29.1 %	4.68	3.49	2,120
1992[b]	*163.69*	*102.70*	*40.2 %*	*30.6 %*	*4.83*	*3.67*	*2,939*
1993	162.38	107.73	37.1 %	29.2 %	4.45	3.50	1,497
1994	164.55	112.47	37.6 %	28.9 %	4.51	3.46	1,522
1995	169.60	124.58	38.8 %	31.0 %	4.66	3.72	1,503
1996	173.01	126.24	40.8 %	32.3 %	4.89	3.88	1,518
1997[b]	*180.85*	*125.42*	*42.7 %*	*35.1 %*	*5.12*	*4.21*	*2,883*
1998	202.63	146.40	43.4 %	34.9 %	5.21	4.19	1,532
1999	215.51	153.24	44.7 %	36.1 %	5.36	4.33	1,531
2000	214.60	147.53	46.7 %	37.8 %	5.61	4.54	1,830
2001	226.57	157.27	47.7 %	38.5 %	5.72	4.62	1,344
2002[b]	*229.08*	*156.37*	*48.0 %*	*38.3 %*	*5.76*	*4.60*	*2,962*
2003	243.45	165.79	47.8 %	39.4 %	5.74	4.73	1,318
2004	247.72	163.36	47.9 %	39.6 %	5.75	4.75	1,699

(continued)

Table 8.1 (continued)

	Cash per capita (adjusted for inflation)		Cash as a % of total expenditures		Months of cash[a]		
	Mean	Median	Mean	Median	Mean	Median	*N*
By population							
<25,000	176.28	113.37	43.1 %	33.4 %	5.17	4.01	35,299
25–50,000	110.12	75.89	35.1 %	27.5 %	4.22	3.30	15,560
50–100,000	115.54	75.51	36.9 %	27.9 %	4.43	3.35	11,208
100–1,000,000	140.28	91.52	38.6 %	31.2 %	4.63	3.74	13,050
>1,000,000	187.34	136.18	36.4 %	31.1 %	4.36	3.73	799
Mean/median for the period 1970–2004	**147.68**	**94.21**	**39.7** %	**30.8** %	**4.77**	**3.69**	**75,916**

[a]Months of data is estimated as follows (cash and security holdings/(total expenditures/12 months))
[b]Represents census year
Notes: Cash and Security Holdings exclude any cash and security holdings reported as liquid assets in fiduciary funds (e.g., employee retirement systems, unemployment compensation systems, workers compensation systems, and any other social insurance trust systems). It also excludes sinking funds (i.e., cash and security holdings held specifically for debt service purposes), but includes bond funds (proceeds from debt issues pending disbursement). Cash and security holdings also include cash reported by utilities and liquor stores operated by county governments. Given significant variation in the data, the mean and the median for each year are reported

Reserves were also larger for smaller governments, particularly those with populations less than 25,000 ($176 per capita or approximately 43 % of expenditures) relative to medium-sized governments (25–50,000; $110 per capita or approximately 35 % of expenditures). Larger municipalities did hold more cash relative to medium-sized municipalities; however, as shown in Table 8.1, the metrics varied between counties with 100,000 to 1 million and those with over 1 million.

Municipalities, other than county governments, generally report higher levels of unrestricted fund balance, total fund balance, or unrestricted cash and security holdings. Gore (2009), for example, found cities, towns, boroughs, and villages for the period 1997 through 2003 reported an average of 12.8 months of cash with a median of 9.8 months. This translates to approximately 107 % of total expenditures in cash reserves (median of 82 %). The average for municipal governments in Minnesota was 54 %—with approximately 20 % reporting fund balances that exceeded total annual general fund expenditures (Marlowe 2005). Hendrick's (2006) examination of suburban Chicago municipalities reported an average unrestricted fund balance of 78 % of general fund expenditures.

Mississippi county governments reported significantly lower fund balances—an average of 10 % of general fund expenditures (Stewart 2009). There was also significant variation in the Stewart (2009) sample, with more than half the counties reporting an unrestricted fund balance greater than or equal to 25 % of general fund expenditures. Wang and Hou (2012) and Plummer et al. (2007) reported lower levels of fund balance for North Carolina county governments (22 % of expenditures)

and Texas school districts (37 % of general fund expenditures), while Pridgen and Wilder (2013) found local governments participating in the GFOA Certificate for Excellence in Financial Reporting with significantly higher fund balances (69 % of general fund expenditures).

Shelton and Tyer (2000) study found fund balances varied by the size of government and whether the municipality reported utility-related activities. Their analysis found the average North Carolina utility city reported fund balances of 25 %, up to 71 % of general fund expenditures. Their level of reserves was substantively lower than non-utility cities (27–266 % of general fund expenditures) and South Carolina cities (26–151 % of general fund expenditures).

Gianakis and Snow (2007) found municipalities in Massachusetts reported very low levels of unrestricted fund balance. In that study, 81.5 % of local governments reported fund balances that were at or below 10 % of general fund expenditures. Moreover, 84.9 % of local governments reported free cash flows that were at or below 10 % of general fund expenditures (see Table 1 in Gianakis and Snow 2007). Using the Census data, I found counties in Massachusetts reported very low levels of cash reserves (21 % of expenditures). Cash reserves have been on a sharp decline—the average in 1970 was 32 %. In 1980, the average was 20 % and in 2004, cash and security holding were 19 % of total expenditures. Moreover, on five different occasions, the cash and security holdings were less than 10 % of expenditures (or approximately 1 month of operations). While one could argue lower levels of savings were the result of Proposition 21/2—a TEL measure adopted in the mid-80s, this finding does not hold in California and Colorado where voters approved Proposition 13 and the TABOR—the other two popular TELs. County governments in California and Colorado reported substantially higher cash reserves (35 % and 50 % of total expenditures, respectively). Counties in these states also reported lower levels of savings pre-TEL of approximately 22 % of expenditures, which suggests higher, not lower, levels of savings following the adoption of TELs.

Notwithstanding, the consistent theme in the data is that local governments have long retained cash reserves and these resources have generally exceeded GFOA's recommendations. More importantly, local governments have retained reserve funds prior to and following the passage of TEL measures. This study seeks to contribute to the existing literature by addressing the impact of TELs on the government's ability to create and retain reserve funds.[14]

Public finance scholars have recognized the negative effects of TELs and the need to accumulate unrestricted reserve funds. Hendrick (2006), for example, noted "local governments with tax limitations face more risk because these conditions reduce their ability to compensate or adapt to shocks" (p. 18). Results from Maher and Deller (2013) show TEL severity was positively associated with the governments unreserved fund balances. The authors note that this, among other factors, is

[14]Another form of slack that is not adequately addressed in the TEL literature is the difference between the rate or caps and actual property tax rates or property tax revenues. For example, if the current rate is far below the cap, the local government has slack taxing capacity. Gianakis and Snow (2007), for example, found the presence of this form of slack was correlated with budget stabilization funds—the relationship between the TEL slack and the free cash flows was weak.

an indicator that the TEL measures forced communities to more effectively manage resources by building up reserves.

If TELs limit the government's ability to raise revenues, one could observe local governments reporting lower levels of cash reserves. What's more, economic (e.g., growth in service demands) and political realities (e.g., anti-tax sentiment) may hamper the government's efforts to retain meaningful levels of cash reserves. Alternatively, governments have a greater incentive to retain reserve funds given changes in revenue structure and volatility in the non-property tax revenues. Their diversified revenue stream also provides them with the opportunity to build up reserve funds by relying more on non-property tax revenues. If this is the case, reserves could be higher following imposition of TELs.

8.3 Empirical Model

Based on the existing literature, I propose the following research model:

$$S = f\left(L, R, D\right),$$

where S represents the government's unrestricted cash and security holdings—the proxy measure of reserve funds, L includes the policy variables of interest, R represents the revenue structure of the government, and D includes a set of demand variables.

Data for this study is drawn primarily from the Census Bureau. As is well known, the Bureau is charged with collecting data on all governmental entities in the U.S. For local governments, the agency only collects data in a census year (i.e., years ending with "2" and "7"). It also collects data in non-census years for a limited sample of governments. What's more, governments may voluntary respond to the survey in non-census years. As summarized in Table 8.1, approximately two thirds of county governments reported to the survey in a non-census years. Using these data, I have constructed an unbalanced panel of county governments from 47 of the 50 states for the period 1970 through 2004. In this section, I briefly discuss the model specification, the policy variables of interest, and the set of control variables R and D. Table 8.2 reports descriptive statistics for the sample. To control for changes in price, all dollar values have been deflated with 1983 as the base year.

8.3.1 Model Specification

The potential for endogeneity of fiscal rules is an empirical challenge that has been widely addressed in the existing literature (Poterba and Rueben 2001). Like Rueben (1997), Shadbegian (1999), Knight (2000), Wagner (2004), and Kioko and Martell (2012), I apply an Instrumental Variable (IV) approach to address endogeneity of the policy variables of interest. I specify the IV model as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 \mathrm{TEL}^{*}_{it} + \mathrm{CD}_i + \mathrm{TD}_t + \varepsilon_{it}, \tag{8.1}$$

Table 8.2 Descriptive statistics

	Mean	Quartile-1	Median	Quartile-3	SD	Source of data
Gross cash (as a percent of expenditures)	39.71	17.48	30.78	51.01	41.64	Census (see Table 8.1)
Property tax rate limits = 1, otherwise 0	0.6742	0	1	1	0.4687	Mullins and Wallin (2004)
Property tax levy limits = 1, otherwise 0	0.3987	0	0	1	0.4896	”
Limit on assessed value = 1, otherwise 0	0.0923	0	0	0	0.2894	”
Binding limit (rate and assessment, levy and caps) = 1, otherwise 0	0.0912	0	0	0	0.2879	”
Property tax limit (rate, levy, or assessment) = 1, otherwise 0	0.7774	1	1	1	0.4160	”
Population	92,171	12,681	28,072	70,811	288,486	Census
Density	139.06	18.14	42.71	103.28	415.76	”
Total expenditures (per capita)	407.00	171.32	304.67	538.85	361.63	”
Income (per capita)	11,467.73	9,460.06	11,097.21	12,934.96	3,060.10	”
Hirschman–Herfindahl index (0–100)	59.05	48.28	61.55	72.57	17.27	“(see Fig. 8.1)
Property tax revenue (per capita)	116.37	49.41	87.11	142.69	141.04	”
Sales tax revenue (per capita)	20.68	0	0	25.72	42.09	”
Income tax revenue (per capita)	2.89	0	0	0	20.16	”
User charges and fees (per capita)	114.41	24.24	52.32	129.25	198.52	”
Federal aid (as a % of total revenues)	5.05	0.28	3.05	7.10	6.56	”
State aid (as a % of total revenues)	29.02	14.06	27.49	42.17	17.97	”
Full-faith and credit debt (per capita)	81.02	0	15.72	90.76	576.03	”
Short-term debt (per capita)	4.01	0	0	0	22.54	”
Capital outlays (as a % of total expenditures)	10.67	3.77	8.13	14.89	9.62	”
Utility (per capita)	4.74	0	0	0	34.12	”
Administrative costs (as a % of total expenditures)	5.55	2.03	4.14	7.43	5.15	”
Complexity in service delivery	3.0427	2	3	4	1.36685	”
Voter initiative	0.4146	0	0	1	0.4927	Waters (2003)
Signature requirement	2.7919	0	0	6	3.6964	”
Ideology index (0–100)	42.9941	33.5606	43.4784	52.2848	13.5342	Berry et al. (1998)

where

$$\mathrm{TEL}_{it} = \alpha_1 X_{it} + \alpha_2 Z_{it} + \mathrm{CD}_i + \mathrm{TD}_t + u_{it}, \tag{8.2}$$

and $t = 1, \ldots, 35$ time periods and $i = 1\ldots$ 3,015 counties. The dependent variable *Yit* is the policy variable of interest as reported in Table 8.1. *Xit* is a vector of factors hypothesized to influence the dependent variable. In this specification, TEL*it** is the instrumented variable of interest, while *Zit* includes a set of instruments that account for the presence of the endogenous variable TEL*it*. Also included in each of the specifications are county fixed effects (CD*i*) and time fixed effects (TD*t*).

8.3.2 Key Explanatory Variable

TELs include limits on property tax rates, limits on assessed values, limits on property tax levy, revenue and expenditure caps, and full disclosure requirements (Mullins and Wallin 2004). Virtually every state has placed limits on their local government's taxing and/or spending authority. As noted in Mullins and Wallin (2004), TELs are potentially binding when more than one type of limit is adopted. For example, the limits are potentially binding if the rate limits are combined with limits on assessed values or when levy limits are combined with revenue or expenditure caps. The limits are potentially non-binding if the government only adopts property tax rate limits, as governments can circumvent the property tax rate limit with changes to assessment practices. While revenue and expenditure caps are likely to be a formidable constraint for local governments, very few states have adopted revenue and expenditure caps. On the basis of Mullins and Wallin (2004), I created the following test variables:

1. *Property tax rate limits* which set the property tax rate ceiling that cannot be exceeded without voter approval. They include overall and specific property tax rate limits. Overall tax rate limits apply to all local governments while specific property tax rate limits apply to specific jurisdictions (e.g., counties or school districts).
2. *Property tax levy limits* are limits on the total amount of revenue that can be raised from the property tax, independent of the property tax rate. The limits are potentially binding given the fixed nature of the ceiling; however, local governments replace lost tax revenues with non-property tax revenues.
3. *Limits on assessed values* are limits on the annual growth in valuation of property. As discussed earlier, the limits on assessed values are potentially binding when combined with property tax rate limits.
4. Because the property tax is a function of the assessed values and the tax rate, the property tax rate limits are potentially binding when combined with limits on assessed values. The levy limits are also potentially binding if combined with caps on revenues or expenditures. In this specification, I focus on *potentially binding limits*, which includes property tax rate limits that are combined with

limits on assessment increases and property tax levy limits that are combined with caps on revenues or expenditures.

5. Finally, I create an indicator variable—*property tax limits*. The variable measures the average effect of the property tax limits on cash reserves. The indicator variable includes tax rate limits, limits on assessment increases, as well as property tax levy limits.

Of the 75,917 observations in the sample, 67 % reported property tax rate limits, approximately 40 % reported property tax levy limits, and approximately 9 % reported limits on assessed values and potentially binding TELs. In aggregate, 78 % of observations reported a limit on rates, assessed values, and/or levies.

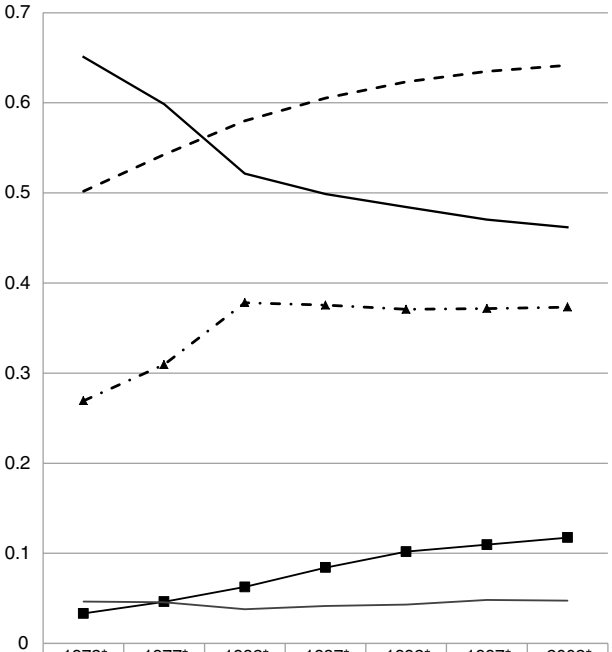
8.3.3 Control Variables

Xit includes a variety of controls for size of government, revenue effort, changes in the revenue structure, complexity in service provision, and other demands on free cash flows. Descriptive statistics for these variables are included in Table 8.2.

Included in the model is a set of explanatory variables that capture the effects of economic factors on the dependent variable. Studies show per capita income to be positively correlated with fund balances (Stewart 2009; Wang and Hou 2012). To control for size, the model includes population (log), density, and county expenditures per capita. Larger governments enjoy economies of scale and often report lower levels of reserves (Gore 2009; Hendrick 2006; Stewart 2009; Wang and Hou 2012). I therefore expect the coefficient for population (log) and expenditures to be negative—that is large governments will report lower cash reserves all else equal. Given economies of scale, I also expect densely populated county governments to report higher reserves, all else equal.

Gore (2009) noted that when governments have access to a variety of revenue sources, they can raise funds relatively quickly and are less susceptible to adverse revenue shocks. Revenue shocks for local governments are likely to be twofold—those driven by their taxing and revenue raising authority and the underlying local economies and, those driven by intergovernmental transfers (federal and state aid). To capture taxing effort of governments, I included per capita revenues for the four major own-source revenues—property tax, sales tax, income tax, and user charges and fees. I expect reserves to be positively correlated with own-source revenues. The magnitude would likely differ across revenue categories. For example, as major sources of revenues, user charges and fees, and property taxes will contribute substantively to reserves, income taxes would not have a substantive impact on reserves given limited use of income taxes by county governments.

I also included in the model the Hirschman–Herfindahl Index (HHI). The HHI index controls for changes in composition of own-source revenues. HHI was first proposed by Suyderhoud (1994). Following the work of Suyderhoud (1994) and Carroll (2005), Carroll and Johnson (2010) noted there are substantial differences in HHI that reflect differences in revenue structure and level of government.



	1972*	1977*	1982*	1987*	1992*	1997*	2002*
Property Tax	0.6508	0.5987	0.5214	0.4987	0.4843	0.4704	0.4618
General and Selective Sales Tax	0.0332	0.0463	0.0627	0.0842	0.1018	0.1096	0.1174
Other Income Tax	0.0466	0.0456	0.0379	0.0416	0.0431	0.0483	0.0475
User Charges and Misc. Revenue	0.2694	0.3094	0.3781	0.3754	0.3708	0.3717	0.3733
HHI	0.5018	0.5426	0.5799	0.6053	0.6234	0.635	0.6416

Fig. 8.1 Revenue structure of county governments 1972–2002. ("*" represents a census year. Sample is limited to counties in 47 states (excluding Alaska, Connecticut, and Rhode Island) for the period 1970 through 2004. The revenue ratios are estimated as a percent of own-source revenues. The HHI index is estimated using the four reported categories and the following equation $\mathrm{HHI}_{\mathrm{county}} = \left[\frac{1-\sum_{i=1}^{n} R_i^2}{1-(100\%/n)}\right])$

Keeping in mind those differences, I followed Carroll and Johnson (2010) and modified categories of own-source revenues—property, sales, other tax, and user charges and fees. As is shown in Fig. 8.1, the structure of local government revenues changed significantly over the period. As the share of property tax revenues declined, local governments replaced lost property tax revenues with user charges and fees as well as the sales tax. Sales tax revenues, as a percent of own-source revenues, were up almost threefold over the period of analysis. User charges were also higher in 2002 relative to the pre-TEL levels. Given changes in the underlying composition of local government revenues, one would expect significant changes in the HHI index. The data shows in 1972, counties reported an HHI of 0.5018. Over the next

three decades, the HHI index was up to 0.6416 (2002). In this analysis, I expect HHI to be positively correlated with cash reserves.

As noted earlier, revenue shocks are also likely to be driven by intergovernmental transfers. However, contrary to the existing literature (Skidmore 1999; Wildasin 2010), the share of intergovernmental transfers as a percent of total revenues declined over the period. In 1972, for example, county governments reported an average of 34 % of total revenues from state and federal grants. In 2002, that share was 30 %. The data also shows a consistent decline in state aid and variability in the share of federal aid. If the potential for volatility in intergovernmental transfers exists, governments are more likely to maintain higher cash reserves. Conversely, a negative relationship may be an indicator that governments do not recognize the risk associated with intergovernmental reserves (Stewart 2009; Wang and Hou 2012).

Included in the analysis are controls for local government debt burdens. When receipts fall short of disbursements, governments will often rely on notes or other forms of short-term debt. Governments will also issue long-term debt to finance its capital expenditures. The proceeds from any bond issue would likely increase the level of cash reserves. There are, however, significant transaction costs associated with (short and long-term) debt issuance, particularly for smaller governments (Fitch 2002; Gore 2009). Moreover, long-term debt obligations have been found to lower fund balances as governments were more likely to create sinking funds to meet bond covenants. My expectation here is therefore twofold. First, short-term debt will increase cash reserves; however, long-term obligations will result in governments reporting lower levels of cash reserves (Gore 2009; Hendrick 2006; Stewart 2009). In other words, governments with proceeds from a debt issue will report higher cash balances in the short-term; but, over the long-run, these governments will likely report more cash in a restricted category. If funds are restricted by bond covenants, local governments have limited discretion over use. Therefore, the use of long-term debt and the creation of bond funds will result in governments reporting lower levels of unrestricted reserve funds.

Reserves restricted for capital outlays are a form of slack (Hendrick 2006). Marlowe (2005) argued that governments will accumulate reserve funds for pay-as-you-go capital spending. I therefore expect capital outlays to be positively correlated with cash reserves. In other words, governments that expect capital-related spending will accumulate cash. These governments therefore have greater flexibility in addressing revenue shortfalls relative to governments that rely on a pay-as-you-use model of financing capital improvements *if* the government chose to reallocate designated resources.

Utility-related activities (electric, water, sewer, etc.) are a secondary source of slack. While transfer of monies from utility-related activities is restricted by statute, the practice is not uncommon (Hendrick 2006). While not all counties in the sample reported utility-related activities, the data shows there has been a significant increase in the number of county-operated utilities. In 1972, for example, less than 5 % of all counties reported utility-related expenditures. In 2002, 20 % of all counties (600 counties) reported utility-related expenditures. Since the dependent variable

aggregates cash and security holdings of all activities (general purpose government, utilities, and liquor stores), I expect utility-related per capita expenditures to be a strong indicator of liquidity.

Finally, based on Gore's (2009) analysis of motivations for accumulating cash, I included as a control variable the share of central staff expenditures as a percent of total expenditures. I expect local governments reporting a larger share of central administrative staff costs to report higher cash balances. Also, on the basis of the discussion in Benton (2005) and Benton et al. (2007) on the changing role of county governments over the period of analysis, I have included a proxy measure of complexity of service delivery for each government over time. The data shows counties were not only responsible for delivering essential public services (welfare, corrections, education, fire protection, court systems, hospitals, highways, housing, water, and waste water treatment), they were also engaged in non-essential/non-major services (e.g., airports, libraries, parking, natural resources, parks, etc.). To account for complexity in service delivery, I developed an ordinal variable of the number of major activities included in the county budget. Major activities were defined as those whose current period expenditures exceeded 5 % of total expenditures. The 5 % threshold, while arbitrary, attempts to capture large expenditure categories included in the budget relative to smaller non-essential budget items. As reported in Table 8.2, the average county reported at least three major activities out of a total of 15 categories. I hypothesize governments reporting a more complex set of activities are more likely to set aside reserve funds to cope with possible expenditure shocks.

8.3.4 Excluded Instruments

The vector *Zit* includes a valid set of instruments that account for the presence of the endogenous variable TEL*it*. I also assumed that the set of instruments was uncorrelated with the error term ϵit, was correlated with the endogenous variable TEL*it*, and was not relevant explanatory variables (Murray 2006).

IV models in the TEL literature have often used direct legislation procedures, particularly voter initiative provisions, as instruments for TEL.[15] Shadbegian's (1999) for example used an indicator variable for voter initiative provisions and the passage rate on proposed measures. Wagner (2004) included indicator variables if voters could propose both statutory and constitutional measures, an indicator variable if initiative provisions-mandated proposals satisfy the geographic signature

[15] The direct legislation provisions enable voters to directly or indirectly amend their state constitutions or statutes. Direct legislation includes a broad array of provisions including statutory and constitutional direct and indirect initiatives, legislative referendums and popular referendums. For the purposes of the model specified in this paper, I limit my interest to voter initiative provisions - whether direct or indirect, statutory or constitutional (Boehmke 2005; Kioko and Martell 2012; Waters 2003).

requirement, and an indicator variable if the state permitted legislative review of proposed initiatives.[16]

I include the following as instruments for the IV model (1) indicator variable for voter initiative provisions, (2) the geographic signature requirement (as a percent), and (3) a citizen ideology index. Voter initiative provisions provide voters the opportunity to amend their existing state constitutions and statutes either directly (i.e., without legislative approval) or indirectly (i.e., with legislative approval). In order to bring the measures to a vote, supporters (and interest groups) were required to meet geographic signature requirements. The higher the threshold for the signature requirement, the less likely the measure would be placed on the ballot in any election year. The citizen ideology index was used in Wagner (2004) as a proxy measure of preferences. Developed by Berry et al. (1998), the scores take on a value of 0–100, with 100 being the most liberal value and 0 being the most conservative value.[17] I expect voters who prefer a conservative taxing and spending policy will support TEL measures.

8.4 Results

Since panel data exhibit heteroskedasticity, I report results using the Generalized Methods of Moments (GMM) estimator that allows one to control for group-wise heteroskedasticity (Baum et al. 2003).

Results in Table 8.3 show TELs should be treated as endogenous variables. In four of the five regressions, I am able to reject the null and conclude an instrumental variable approach is appropriate (except Model 5). Results of the underidentification tests reveal the instruments (indicator variable for voter initiative, the geographic signature requirement, and the ideology index) are appropriate predictors of TELs. To explore the strength of this relationship, I also report results of the weak identification test. Our null hypothesis is that our instruments are weak and subject to bias that we find unacceptably large. The *F*-statistic from the weak identification test is larger than the Stock and Yogo (2005) critical value (13.91) in each of five specifications, an indicator that our excluded instruments are correlated with the

[16] Kioko and Martell (2012) found voter initiative provisions were not valid instruments in their study of the impact of state-level TELs. They argue initiative processes have been used to alter the direction of state and local government policies (Waters 2003), as such voter initiative provisions were an important explanatory variable that could be used to not only explain the presence of the endogenous variable, but also have an independent effect on taxing and spending levels. While initiatives have been shown to have a substantive impact on taxing and spending levels, I do not expect them to have any impact on reserves. In other words, voters have approved measures that would alter the course of government taxing and spending levels, but there are no measures that have been proposed to alter the level of reserves.

[17] The index infers the ideological position of the electorate from the distribution of votes in congressional races as well as the Americans for Democratic Action (ADA) and AFL-CIO Committee on Political Education (COPE) score for members of congress.

Table 8.3 Results from the instrumental variable model (1970–2004)

	Expectation	Model 1	Model 2	Model 3	Model 4	Model 5
Property tax rate limits[a]	±	−41.07** (16.38)				
Property tax levy limits[a]	±		9.996** (4.824)			
Limit on assessed values[a]	±			−26.75* (15.42)		
Binding limit (rate and assessment, levy and cap)[a]	±				−21.64* (11.40)	
Property tax limit (rate, levy, or assessment)[a]	±					9.176 (8.427)
Population (log)	−	9.519*** (2.690)	5.686*** (1.840)	8.018*** (2.596)	6.423*** (2.045)	5.065*** (1.827)
Density	+	0.00705 (0.0076)	0.0172*** (0.0056)	0.0177*** (0.0063)	0.0170*** (0.00603)	0.0179*** (0.0056)
Total expenditures (per capita)	−	−0.0266*** (0.004)	−0.0290*** (0.0047)	−0.0290*** (0.0048)	−0.0296*** (0.0049)	−0.0277*** (0.0049)
Income (per capita)	−	0.0000779 (0.0003)	−0.000172 (0.0002)	−0.000407 (0.0003)	−0.000293 (0.0002)	−0.000269 (0.0002)
Hirschman–Herfindahl index (HHI)	+	0.117*** (0.0262)	0.176*** (0.0227)	0.170*** (0.0223)	0.156*** (0.0203)	0.171*** (0.0254)
Property tax revenue (per capita)	+	0.0202*** (0.0065)	0.0314*** (0.0072)	0.0248*** (0.0063)	0.0247*** (0.0063)	0.0294*** (0.0071)
Sales tax revenue (per capita)	+	0.0162 (0.0217)	0.0701*** (0.0121)	0.0517*** (0.0114)	0.0559*** (0.0114)	0.0711*** (0.0161)
Income tax revenue (per capita)	+	−0.0127 (0.0217)	0.0144 (0.0181)	−0.0155 (0.0270)	−0.0167 (0.0263)	0.0124 (0.0191)
User charges and fees (per capita)	+	0.0153*** (0.004)	0.0168*** (0.0046)	0.0167*** (0.0046)	0.0173*** (0.0048)	0.0156*** (0.0047)
Federal aid (as a % of total revenues)	±	0.261*** (0.0676)	0.190*** (0.0545)	0.169*** (0.0525)	0.197*** (0.0560)	0.154*** (0.0512)
State aid (as a % of total revenues)	±	0.0692* (0.0388)	0.00118 (0.0306)	0.00951 (0.0305)	0.00607 (0.0303)	0.00833 (0.0308)
Full-faith and credit debt (per capita)	−	0.000586 (0.0006)	0.000581 (0.0006)	0.000470 (0.0005)	0.000493 (0.0005)	0.000560 (0.0005)
Short-term debt (per capita)	±	0.0235** (0.0118)	0.0225** (0.0109)	0.0248** (0.0117)	0.0244** (0.0118)	0.0214** (0.0107)
Capital outlays (as a % of total expenditures)	+	0.111*** (0.0257)	0.108*** (0.0253)	0.0960*** (0.0254)	0.0973*** (0.0253)	0.101*** (0.0252)
Utility (per capita)	+	0.0308*** (0.0095)	0.0230*** (0.0085)	0.0300** (0.0121)	0.0312*** (0.0111)	0.0221** (0.00901)

(continued)

Table 8.3 (continued)

	Expectation	Model 1	Model 2	Model 3	Model 4	Model 5
Administrative costs (% of total expenditures)	+	0.642*** (0.0700)	0.619*** (0.0664)	0.576*** (0.0652)	0.587*** (0.0648)	0.564*** (0.0660)
Complexity in service delivery	+	1.665*** (0.277)	1.445*** (0.277)	1.631*** (0.268)	1.588*** (0.266)	1.587*** (0.266)
County fixed effects		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Time dummies		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations		75,917	75,917	75,917	75,917	75,917
Test of endogenous regressors		6.504**	5.060**	2.866*	3.073*	1.354
Underidentification test (Kleibergen-Paap statistic)		88.282***	305.549***	202.067***	226.580***	169.254***
Weak identification tests		44.193	446.953	172.592	230.421	553.621
Stock and Yogo ID test critical values (10% maximal IV size)		13.91	13.91	13.91	13.91	13.91
Hansen J overidentification test of all instruments		1.011	3.349	4.324	3.809	6.398**
Excluded instrument		Voter initiative provision, geographic signature requirement, and citizen ideology index				

[a] Represents instrumented variables

Heteroscedastic-consistent standard errors reported in parentheses

*p<0.10, **p<0.05, ***p<0.01

endogenous variable and therefore strong predictors of TELs.[18] Finally, the Hansen J overidentification tests suggest our instruments are not correlated with the error term except in Model 5. I believe these findings are a strong indicator that TELs should not be modeled using a single indicator variable, but rather factor in the structure of the property tax limits. For comparative purposes, I also report the results from the fixed effects model (see Appendix).

Results from the empirical analysis show TELs do have an impact on cash reserves. In Model 1, I included property tax rate limits. These are limits on the property tax rate that cannot be exceeded without voter approval. The results here show county governments on average reported significantly lower unrestricted cash reserves (40 %, *p-value* < *0.05*). Assuming the average county retained 40 % of its expenditures in cash, those reporting a property tax rate limit would be reporting an average of 24 % of expenditures (approximately 3 months cash). In the second specification, I included property tax levy limits. These are limits on the total amount of revenue that can be raised from the property tax. As noted earlier, the limits are potentially binding if the laws did not permit governments to replace lost property tax revenues with non-property tax revenues. They are, however, potentially non-binding if they do not include an expenditure or revenue cap. Results in Model 2 show local governments subject to property tax levy limits do report higher reserves (10 %, *p-value* < *0.05*). Assuming the average county retained 40 % of its expenditures in cash reserves, those reporting a property tax levy limit reported an average of 44 % of expenditures in cash reserves (approximately 5.3 months of cash). In the third specification, I included limits on assessed values. These are the limits on the maximum possible increase in the value of the property for tax purposes. Given the structure of the property tax, the limits are only potentially binding when combined with rate limits; otherwise, governments can amend the property tax rate to yield revenues consistent with those levied prior to the adoption of the TEL. Results show local governments subject to a property tax assessment limit retained lower cash reserves (26.75 %, *p-value* < *0.1*). Again, assuming the average county retained 40 % of its expenditures in cash reserves, those reporting a property tax levy limit reported an average of 29 % of expenditures in cash reserves (approximately 3.5 months of cash).

Thus far the analysis has focused on a single TEL—that is a rate limit, a levy limit, or a limit on assessments. In Model 4 and 5, I include interactions of TELs. In Model 4, I included potentially binding property tax TELs—that is, the combination of rate limits with assessment limits or the combination of a property tax levy limit with caps on revenue or expenditure. Results show local governments subject to potentially binding TELs reported lower levels of cash reserves (21 %, *p-value* < *0.05*). Again, assuming the average county reported an average of 40 % of its expenditures in reserves, those subject to a potentially binding limit reported an average of approximately 4 months of cash or 35 % of expenditures.

[18] Results from the first stage regressions are available from the author.

In the final specification, I included the universe of property tax limits (rate limits, limits on assessed values, and levy limits). In that specification, I did not find TELs having a significant impact on reserve funds. It's important to note that relative to the results reported in Model 1–4, these results were not robust to tests on the validity of the instruments (see the Hansen J Overidentification Test).

For comparative purposes, I have reported results from a fixed effects model in Appendix.[19] In Model A through C the TELs coefficients, rate limits, levy limits, limit on assessed values, were not significantly different from zero. The potentially binding limit (Model D) was negative and significantly different from zero (−1.876 %, *p-value*<*0.10*); however, its effect on cash reserves was modest. Model E, which includes an indicator variable if the county government reported at least one of the five TELs (i.e., limits on rates, assessed values, levies, revenue caps, or expenditure caps), shows that on average, TELs did not have a significant impact on cash reserves. Notwithstanding, the results for all other variables were consistent with those reported in Table 8.3. This suggests TELs should not be treated as exogenous variables.

The control variables for the most part have the expected sign and are significantly different from zero. Surprisingly, larger governments (as measured using log of population) maintain higher and not lower levels of cash reserves (*p-value*<*0.01*). Densely populated counties also reported significantly higher reserves (*p-value*<*0.01*, except in Model 1), while governments reporting high per capita expenditures reported lower levels of reserves (i.e., reserves as a percent of expenditures were lower by approximately 2.6 percentage points for every $100 in per capita expenditures). While the literature on fund balance largely finds per capita income to be positively correlated with fund balances (Stewart 2009; Wang and Hou 2012), coefficients for the variable were not significantly different from zero in any of the specifications.

To capture taxing effort and changes in composition of own-source revenues, I included in the model HHI and per capita revenues for the four major own-source revenues—property tax, sales tax, income tax, and user charges and fees. As expected, reserves were positively correlated with HHI. Local governments with a diversified own-source revenue base reported higher levels of reserve. A unit change in the HHI index resulted in an increase in reserve funds of 0.12 percentage points (*p-value*<*0.01*). The coefficient was slightly larger in all other specifications (up to 0.176). Property taxes, sales taxes, and user charges and fees were also positively correlated with the cash reserves. For every $100 in per capita property tax

[19] The fixed effects model was specified as follows $Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 \mathrm{TEL}_{it} + \mathrm{CD}_i + \mathrm{TD}_t + \varepsilon_{it}$ where X_{it} is our vector of explanatory variables (R, D), TEL_{it} is the policy variable of interest that is suspected to be endogenous, CD_i and TD_i are the county and time fixed effects, and ε_{it} is the error term.

revenues, cash reserves rose by up to 2.02 percentage points (*p-value* < *0.01*). For every $100 per capita in user charges, cash reserves rose by up to 1.53 percentage points (*p-value* < *0*.01). Sales tax revenues contributed substantively to reserve funds. For every $100 per capita in sales tax revenues, cash reserves rose by up to 7 percentage points (*p-value* < *0.01* except in Model 1). This is also indicative of the significant growth in sales tax revenues as an important source of own-source revenues for county governments. The coefficient for income tax was not significantly different from zero in any of the specifications. As noted earlier, very few county governments adopted a local option income tax in the period of analysis (also see Fig. 8.1).

Because grants were a volatile revenue stream, I expect governments, recognizing such risk, to maintain significantly higher reserves. Results show reserves were positively correlated with intergovernmental transfers. A 1 % increase in the share of federal aid resulted in an increase in reserves of 0.26 percentage points. The coefficients, while statistically significant, varied in magnitude (0.155 up to 0.26). For state aid, results were not significantly different from zero except in Model 1 (0.07 %, *p-value* < *0.1*). Data in Table 8.2 shows us there was more variation in share of federal aid dollars (Mean = 5.05 %, SD = 6.56 %) relative to share of state aid dollars (Mean = 29.02 %, SD = 17.97 %). Governments therefore maintain reserves for precautionary purposes (revenue shocks). Alternatively, these governments could maintain larger reserves in part due to nature of the funded projects. For example, if federal intergovernmental transfers included capital outlays, these funds are more likely to be unevenly distributed and would likely vary significantly across governments as well as overtime. State aid dollars are more likely to be allocated for essential services and social safety programs. Local governments are therefore not buffering themselves against revenue shocks if state-aid dollars are cut during an economic downturn.

While studies have shown long-term obligations were negatively correlated with reserves (Gore 2009; Hendrick 2006; Stewart 2009), results here do not support that hypothesis. In fact, local governments reported significantly higher cash reserves if the government reported any short-term debt. In other words, if a government were to borrow funds in the short run to cover revenue short-falls, it would maintain an average of 2.35 % of its expenditures in cash for every $100 in short-term debt outstanding (*p* < *0.05*). However, as noted earlier, there are significant transaction costs associated with debt issuance, as such, only a very small portion of governments (10,756 or 14 %) of the sample reported any outstanding short-term debt obligations. This is strong indication that local governments, unlike state, will rely on reserve funds to cover cash flow shortages and only access the credit markets when all other avenues have been exhausted.

Capital outlays were positively correlated with cash reserves. A 1 % increase in capital-related spending (as a percent of total expenditures) resulted in a 0.11 percentage point increase in cash reserves (*p-value* < *0.01*). Utility-related activities were also an additional source of slack. $100 of per capita utility-related spending resulted in 3.08 percentage point increase in cash reserves (*p-value* < *0.01*). As noted

earlier, only a small portion of our sample reported utility-related activities. This finding is therefore a strong indicator that public utilities generate and retain cash that general purpose governments could tap into for cash flow purposes in lieu of short-term debt.

Finally, Gore (2009) hypothesized governments reporting a greater share of administrative expenses maintained large cash reserves. Results reported in Table 8.3 (and Appendix) are consistent with Gore (2009) hypothesis. For the sample of county governments, our data shows a 1 % increase in administrative expenses resulted in a 0.64 percentage point increase in cash reserves. While administrative expenses were only 5.5 % of the total expenditures (Median = 4.14, $\hat{\beta} = 0.61$), they had a substantive impact on reserves. For example, when compared to federal aid dollars (Mean = 5.05, Median = 3.05, $\hat{\beta} = 0.26$), the estimate for administrative expenses was significantly larger. It also begs the question whether governments holding larger cash reserves reported a larger share of administrative expenses or whether because there are larger administrative expenses, financial managers maintained larger cash reserves. Finally, as expected, complexity in the composition of the government's responsibility resulted in larger reserves (1.67 %, *p-value* < *0.01*).

8.5 Concluding Remarks

A number of studies have addressed the role and impact of slack resources on local government spending (Gianakis and Snow 2007; Gore 2009; Hendrick 2006; Marlowe 2005, 2011; Shelton and Tyer 2000; Stewart 2009; Wang and Hou 2012). In this chapter, I provide an extension to the existing literature by analyzing the impact of TELs on unrestricted cash reserves. Unlike existing studies that rely solely on the fund balances, I used cash reserves to test the impact of TELs on local government savings behavior. The measure, previously explored in Gore (2009), is correlated with widely used measures of slack. What's more, cash reserves are a more accurate measure of liquidity and an important indicator of credit quality (Moody's 2014).

Using data from the Census Bureau, I constructed an unbalanced panel dataset using county level data from 47 of the 50 states for the period 1970 through 2004. The analysis shows that over the years, county governments maintained large cash reserves. Controlling for the endogeneity of these fiscal rules, the analysis finds local governments subject to the TELs reported significantly lower levels of reserves. Notwithstanding, the level of cash reserves was more likely to be meaningful. The analysis also finds governments with diversified revenue streams reported higher cash reserves. Cash reserves are positively correlated with each of the major sources of revenues—property tax, sales tax, user charges and fees. Of the three, sales tax revenues substantively contribute to cash reserves. Cash reserves were not positively correlated with state-aid. In other words, local governments were not buffering themselves against potential negative shocks that were a result of cuts to aid.

Notwithstanding, the analysis also brings to the fore new research questions in particular how do governments manage liquidity (i.e., cash and cash equivalents) over the economic cycle. For example, Marlowe (2005) and Wang and Hou (2012) found fund balances offer only marginal countercyclical benefits. However, Gianakis and Snow (2007) show governments draw down on their free cash flows during an economic downturn. What's missing in this literature is how governments balance between drawing down on cash reserves (an asset), collecting on their outstanding receivables (also reported as an asset), or rely on credit facilities, including delaying payments on outstanding non-debt obligations (a liability) and/or the use of short-term debt. In other words, the analysis of the net balance (i.e., fund balance or unrestricted fund balance) does not provide us with any information on the use of cash or the use of debt (implicit, e.g., delayed payments and explicit, e.g., short-term debt) and understanding the tradeoff governments make would inform management theories.

Using cash as a proxy measure of reserves also opens up new avenues for research using Census data. For example, given the existence of TELs, what is the impact of revenue shocks or expenditure shocks on cash reserves and are local governments subject to the TEL more or less able to buffer themselves given changes in the economic environment?

While the analysis provides us with interesting results, there are limitations to these data relative to the existing work. For example, the data from the Census Bureau does not identify designations in cash reserves (e.g., capital projects or special revenue funds). As such, it likely overestimates the level of cash reserves reported in Table 8.1.[20] Notwithstanding, this likely means I have underestimated (and not overestimated) the magnitude of the impact of these rules on cash reserves. A comparative study using alternative sources of data and alternative specifications for the dependent variable would provide valuable insights.

Appendix: Results from the OLS regression (1970–2004)

[20] For example, if when reporting to the Census Bureau the government aggregates unrestricted cash of governmental activities together with cash reserves for their business-type activities. Alternatively, cash reserves could include designated purposes which we are unable to clearly identify relative to fund-based data.

	Expectation	Model A	Model B	Model C	Model D	Model E
Property tax rate limits	+/–	–0.318 (0.882)				
Property tax levy limits	+/–		–0.613 (0.759)			
Limit on assessed values	+/–			–0.867 (1.126)		
Binding limit (rate and assessment, levy and cap)	+/–				–1.876* (0.974)	
Property tax limit (rate, levy, or assessment)	+/–					–0.414 (0.835)
Population (log)	–	5.054*** (1.807)	4.990*** (1.799)	5.113*** (1.801)	5.129*** (1.802)	5.024*** (1.800)
Density	+	0.0152*** (0.00533)	0.0152*** (0.00534)	0.0153*** (0.00536)	0.0153*** (0.00538)	0.0152*** (0.00534)
Total expenditures (per capita)	–	–0.0290*** (0.00476)	–0.0290*** (0.00475)	–0.0290*** (0.00475)	–0.0290*** (0.00476)	–0.0289*** (0.00476)
Income (per capita)	–	–0.000149 (0.000203)	–0.000151 (0.000203)	–0.000158 (0.000202)	–0.000161 (0.000203)	–0.000145 (0.000203)
Hirschman–Herfindahl index (HHI)	+	0.157*** (0.0201)	0.157*** (0.0203)	0.158*** (0.0202)	0.158*** (0.0201)	0.157*** (0.0202)
Property tax revenue (per capita)	+	0.0279*** (0.00672)	0.0278*** (0.00670)	0.0278*** (0.00669)	0.0276*** (0.00665)	0.0279*** (0.00672)
Sales tax revenue (per capita)	+	0.0602*** (0.0108)	0.0599*** (0.0106)	0.0603*** (0.0106)	0.0602*** (0.0106)	0.0599*** (0.0109)
Income tax revenue (per capita)	+	0.0166 (0.0183)	0.0170 (0.0183)	0.0158 (0.0183)	0.0140 (0.0183)	0.0171 (0.0182)
User charges and fees (per capita)	+	0.0167*** (0.00464)	0.0167*** (0.00464)	0.0167*** (0.00464)	0.0168*** (0.00464)	0.0167*** (0.00464)
Federal aid (as a % of total revenues)	+/–	0.173*** (0.0517)	0.171*** (0.0518)	0.172*** (0.0519)	0.174*** (0.0518)	0.172*** (0.0519)
State aid (as a % of total revenues)	+/–	0.0176 (0.0305)	0.0180 (0.0305)	0.0171 (0.0306)	0.0165 (0.0306)	0.0173 (0.0305)
Full-faith and credit Debt (per capita)	–	0.000564 (0.000587)	0.000563 (0.000586)	0.000561 (0.000584)	0.000558 (0.000582)	0.000563 (0.000586)
Short-term debt (per capita)	+/–	0.0229** (0.0109)	0.0229** (0.0108)	0.0229** (0.0109)	0.0230** (0.0109)	0.0229** (0.0109)
Capital outlays (as a % of total expenditures)	+	0.105*** (0.0251)	0.105*** (0.0251)	0.105*** (0.0251)	0.105*** (0.0251)	0.105*** (0.0251)
Utility (per capita)	+	0.0246*** (0.00877)	0.0247*** (0.00881)	0.0247*** (0.00885)	0.0251*** (0.00888)	0.0246*** (0.00878)
Administrative costs (% of total expenditures)	+	0.610*** (0.0644)	0.608*** (0.0643)	0.609*** (0.0646)	0.608*** (0.0645)	0.611*** (0.0643)
Complexity in service delivery	+	1.654*** (0.263)	1.667*** (0.264)	1.653*** (0.263)	1.649*** (0.263)	1.656*** (0.263)
Constant		–32.16* (18.62)	–31.56* (18.58)	–32.87* (18.60)	–32.92* (18.61)	–31.80* (18.60)
County fixed effects		Yes	Yes	Yes	Yes	Yes
Time dummies		Yes	Yes	Yes	Yes	Yes
Observations		75,917	75,917	75,917	75,917	75,917
Adjusted *R*-squared		0.033	0.033	0.033	0.033	0.033

Heteroscedastic-consistent standard errors reported in parentheses.
*$p<0.10$, **$p<0.05$, ***$p<0.01$

References

Anderson NB (2006) Property tax limitations: an interpretative review. Natl Tax J 59(3):685–694
Baum CF, Schaffer ME, Stillman S (2003) Instrumental variables and GMM: estimation and testing. Department of Economics, Boston College, Boston
Bennett J, DiLorenzo TJ (1982) Off-budget activities of local government: the bane of the tax revolt. Public Choice 39(3):333–342
Benson ED, Marks BR (2010) Dueling revenue caps and municipal bond yields: the case of Houston, Texas. Public Budg Finance 30(2):112–133
Benton JE (2005) An assessment of research on American counties. Public Adm Rev 65(4):462–474
Benton JE, Byers J, Cigler BA, Klase KA, Menzel DC, Salant TJ, Streib G, Svara JH, Waugh WL (2007) Conducting research on counties in the 21st century: a new agenda and database considerations. Public Adm Rev 67(6):968–983
Berry WD, Ringquist EJ, Fording RC, Hanson RL (1998) Measuring citizen and government ideology in the American states. Am J Polit Sci 42(1):327–348
Boehmke FJ (2005) The indirect effects of direct legislation: how institutions shape interest group systems. The Ohio State University Press, Columbus
Bradbury KL, Mayer CJ, Case KE (2001) Property tax limits, local fiscal behavior, and property values: evidence from Massachusetts under Proposition 21/2. J Public Econ 80:287–311
Brennan G, Buchanan JM (1979) The logic of tax limits: alternative constitutional constraints on the power to tax. Natl Tax J 32:11–22
Carr JB (2006) Local government autonomy and state reliance on special district governments: a reassessment. Polit Res Q 59(3):481–492
Carroll DA (2005) Are state governments prepared for fiscal crises? A look at revenue diversification during the 1990's. Public Finance Rev 33(5):603–633
Carroll DA, Johnson T (2010) Examining small town revenues: to what extent are they diversified? Public Adm Rev 70(2):223–235
Clingermayer JC, Dan Wood B (1995) Disentangling patterns of state debt financing. Am Polit Sci Rev 89(1):108–120
Cornia GC, Walters LC (2005) Full disclosure: unanticipated improvements in property tax uniformity. Public Budg Finance 25(3):106–123
Dye RF, McGuire TJ, McMillen DP (2005) Are property tax limitations more binding over time. Natl Tax J 58(2):215–225
Fitch (2002) The 12 habits of highly successful finance officers. Fitch Ratings, New York
GASB (2009) Fund balance reporting and governmental fund type definitions. Governmental Accounting Standards Board
Gianakis G, Snow D (2007) The implementation and utilization of stabilization funds by local governments in Massachusetts. Public Budg Finance 27(1):86–103
Gordon TM, Rueben K (2010) The best of times or the worst of times? How alternative revenue structures are changing local government. In: Ingram GK, Hong Y-H (eds) Municipal revenues and land policies. Lincoln Institute of Land Policy, Cambridge
Gore AK (2009) Why do cities hoard cash? Determinants and implications of municipal cash holdings. Account Rev 84(1):183–207
Hendrick R (2006) The role of slack in local government finances. Public Budg Finance 26(1):14–46
Hoene C (2004) Fiscal structure and the post-Proposition 13 fiscal regime in California cities. Public Budg Finance 24(4):51–72
Hou Y (2003) What stabilizes state general fund expenditures in downturn years—budget stabilization fund or general fund unreserved undesignated balance? Public Budg Finance 23(3):64–91
Hou Y (2004) Budget stabilization fund: structural features of the enabling legislation and balance levels. Public Budg Finance 24(3):38–64

Hou Y (2005) Fiscal reserves and state own-source expenditure in the downturn years. Public Finance Rev 33(1):117–144
Johnson CL, Kriz KA (2005) Fiscal institutions, credit ratings and borrowing costs. Public Budg Finance 25(1):84–103
Kioko SN, Martell CR (2012) Impact of state-level tax and expenditure limits (TELs) on government revenues and aid to local governments. Public Finance Rev 40(6):736–766
Kioko SN, Zhang P (2014) Impact of tax and expenditure limits (TELS) on local government debt burdens. Association of Budgeting and Financial Management, Grand Rapids
Knight B (2000) Supermajority voting requirements for tax increases: evidence from the states. J Public Econ 76:41–67
Lobao L, Kraybill DS (2005) The emerging roles of county governments in metropolitan and nonmetropolitan areas: findings from a national survey. Econ Dev Q 19(3):245–259
Maher CS, Deller SC (2013) Measuring the impact of TELs on municipal financial condition. In: Levine H, Justice JB, Scorsone EA (eds) Handbook of local government fiscal health. Jones and Bartlett Learning, Burlington
Marlowe J (2005) Fiscal slack and counter-cyclical expenditure stabilization: a first look at the local level. Public Budg Finance 25(3):48–75
Marlowe J (2011) Beyond 5 percent: optimal municipal slack resources and credit ratings. Public Budg Finance 31(4):93–108
Marlowe J (2013) Fiscal slack, reserves, and rainy day funds. In: Levine H, Justice JB, Scorsone EA (eds) Handbook of local government fiscal health. Jones & Bartlett Learning, Burlington, pp 321–341
McCubbins MD, Moule E (2010) Making mountains of debt out of molehills: the pro-cyclical implications of tax and expenditure limitations. Natl Tax J 63(3):603–622
Moody's (2004) The six critical components of strong municipal management. Moody's Investors Service, New York
Moody's (2014) Rating methodology: US local government general obligation debt. Moody's Investor Services, New York
Mullins DR, Joyce PG (1996) Tax and expenditure limitations and state and local fiscal structure: an empirical assessment. Public Budg Finance 16(1):75–101
Mullins DR, Wallin BA (2004) Tax and expenditure limitations: introduction and overview. Public Budg Finance 24(4):2–15
Murray MP (2006) Avoiding invalid instruments and coping with weak instruments. J Econ Perspect 20(4):111–132
Plummer E, Hutchison PD, Patton TK (2007) GASB No. 34's governmental financial reporting model: evidence in information relevance. Account Rev 82(1):205–240
Poterba JM, Rueben KS (2001) Fiscal news, state budget rules, and tax-exempt bond yields. J Urban Econ 50:537–562
Pridgen AK, Wilder WM (2013) Relevance of GASB No. 34 to financial reporting by municipal governments. Account Horiz 27(2):175–204
Rose S, Smith DL (2012) Budget slack, institutions, and transparency. Public Adm Rev 72(2):187–195
Rubin I (1998) Class, tax, and power: municipal budgeting in the United States. Chatham House, Chatham
Rueben KS (1997) The effect of tax and expenditure limitations on state and local governments, economics. Massachusetts Institute of Technology, Boston
S&P (2013) U.S. local governments general obligation ratings: methodology and assumptions. Standard and Poor's Rating Services, New York
Saxton GD, Hoene CW, Erie SP (2001) Fiscal constraints and the loss of home rule: the long term impacts of California's post-Proposition 13 fiscal regime. Am Rev Public Adm 32(4):423–454
Shadbegian RJ (1999) The effect of tax and expenditure limitations on the revenue structure of local government, 1962–87. Natl Tax J 52(2):221–238
Shelton M, Tyer C (2000) Local government reserve funds and fund balance. Munic Finance J 21(1):1–18

Skidmore M (1999) Tax and expenditure limitations and the fiscal relationships between state and local governments. Public Choice 99(1):77–102
Sokolow AD (2000) The changing property tax in the west: state centralization of local finances. Public Budg Finance 20(1):85–104
Stewart LSM (2009) Examining factors that impact Mississippi counties' unreserved fund balance during relative resource abundance and relative resource scarcity. Public Budg Finance 29(4):45–73
Stock JH, Yogo M (2005) Testing for Weak Instruments in Linear IV Regression. In Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg, edited by Donald W K Andrews and James H Stock. Cambridge, MA: Cambridge University Press
Sun R (2012) Reevaluating the effect of tax and expenditure limitations: an instrumental variable approach. Public Finance Rev 42(1):92–116
Suyderhoud JP (1994) State-local revenue diversification, balance, and fiscal performance. Public Finance Rev 22(2):168–194
Thaiprasert N, Faulk D, Hicks MJ (2010) The economic effects of Indiana's property tax rate limits. Center for Business and Economic Research, Ball State University, Muncie
Thompson F, Green MT (2004) Vox populi? Oregon tax and expenditure limitation initiatives. Public Budg Finance 24(4):73–87
Wagner GA (2004) The bond market and fiscal institutions: have budget stabilization funds reduced borrowing costs? Natl Tax J 57(4):785–804
Wagner GA, Elder EM (2005) The role of budget stabilization funds in smoothing government expenditures over the business cycle. Public Finance Rev 33(4):439–465
Wang W, Hou Y (2012) Do local governments save and spend across budget cycles? Evidence From North Carolina. Am Rev Public Adm 42(2):152–169
Waters MD (2003) Initiative and referendum almanac. Carolina Academic Press, Durham
Wildasin DE (2010) Intergovernmental transfers to local governments. In: Ingram GK, Hong Y-H (eds) Municipal revenues and land policies. Lincoln Institute of Land Policy, Cambridge, pp 47–76
Wolkoff M (1987) An evaluation of municipal rainy day funds. Public Budg Finance 7(2):52–63

Chapter 9
Is There an Optimal Size of Fiscal Reserves for Local Governments?

Kenneth A. Kriz

Abstract This chapter examines the topic of the optimal size of fiscal reserves. The fundamental question of whether there is an optimal level of reserves is considered, along with the elements of a model of the optimal reserve size. We examine existing research on the topic, and then build a model of reserves using a forecast simulation approach. We first develop a forecast model using data from a local government. The forecast model consists of two time-series systems equations. The first equation contains economic variables, producing a forecast of the local economy. Those forecasts then enter the second equation as predictors of revenues and expenditures. We then simulate the equations going forward to produce estimates of revenues and expenditures for the government, thus leading us to the level of fiscal reserves that should be required to cover potential shortfalls.

9.1 Introduction

As other chapters in this volume have shown, there is wide variation in the implementation of fiscal reserves, the levels and types of fiscal reserve funds maintained, and the usage of fiscal reserves during times of financial uncertainty. However, the rationale for maintaining fiscal reserves is widely accepted. As several chapters have put it, local governments facing a shortfall in revenues available to service-desired expenditures have one of four choices: (1) Increase revenues through rate increases or base broadening; (2) Reduce expenditures by eliminating or downsizing programs, restricting eligibility requirements, postponing capital outlays, and deferring maintenance programs; (3) Borrowing money directly from the public through debt issuance or indirectly from fiduciary trust funds; or (4) Use fiscal reserves (see for example Vasche and Williams 1987).

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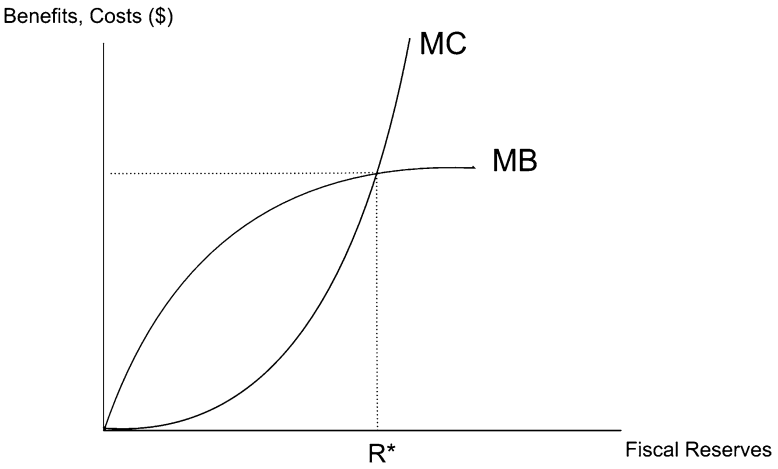


Fig. 9.1 The optimal level of reserve funds

Of the above options, the first tends to be tremendously politically unpopular (though some cities accomplished this during the last major economic downturn) and the timing of tax increases can be problematic (it may take time to raise rates or broaden bases, leading to revenue increases just as a recovery is taking shape). Number two is unpopular at least in communities who are disproportionately affected by cuts and may produce cuts in programs that are successful in the long run but simply costly in the short term. The third may be restricted in time (most localities are prohibited from using long-term borrowing to fund short-term budget shortfalls) and the time when funds are needed may be exactly the time that it is most difficult to borrow. This leaves number four, fiscal reserves as being the most viable (and sometimes only viable) option open to local officials.

There are thus obvious benefits to using fiscal reserves to smooth revenues over the economic cycle. Fiscal reserves act as a cushion for governments. However, there are costs associated with the accumulation of fiscal reserves. Some are the "opportunity costs" of projects/programs foregone in order to accumulate reserves. Others are political costs of the perceived opportunity for improper use of resources. One can view the decision about the optimal level of reserves as a balancing of those benefits and costs. Figure 9.1 illustrates this decision. The marginal benefit of an additional dollar of fiscal reserves is shown as a concave function. At low levels of reserves, the extra benefit of holding an additional dollar of reserves is high. But as the reserves grow, the marginal benefit falls, at some point becoming zero. The marginal cost of adding a dollar of reserves is initially small, but it grows strongly as more revenue is saved versus put to use providing programs. At point R^*, the marginal benefit of the last dollar of reserves accumulated is exactly equal to its marginal cost, signaling the optimal level of reserves has been reached.

If that were all there was to be said about the analysis, determining the optimal level of reserves would be an easy task. However, calculating the marginal benefit of a given level of reserves is extraordinarily difficult due to some fundamental

challenges. These include: (1) The need to decide on the appropriate measure of reserves; (2) The analysis of necessary levels of reserves involves stochastic uncertainty; (3) The asymmetric nature of uncertainties; (4) The shifting nature of public finances; and (5) The need for an implementation plan that recognizes a true need for the use of reserves versus a "manufactured need."

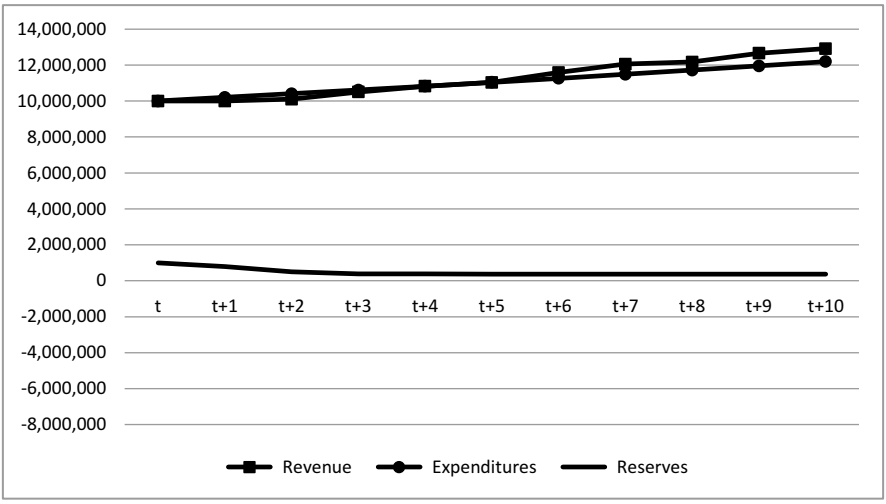
We next consider these in turn. With respect to the appropriate measure of reserves, governments theoretically have many potential sources of reserves. There are budget stabilization funds, sometimes called "rainy day funds," where governments can formally set aside revenues in a savings account for future use. There are also unreserved fund balances in the General Fund and other Governmental Funds which theoretically are available for spending in future years. Finally, there may be unrestricted balances that have accrued in other funds (including in Fiduciary Funds such as trust funds) which can be spent. This last category is the most contentious, although many state and local governments made transfers from many funds into their General Funds during the last economic downturn in order to stabilize finances (Williams 2012).

Stochastic uncertainty affects the determination of optimal levels of fiscal reserves directly. The need for fiscal reserves plays out many years, if not decades, into the future. As with revenue forecasting, errors in determining needs for expenditure and realizations of revenues (which are fundamental to the calculation of optimal budget reserves) are likely. The size of future forecasting errors can be estimated based on past data, but if a fundamental "structural break" happens in the finances of an organization, future errors may be much larger than past errors.

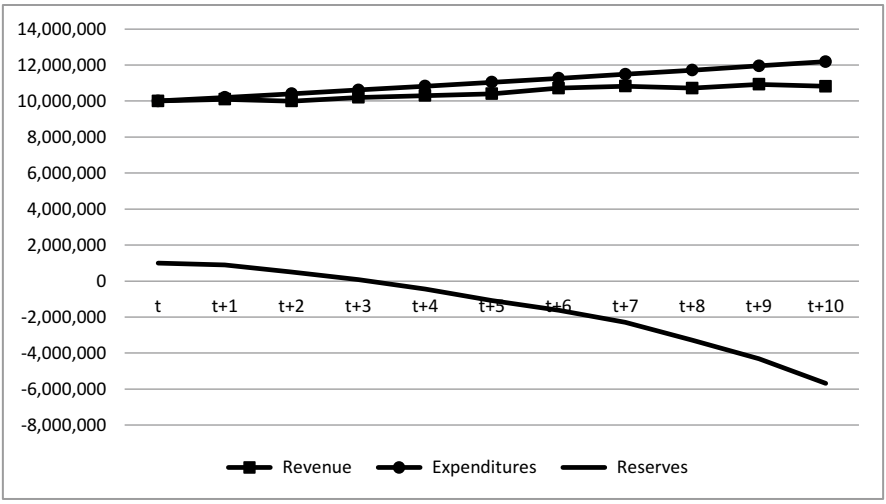
The effects of stochastic uncertainty can be shown in Fig. 9.2. Panel A and Panel B both show outcomes 10 years into the future for a revenue process where the growth rate of revenue varies annually according to a uniform distribution with a minimum of −1 % and maximum of 5 %. Expenditure growth is a known value of 2 % per year. In Panel A, the random outcome is that the initial level of reserves (10 % of annual revenues) is sufficient to support revenues over the 10-year period. In Panel B, the random outcome is that the same initial level of reserves is nowhere near sufficient to stabilize revenues. The key to understanding the effect of this uncertainty is that each of the outcomes is equally probable. Obviously, the role of stochastic uncertainty greatly affects the evaluation of any level of fiscal reserves.

Compounding this problem is the asymmetric nature of uncertainty. As many authors have noted, positive forecasting errors (underestimating future revenues or overestimating future expenditure demands) may have lesser consequences for governments and citizens than negative forecasting errors. This asymmetry may create a subtle bias toward forecasting a greater need for reserves than would be forecast if the consequences for forecasting errors were symmetric.

Another potential for structural breaks are breaks in the fiscal composition of governments. These can come from the decisions of a jurisdiction (for example, the state of Kansas drastically cutting reliance on the income tax in favor of sales taxes). They can also come from decisions of other jurisdictions that cause fiscal spillover effects (changes in federal Medicaid eligibility or compensation rules cause fiscal effects for state and local governments). These changes may raise or lower required reserves in ways that are not always easily forecastable.



Panel A.



Panel B.

Fig. 9.2 Effect of stochastic uncertainty on reserve levels. Panel (**A**) Realization of sufficient revenues to meet expenditure needs. Panel (**B**) Realization of insufficient revenues to meet expenditure needs

Finally, implementing a plan for accumulating fiscal reserves may not be simple. Beyond the obvious political and programmatic pressures to spend more than any plan may mandate, there is a need to be able to distinguish between a real need for the expenditure of reserve resources and a manufactured need. There are obvious pressures to spend down reserves during even the mildest of economic downturns. This creates a need for firm and specific "release rules" that must be followed by governments.

9.2 Existing Academic Literature

While the literature on the determinants and use of fiscal reserves is somewhat more developed, the literature on the optimal size of those funds has received far less attention, possibly due to the problems identified above. Table 9.1 lists each of the major pieces of literature in this topic area along with their focus on the risks facing state and local governments, the geographic nexus of data underlying their model, and the model that they use to determine the optimal level of fiscal reserves and their findings.

Vasche and Williams (1987) were the first to take up the question of how large fiscal reserves should be. They pointed out that this fundamental question was often left to the realm of politics and public opinion. They established that the need to use fiscal reserves to offset budgetary shortfalls had to be balanced against public opinion, which often seems to feel that fiscal reserves are a "slush fund" that allows for currying political favors. They examined revenue forecasting errors from the state of California in order to project the amount of budget reserves that should be carried as a defensive budget mechanism. They conclude that the state should keep a minimum of 10 % in fiscal reserves to cover potential shortfalls in the state budget.

Navin and Navin (1997) attempt to calculate the optimal size of and contribution rate to the Ohio Budget Stabilization Fund. They use a combination of regression

Table 9.1 Existing literature on optimal fiscal reserves

Author(s)	Source of risk	Geography	Model	Findings
Vasche and Williams (1987)	Revenue forecasting errors	State of California	Confidence intervals	State should keep a minimum of 10 % reserves
Navin and Navin (1997)	Economic and revenue risk	State of Ohio	Correlation/ regression	Optimal fund balance of 13.51 % with 68 % confidence
Joyce (2001)	Economic, revenue, and expenditure (Medicaid)	Numerous states	Index construction/ comparison	No "one size fits all" recommendation
Kriz (2002, 2003)	Revenue risk, desired expenditure growth	Minnesota local governments	Monte Carlo simulation	Required reserves 91.94 % for average local government with 75 % confidence
Dothan and Thompson (2009)	Economic (inflation and population growth), revenue, time preference for expenditures	Hypothetical municipal government	Optimal control theory	Optimal reserve fund balance 93.57 %
Marlowe (2011)	Fall in bond rating caused by inability to maintain spending, tax rates	Cities nationwide	Calculated change in probability of a given rating using ordered probit model	Reserves have minimal effect on rating probabilities

analysis and simple trend analysis on state personal income and general fund own-source revenue. Analyzing the personal income data, they find that the average contribution period for building up reserves should be approximately 1.5 times as long as the average period when the fund would have to be available in order to stabilize spending. Examining the revenue data, they calculate that the optimal fund balance would be 13.51 % during the period when the state was accumulating reserves. This would cushion the average revenue shortfall during a downturn with 68 % confidence. If the state wished to be more confident in covering potential revenue shortfalls, they would need higher fund balances.

Joyce (2001) was one of the first to attempt to analyze "optimal" fiscal reserves across multiple jurisdictions. He developed an index of fiscal volatility through evaluating a state government's reliance on the corporate income tax, federal aid, and gambling revenues along with the relative budget share of state Medicaid expenditures and the volatility of the state's economic environment (measured by the difference between the state's average unemployment rate and the average national unemployment rate for the 1990–1997 period). He then relates the volatility index to the rainy day fund maintained in each state using a rank order type of analysis. He finds that some states with low volatility still maintain high balances and some states with high volatility maintain a low balance. He concludes that a "one size fits all" optimal rainy day fund balance prescription may not make sense.

Kriz (2002, 2003) pursued a more general model of determining fiscal reserve balances. His model was built up from the budget constraint of a jurisdiction. Implicitly, Kriz assumes a single budget decision maker who maximizes the utility of citizens in the jurisdiction through maintaining a certain level of expenditure growth over time. Kriz then introduces volatility into the model by specifying that the time path of revenues follows a Markov process (Geometric Brownian Motion). This introduces uncertainty as to whether the jurisdiction can fund the desired level of expenditures over time. Fiscal reserves are kept in order to smooth the revenue stream and allow the government to reach their desired expenditure growth level. Using data from larger Minnesota local governments over the period 1984–1999, Kriz solves for the level of fiscal reserves necessary to maintain various levels of expenditure growth. For a desired expenditure growth rate of 3 % and rate of return on invested assets of 5 %, if a government wanted to ensure that the expenditure growth rate would be maintained with 75 % confidence, the required fiscal reserves would be 91.94 % of annual revenues. For jurisdictions with greater reliance on less volatile tax bases or with better returns on reserve investments, lower levels of reserves are required.

Dothan and Thompson (2009) do not analyze the topic of optimal fiscal reserves directly. Rather, they build a model of the optimal spending rate given several variables. Similar to Kriz, they build a model based on the budget constraint of a jurisdiction. Their model is built around a utility function of a budget policymaker that values a constant ratio of spending to wealth. Given an average growth rate and volatility of revenues, inflation and population growth, risk aversion coefficient, rate of time preference for expenditures, capitalization rate for expenditures, market price of risk, and rate of return on invested reserve fund assets, they solve for the optimal spending rate and reserve fund balance. Given a set of assumptions for a

hypothetical jurisdiction, they find that the optimal spending rate of the jurisdiction should be approximately 2.4 % of the wealth of the jurisdiction. The optimal reserve fund balance would be 93.57 % of revenue. As the parameter assumptions are varied, the optimal spending rate does not change much. However, the optimal reserve fund balance varies dramatically, from a negative 200 % of revenues for situations with high mean growth rates of revenues to 350 % of revenues for situations with high inflation and population growth.

Marlowe (2011) takes a somewhat different approach to analyzing the optimal level of fiscal reserves. He relates the level of three measures of fiscal reserves (unreserved fund balance, total general fund balance, and unrestricted net assets in government funds) to bond ratings for a sample of over 500 cities. He derives predicted probabilities of credit ratings using an ordered probability model under different conditions of fiscal reserves, fiscal conditions, and demographic characteristics. He finds that slack resources (reserves) exhibit little effect on credit quality. Small, budget-constrained jurisdictions show the greatest reduction in the probability of obtaining a relatively low rating (A) if they keep a modest amount of slack versus a small amount. Larger, wealthier jurisdictions show a relatively strong increase in the probability of getting a prime (AAA) rating by keeping high levels of fiscal reserves (versus low levels). Otherwise the observed probability changes are mostly small and economically insignificant. He concludes that despite the rhetoric surrounding the maintenance of fiscal reserves, there is little evidence that keeping high levels of reserves reduces credit risk as measured by credit ratings.

9.3 Comparing Models

There are certainly many differences among the previous papers published on the topic of optimal fiscal reserves. The level of governments ranges from local to state, the geography varies from Ohio to California. There are three general or national level models (Joyce, Dothan/Thompson, and Marlowe), while the others are geographic-specific, at least in their calibration. The modeling framework varies dramatically, from ad hoc examinations of what should be items that contribute to volatility (Joyce, for example) to fully defined systems based on the intertemporal budget constraint of a representative decision maker Dothan and Thompson (2009).

However, there are also many commonalities among the existing models. All of the models mention the need to maintain expenditures at a certain level as the reason for reserves. In the earlier models, this rationale was implicit. Kriz and Dothan/Thompson model explicitly the expenditure demands of jurisdictions. In Kriz, the model assumes that the expenditure demand is a choice of the budget decision maker, whereas in Dothan and Thompson the choice variable is the timing of expenditures. For Kriz, the "failure" of a given level of reserves is manifested in a need to reduce spending below the required level or increase tax rates to maintain the desired spending level. In Dothan and Thompson, failure would be defined as an inability to maintain spending as a percentage of wealth as indicated by the model. All of the existing models rely heavily on revenue risk to motivate the level of need

for budget reserves. In Vasche and Williams, this risk manifests itself through errors in revenue forecasts, while in the other major models the risk is realized directly through fluctuations in revenue realizations.

There are also some common elements that are largely missing from the models. The first is that with the exception of Dothan and Thompson, there is no discussion of the costs of accumulating reserves. In Dothan and Thompson, there is a penalty for accumulating reserves in the form of reducing current spending and therefore utility of decision makers. But the other models only mention the cost of accumulating reserves in passing. The problem with the Dothan and Thompson paper, like the majority of the other papers (with the notable exception of Navin and Navin), is a definitive plan or path to accumulate reserves. Navin and Navin estimate the period necessary to accumulate reserves from economic data, and then use that and revenue volatility to calculate the required reserves.

9.3.1 Elements of a Synthesis Model

Developing a synthesis model for determining the optimal size of budget reserves is a task that has not heretofore been attempted in the academic literature. Each of the authors mentioned earlier appears to have been working very much independently. Still, we can use the information gleaned from reviewing those works as well as our basic knowledge of the role of budget reserves to sketch out the elements that should be present in a synthesis model of the optimal level of budget reserves. These are listed below with a short description: (a) Economic uncertainty, either directly or indirectly through revenue uncertainty; (b) Revenue uncertainty, in the form of stochastic uncertainty about the future growth of the tax base and revenue forecasting errors; (c) Expenditure demands, including desired expenditure levels and desired expenditure timing; (d) Some recognition of the costs of accumulating reserves, either through displaced expenditure demand or a political "loss function"; and (e) A plan for the accumulation of reserves, ensuring a long enough accumulation period to meet demands.

9.3.2 Forecasting-Simulation Model

We develop one method for building a model of optimal budget reserves. We term this method the "forecast-simulation" method because it involves building a forecast of key economic and financial variables for a jurisdiction, then simulating the economic/financial system into the future, and assessing the likelihood of needing a reserve of a certain level. Our analysis involves the city of Omaha, Nebraska. Omaha was chosen due to the availability of a relatively long time-series of data on financial variables, which is necessary given our approach. Since the unit of analysis was not chosen randomly, this analysis should be viewed as a calibration of our approach.

Table 9.2 Variables used in the forecasting-simulation model

Variable	Definition (units)	Source
PCPI	Per capita personal income, Omaha-Council Bluffs MSA (dollars)	U.S. Bureau of Economic Analysis, Table CA 1-3
Wages	Wages and salaries, Omaha-Council Bluffs MSA (thousands of dollars)	
Emp	Wage and salary employment, Omaha-Council Bluffs MSA (jobs)	
Taxable	Taxable retail sales in the city of Omaha, NE	Nebraska Department of Revenue, monthly taxable retail sales by city and county
Tot valuation	Total property valuation	City of Omaha annual budgets, 1976–2015
Sales and use tax	General Fund Sales and Use Tax	
Property tax	General Fund Property Tax and In Lieu of Taxes (PILOTs)	
IGR	General Fund Intergovernmental Revenue	
Other revenues	General Fund Revenue from the following categories: Municipal Enterprise Revenue (1975–1981), Business Taxes (1982–2013), Permits, Utility Occupation Taxes, and Cost Recovery Items, Miscellaneous Revenue, Restaurant Tax (2010–2013), Tobacco Tax (2013)	
Expenditures	General Fund Total Expenditures	

We begin our approach by creating a time-series statistical model of the economy in the area that the jurisdiction encompasses, forecasting the economic variables into the future. Then we create a time-series statistical model of the financial variables in the jurisdiction that includes the economic variables as explanatory variables. Those financial variables should be affected by economic activity. We then generate forecasts of the key financial variables. Finally, we use the point estimates of the forecasts along with their associated standard errors to simulate the future financial situation of the city.

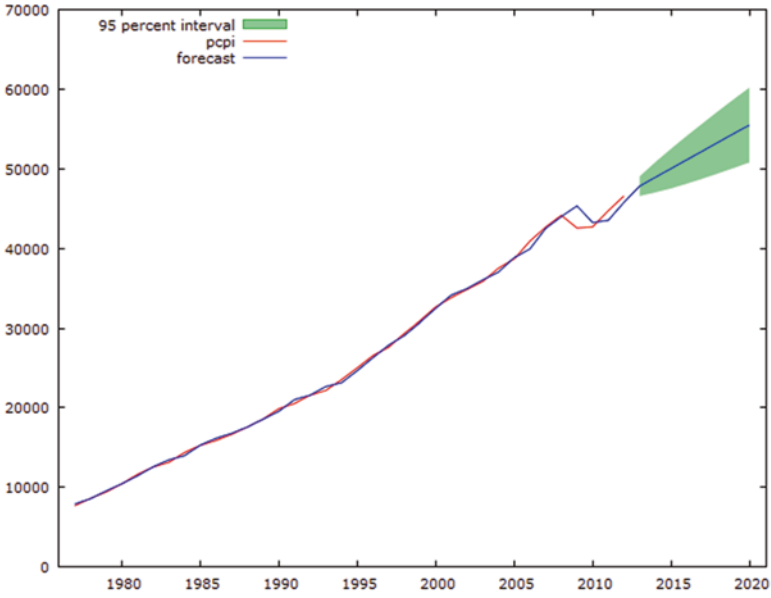
The variables used in the economic model are shown in Table 9.2 below, along with their sources. These variables are commonly used as indicators of an economy's health. As we have no intuition regarding the model specification, we use a vector autoregression (VAR) to forecast the variables. A VAR is a flexible model that uses the lagged values of one variable in a system of variables to predict the current values of itself and of the other variables in the system. The forecasting power comes from the fact that a VAR uses all of the information in the system of variables to predict the values of interest to forecasters versus using restrictions which variables affect other variables in the system. In vector notation, the system estimated was:

$$Y_t = c + \Pi_1 Y_{t-1} + \Pi_2 Y_{t-2} + \cdots + \Pi_p Y_{t-p} + e_t, \quad t = 1, 2, \cdots, T \tag{9.1}$$

The bold-faced ***Y*** vectors consist of the variables in the system; the ***Π*** matrices are coefficients relating a lag at time $t-p$ to the current value of the ***Y*** variables (Mills 1990). The appropriate lag length, p, was chosen using the Schwarz-Bayesian Criterion and Portmanteau tests of serial correlation in the residuals of the system estimation.

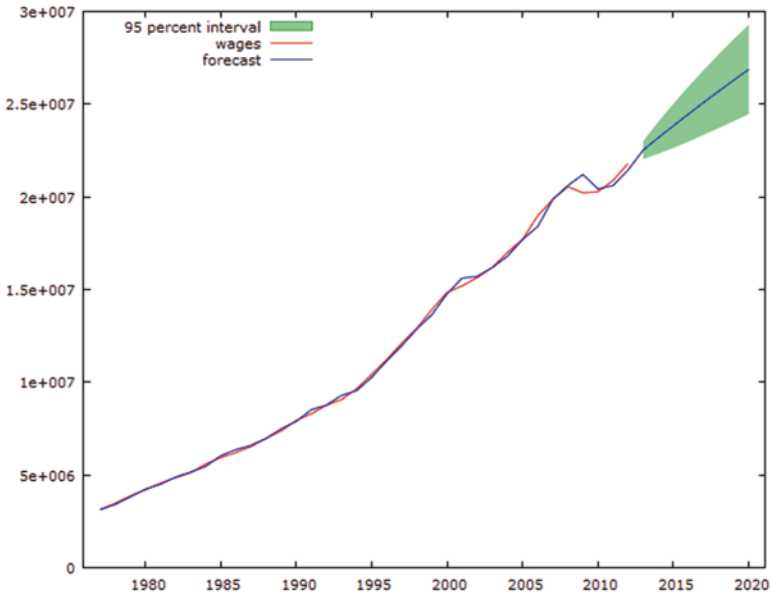
9.4 Results

The results of the VAR are shown in Appendix 1. A lag length of 2 was determined to be optimal. One note of caution about interpreting the results is that since the system is so heavily parameterized (it is only nearly identified), individual coefficient standard errors tend to be inflated, producing Type II biases in the interpretation of causal relationships. If our focus were hypothesis testing, we would typically present impulse response functions to interpret relationships. However, since our goal is to forecast the future values of the variables, we instead present graphs of the historical values of the variables (red line), the predicted and forecast values generated by the VAR (blue line), and the 95 % confidence interval of the forecasts (green shaded area) in Fig. 9.3. The model does a good job of predicting the values of the

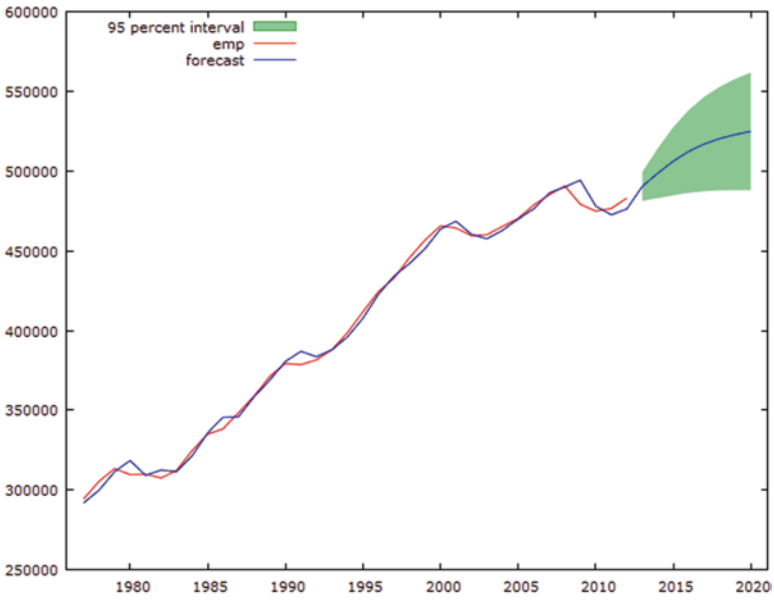


Panel A. Per Capita Personal Income

Fig. 9.3 Results of VAR estimation of equation (9.1), $T = 1977–2019$. (*Panel A*) Per capita personal income. (*Panel B*) Wages and salaries. (*Panel C*) Wage and salary employment



Panel B. Wages and Salaries



Panel C. Wage and Salary Employment

Fig. 9.3 (continued)

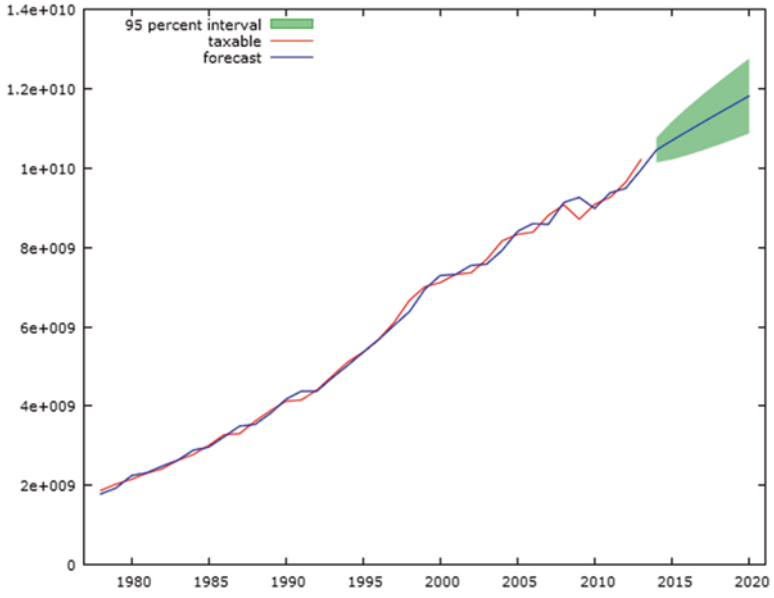
variables. Tests for serial correlation (using Ljung-Box *p*-values) autoregressive-conditional heteroscedasticity (ARCH), residual multivariate normality, and cointegration all proved negative, indicating that the results are robust against the most important time-series threats to validity. The forecasts were then saved and entered into the next stage of the model.

We then ran the financial forecast model. Table 9.2 also details the variables included in the financial forecast model. For this analysis, we chose to focus on General Fund financial variables. Our model is general, so it could be extended to include all Governmental Funds finances. Some of the revenue items were combined to form an Other Revenues variable. We model the base of the sales tax and property tax instead of their actual revenue realizations for two reasons. First, as we said earlier in the chapter, the volatility of those revenue sources is largely realized through volatility in the base. Second, to some extent, property tax revenue and sales tax revenue (somewhat less so) are decided through policy terms. Later we will add a policy decision variable to the model to reflect that if policy changes are known, the jurisdiction may have to keep more or less reserves. We decided not to include Intergovernmental Revenue in the Other Revenues variable as it has a markedly different historical pattern than the other revenue sources. We also combined all of the expenditures into a Total Expenditures variable. When we first developed our model, we had various categories of spending (e.g., Public Safety, General/Administrative) modeled separately. But the time series model lacked predictive power due to the relatively low degrees of freedom, so we reduced the number of variables by combining expenditures.

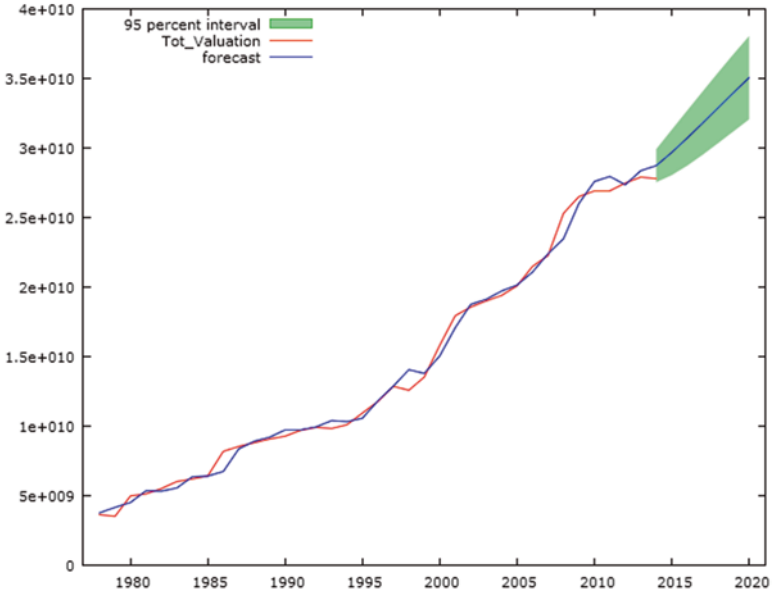
Initially, we ran a VAR on the financial variables, including Taxable Retail Sales, Property Valuation, Intergovernmental Revenues, Other Revenues, and Total Expenditures as endogenous variables (***Y*** variables in the VAR) and the forecasted economic variables from the first model estimation as exogenous variables (***X*** variables). However, a cointegration test according to the Johansen method (Harris 1995) indicated the presence of cointegration—that the endogenous variables shared long-term trends. Therefore, we estimated a Vector Error-Correction model (VECM) to predict the variables:

$$\Delta Y_t = c + \mathrm{B}_1 Y_{t-1} + \Pi_1 \Delta Y_{t-1} + \Pi_2 \Delta Y_{t-2} + e_t \tag{9.2}$$

Here the ***Π*** matrices capture the short-run effects of changes in the endogenous variables on each other (the "error correction" matrices), while the ***B*** vector captures the long-run effects (the "cointegrating vector"). Appendix 2 shows the statistical results of the VECM. Again, the tests of statistical significance are biased against rejection of the null hypothesis, so interpretation is challenging. Tests of serial correlation, ARCH, and multivariate normality for the residuals were negative, indicating robustness against threats to validity. Figure 9.4 shows the results of the forecast for each of the endogenous variables. The VECM produces predictions that fit the data very well for taxable retail sales, total property valuation, other revenues, and total expenditures. The model fits less well for intergovernmental revenues. The reason for the relatively poor fit lies in the inherent volatility of the

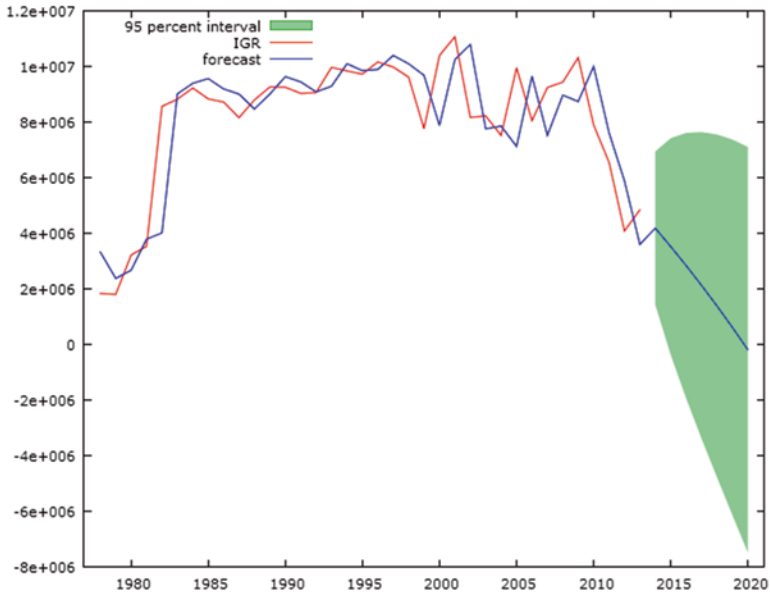


Panel A. Taxable Retail Sales

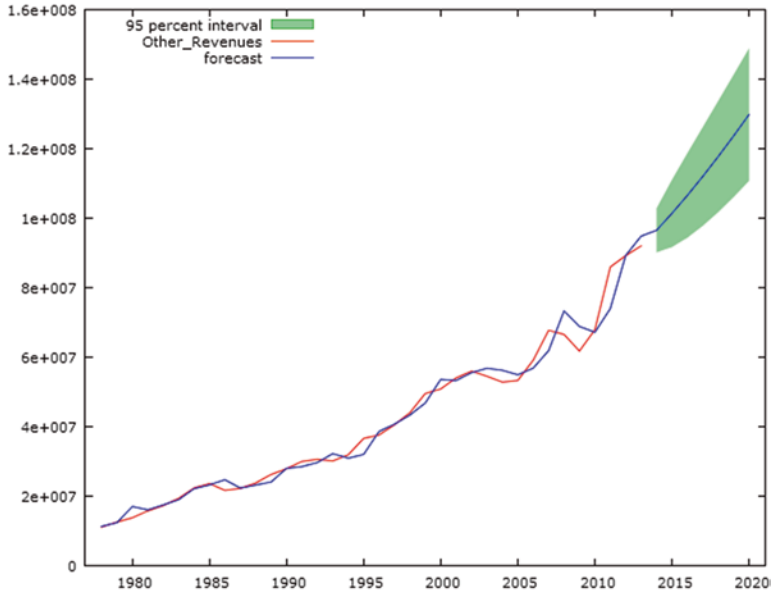


Panel B. Total Property Valuation

Fig. 9.4 Results of the VECM estimation of equation (9.2), $T = 1978–2019$. (*Panel A*) Taxable retail sales. (*Panel B*) Total property valuation. (*Panel C*) Intergovernmental revenues. (*Panel D*) Other revenues. (*Panel E*) Total expenditures

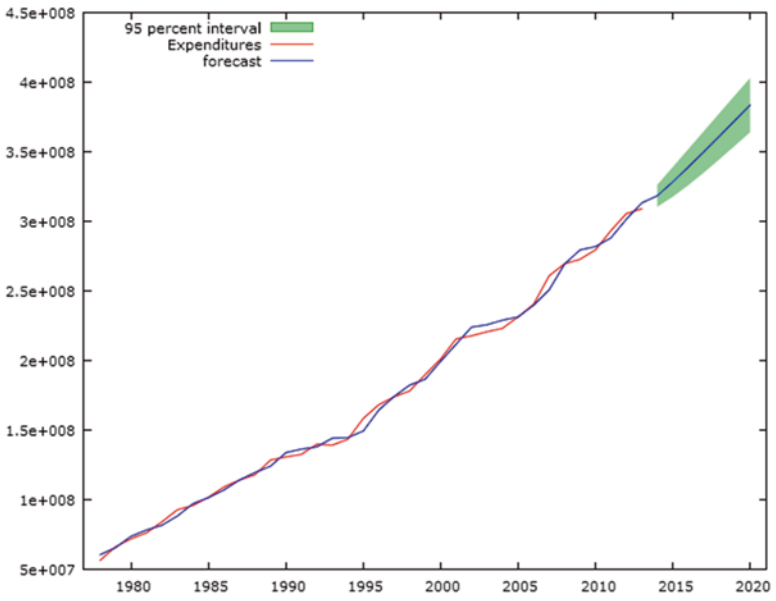


Panel C. Intergovernmental Revenues



Panel D. Other Revenues

Fig. 9.4 (continued)



Panel E. Total Expenditures

Fig. 9.4 (continued)

revenue source, something noted earlier by Kriz (2003). There are clear upward trends in all of the other financial variables. But intergovernmental revenues resemble a "random walk" much more than having a clear trend. This volatility is reflected in the standard errors, which are larger as a percentage of revenue generated. Once again, the forecasted values generated by the financial model were saved.

The final step of our model involved using the point estimates of the forecasts developed above along with their standard errors in a Monte Carlo simulation framework. In essence, what we are doing is using the information generated by the forecast model to simulate future outcomes. In our model, we simulate only the current fiscal year (2014) and 5 years of future financial realizations. This keeps the model tractable and provides for recommendations that matter more to Mayors and City Councils that must make decisions about the level of reserves that affect cities currently and not far into the future.

Many authors have discussed the use of stochastic simulation models such as Monte Carlo simulation models in finance and public finance. As we said earlier, Kriz (2003) uses a similar model to determine the optimal level of budget reserves for cities in Minnesota. Our model differs from the earlier Kriz research because we are not using a naïve simulation. Kriz assumed a Markov process, whereas the forecasts generated by the models above contain information on the joint realization of financial variables, since they are estimated as a system using historical information. Therefore, we can use the information generated by the model to simulate the

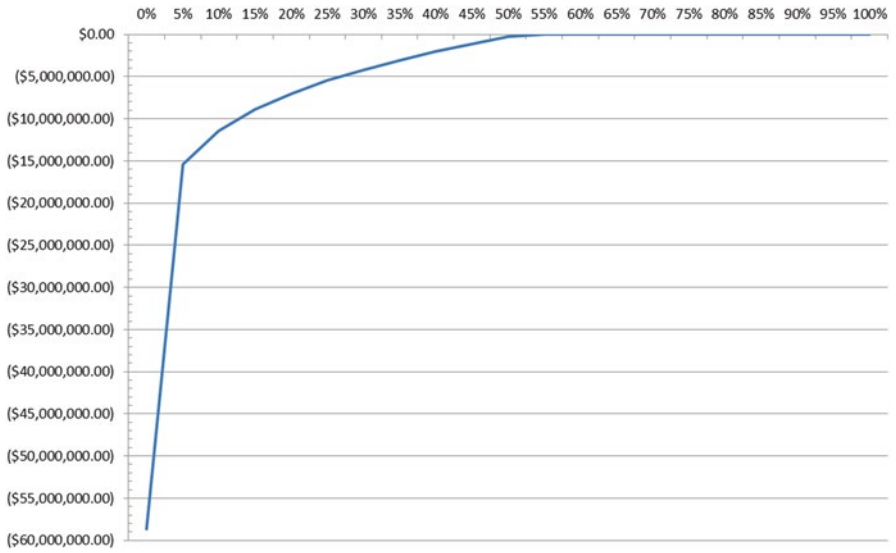


Fig. 9.5 Results of the Monte Carlo simulation of equation (9.3), T=2014–2019

future with less error than a naïve simulation approach. Our simulation model is based on the following relationship:

$$Balance_t = Balance_{t-1} + \widetilde{Taxable_t} \times STYield + \widetilde{TotalValuation_t} \times PTYield + \widetilde{IGR_t} + Other\widetilde{\text{Re}venues_t} - \widetilde{TotalExpenditures_t} \quad (9.3)$$

The tilde over the various financial variables indicates an uncertain realization of the value of the variable. The uncertainty is determined by a random draw for the normal distribution with the parameters consisting of the point estimate from the forecast model for that year (mean) and standard deviation of that estimate. We also include a "yield" variable for determining the amount of sales taxes and property taxes realized in each year. This yield can be thought of as the ratio of sales tax revenues to the level of taxable sales and the ratio of property tax revenues to total property valuation. We set the yield variables to the most recent value available (2013). In our model, each year that the balance goes below zero triggers a need for the use of reserves. We incorporate the need for a plan to accumulate reserves by discounting the need for reserves by 4 %, our estimate of the cost of obtaining capital for a jurisdiction with a moderately strong credit rating. The resulting total of the present value of future deficits gives the optimal level of budget reserves that the jurisdiction should have now in order to cushion against future financial uncertainty.

Figure 9.5 shows the results of the simulation analysis. The horizontal axis shows the probability that the needed reserves will be *at most* that level. For example, there is a 50 % chance that the necessary reserves will be at most $257,570. Therefore, if the city of Omaha wanted to be 50 % certain that its reserves were sufficient to cover

potential revenue shortfalls over the next 5 years, it should keep that amount of reserves on hand. If it wanted to be 75 % certain it had adequate reserves (implying a 25 % probability of a reserve realization), it should have $5,478,917 in reserves. And if it wanted to be 95 % certain, it should keep $15,430,000 in reserves.

9.5 Conclusion

In this chapter, we have reviewed the existing literature on the determination of an optimal level of fiscal reserves. We have seen some of the challenges surrounding the determination of how large a fiscal reserve is necessary to stabilize revenues. We then compared the various models that have emerged in the literature and discussed their commonalities as well as unique features that each of them possesses. We developed a framework for the creation of a model that synthesizes the best features from each of the models. Finally, we developed a model that addressed all of the features that should be present in a model of optimal budget reserves and discussed the results. Our model is scalable in that one could forecast necessary reserves with a longer period of analysis, using different costs of capital that may affect the need to accumulate reserves, or a change in the policies regarding property taxes and sales taxes (through different yield parameters). Therefore, it provides a strong alternative to existing models of optimal reserves. In conclusion, we feel that there is room for more research in this area, while at the same time admitting that developing a model that can achieve acceptance and be implemented will require a tough task.

Appendix 1. Results of VAR Estimation of Equation (1)

System statistics	
AIC	61.4530
BIC	62.3767
HQC	61.7754
Ljung-box (9 df)	79.0089

Equation 1: Dependent variable is pcpi

	Coefficient	SE	*t*-Ratio	*p*-Value
Constant	–431.502	1,884.54	–0.2290	0.82050
pcpi_1	0.905212	0.351493	2.5753	0.01538
pcpi_2	0.0462277	0.351894	0.1314	0.89639
wages_1	0.000811061	0.000787011	1.0306	0.31127
wages_2	–0.000765369	0.000899694	–0.8507	0.40191
emp_1	–0.00324879	0.0198799	–0.1634	0.87132
emp_2	0.00815657	0.0245793	0.3318	0.74239
Adjusted *R*-squared		0.996933		
F(6, 29)		5,851.423***		
Durbin–Watson		1.800817		

Equation 2: Dependent variable is wages

	Coefficient	SE	*t*-Ratio	*p*-Value
Constant	−363,759	981,913	−0.3705	0.71373
pcpi_1	−0.986022	138.021	−0.0071	0.99435
pcpi_2	34.4603	146.137	0.2358	0.81524
wages_1	1.3742	0.308946	4.4480	0.00012
wages_2	−0.450504	0.34673	−1.2993	0.20408
emp_1	5.03851	7.68838	0.6553	0.51741
emp_2	−3.33156	8.77596	−0.3796	0.70699
Adjusted *R*-squared		0.998019		
F(6, 29)		6,184.220***		
Durbin–Watson		1.653584		

Equation 3: Dependent variable is emp

	Coefficient	SE	*t*-Ratio	*p*-Value
Constant	35,778.7	15,863.4	2.2554	0.03182
pcpi_1	−2.81792	2.85557	−0.9868	0.33190
pcpi_2	6.10315	2.72729	2.2378	0.03308
wages_1	0.00810603	0.00594357	1.3638	0.18311
wages_2	−0.0134151	0.00624632	−2.1477	0.04023
emp_1	1.33965	0.164751	8.1314	<0.00001
emp_2	−0.483928	0.175906	−2.7511	0.01013
Adjusted *R*-squared		0.994585		
F(6, 29)		1,230.833***		
Durbin–Watson		1.653598		

Appendix 2. Results of VAR Estimation of Equation (2)

System statistics	
AIC	181.6872
BIC	183.6666
HQC	182.3781
Ljung-box (9 df)	79.0089
Beta (*cointegrating vector*)	
Taxable	1.0000***
Tot_Valuation	4.4691***
IGR	473.11***
Other_Revenues	816.16***
Expenditures	−872.29***
Alpha (*adjustment vectors*)	
Taxable	−0.022361
Tot_Valuation	−0.066538
IGR	−5.5796e−005
Other_Revenues	−0.00049628
Expenditures	0.00028635

Equation 1: Dependent variable is first difference of taxable

	Coefficient	SE	*t*-Ratio	*p*-Value
const	6.41861e+08	6.77783e+08	0.9470	0.35096
pcpi_hat	−5,507.8	68,022	−0.0810	0.93599
wageshat	11.0534	124.027	0.0891	0.92956
emp_hat	−3,341.38	3,143.78	−1.0629	0.29606
EC1	−0.0223609	0.0142185	−1.5727	0.12595
Adjusted *R*-squared		0.022145		
Durbin–Watson		2.053530		

Equation 2: Dependent variable is first difference of Tot Valuation

	Coefficient	SE	*t*-Ratio	*p*-Value
Const	−1.7412e+09	2.5886e+09	−0.6726	0.50616
pcpi_hat	−586,640	259,789	−2.2581	0.03112
wageshat	1,002.97	473.683	2.1174	0.04235
emp_hat	8,416.71	12,006.7	0.7010	0.48853
EC1	−0.0665383	0.0543032	−1.2253	0.22969
Adjusted *R*-squared		0.174945		
Durbin–Watson		1.733248		

Equation 3: Dependent variable is first difference of IGR

	Coefficient	SE	*t*-Ratio	*p*-Value
Const	2.01971e+06	5.9982e+06	0.3367	0.73860
pcpi_hat	−274.587	601.977	−0.4561	0.65147
wageshat	0.447271	1.09761	0.4075	0.68644
emp_hat	−5.63573	27.8216	−0.2026	0.84080
EC1	−5.57963e−05	0.00012583	−0.4434	0.66054
Adjusted *R*-squared		−0.048488		
Durbin–Watson		2.354224		

Equation 4: Dependent variable is first difference of other revenue

	Coefficient	SE	*t*-Ratio	*p*-Value
Const	1.91865e+07	1.38203e+07	1.3883	0.17495
pcpi_hat	−2,549.96	1,387	−1.8385	0.07559
wageshat	5.16459	2.52897	2.0422	0.04972
emp_hat	−76.4452	64.103	−1.1925	0.24210
EC1	−0.000496283	0.000289922	−1.7118	0.09693
Adjusted *R*-squared		0.093382		
Durbin–Watson		1.854034		

Equation 5: Dependent variable is first difference of expenditures

	Coefficient	SE	*t*-Ratio	*p*-Value
Const	−1.3907e+07	1.7230e+07	−0.8071	0.42575
pcpi_hat	−1,950.4	1,729.23	−1.1279	0.26802
wageshat	3.43215	3.15298	1.0885	0.28475
emp_hat	111.187	79.9201	1.3912	0.17406
EC1	0.000286347	0.000361459	0.7922	0.43427
Adjusted *R*-squared		0.064563		
Durbin–Watson		1.747921		

References

Dothan M, Thompson F (2009) A better budget rule. J Policy Anal Manage 28:463–478

Harris R (1995) Using cointegration analysis in econometric modelling. Prentice Hall/Harvester Wheatsheaf, London

Joyce PG (2001) What's so magical about five percent? A nationwide look at factors that influence the optimal size of state rainy day funds. Public Budg Finance 21:62–87

Kriz KA (2002) The optimal level of local government fund balances: A simulation approach. In: National Tax Association proceedings of the annual conference on taxation, vol 95, pp 78–84

Kriz KA (2003) The optimal size of local government budget reserves: a simulation approach. State Tax Notes 27:887–892

Marlowe J (2011) Beyond 5 percent: optimal municipal slack resources and credit ratings. Public Budg Finance 31:93–108

Mills TC (1990) Time series techniques for economists. Cambridge University Press, Cambridge

Navin JC, Navin LJ (1997) The optimal size of countercyclical budget stabilization funds: a case study of Ohio. Public Budg Finance 17:114–127

Vasche JD, Williams B (1987) Optimal governmental budgeting contingency reserve funds. Public Budg Finance 7:66–82

Williams B (2012) Budget gimmicks used by states. State budget solutions. http://www.statebudgetsolutions.org/publications/detail/budget-gimmicks-used-by-states. Accessed 18 July 2014

Chapter 10
Inherent System Dynamics of Instability and Resilience in Nonprofit Human Services

Shena R. Ashley

Abstract This study advances the notion that the observed instability of nonprofit human service organizations may be inherent to the institutional environment and that decisions to save in order to smooth resources across the business cycle may be, in part, outside of the control of any single organization. The conclusion drawn from the analysis points to a need for more sufficient reserve funds in the sector. But, the discussion of barriers in the institutional environment raises the caution that increasing reserve funds in these organizations cannot simply be done by encouraging better financial management practices. Consideration has to be given to reducing the barriers created by the set of complex perspectives and norms that affect the legitimacy of surplus accumulation.

10.1 Overview

Like the iconic wobbling Weebles toy of the 1970s, which, when tipped, would return back to its upright position, nonprofit human service organizations—although battered—have, to a large degree, shown a higher than expected level of resilience through the greatest economic downturn since the Great Depression (Brown et al. 2013). But unlike the toy, whose wobbling, caused by its egg-shape and density, was a fun demonstration of basic physics principles, the wobbling of a nonprofit organization is a complex and costly demonstration of a failure to meet fundamental standards of financial health.

Financially healthy organizations are expected to accumulate reserves in anticipation of revenue fluctuations (Tuckman and Chang 1991). This would allow them to absorb the shock of an economic downturn with fewer expenditure cuts (or, in the language of the metaphor, become less wobbly). This is especially significant for human service organizations since, during a downturn, they face declining revenues and increased demand for their services. In the absence of reserves, these organizations may need to cut services at a time when beneficiaries need them most.

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For these types of organizations, who face countercyclical demand conditions, countercyclical financial measures are essential.

Yet, the economic recession of 2007–2009 exposed a sobering reality—that many of the human service nonprofit organizations that deliver the nation's safety net services are undercapitalized and financially vulnerable (Bridgeland et al. 2009; Miller 2010). Calabrese (2013) found that 40 % of nonprofit organizations had no operating reserves and that the median held only 1 month of operating expenditures in reserves. Faced with a sudden and rapid escalation of demand and profound cuts in funding from all sources, many organizations have had to respond with cost-cutting measures to mitigate their diminished funds (Harrison et al. 2011; Morreale 2011; Mosley et al. 2012; Never 2010). These types of measures are costly in terms of negative impacts for the individuals seeking help and for the organization's ongoing capacity. They only serve to exacerbate stress on already strained organizations.

This begs the question, if budget stabilization is so important for the continuity of human services during downturns, why are human service nonprofit organizations lacking the reserved capital to stabilize their budgets when needed? The perspective advanced here is that the answer to this question cannot be found by only looking at the organizations. Rather, the problem should be viewed in a broader system level context to see that this behavior is, in part, due to a much broader and more complex set of incentives and constraints in the organizational environment.

Explanations for the financial vulnerability of nonprofits that narrowly attribute the condition to poor financial management capacity of the management and board are overly simplistic. A recent study of nonprofit leaders that measured the financial literacy of nonprofit managers and the financial performance of their organizations found that only 10 % of managers in the study had low financial literacy capacity and that the majority of organizations with weak financial performance were led by individuals with middle to high levels of financial literacy (Nelson 2009). These findings indicate that internal financial literacy and management may only be part of the story.

The purpose of this chapter is to direct the attention of financial management scholars and practitioners and policymakers to the incentives and constraints in the organizational environment that serve to influence nonprofit financial management behavior. That is, understanding how some of the observed instability of nonprofits may be the result of sector level forces outside the control of any single organization. This insight is central to stakeholder and institutional theories of organizational behavior, which emphasize how external dynamics shape organizational practice. The focus of these theories is explaining how organizations conform to the expectations of key stakeholders in the environment (DiMaggio and Powell 1983; Jones 1995). Nonprofit organizations have many different stakeholders—staff, clients and beneficiaries, and donors, for example (Frumkin 2009)—who have considerable influence over the decisions made by managers (Krashinsky 1997). From an institutional perspective, managers are concerned with generating legitimacy—the basis from which their resources flow—by conforming to the norms, myths, and symbols found in their external environment (Suchman 1995). Thus, managers may be led to behave in ways that conform to what they perceive as acceptable among their stakeholders as opposed to their own preferences.

An advantage of this kind of problem framing over narrower approaches limited to internal financial management practices is that it raises the unit of analysis from the organization to the sector and allows for a broader sociological understanding of the complexity around nonprofit financial vulnerability. By doing so, the intention is not to absolve nonprofit managers of responsibility or to deemphasize their role in ensuring the financial health of the organization. Rather, it is to understand how other stakeholders along with managers share responsibility for the dynamics of instability and resilience in the sector. This shift in thrust from finger pointing at the organizations to a more systemic view of the issue has important implications for both scholarly understanding and policy formulation.

The effectiveness of policies to address financial vulnerability of nonprofits hinges on an improved understanding of the larger forces shaping nonprofit financial management behavior. For policymakers, there are significant consequences from financial instability and resultant disruptions to service delivery. In the current system of third party public service delivery, where three out of five human service organizations indicate that government is their largest source of revenue (Boris et al. 2010), government has a significant stake in whether these organizations can sustain activities through a downturn. Although outsourcing provides some political cover (Smith and Lipsky 2009; Van Slyke and Roch 2004), elected officials are still vulnerable to public outcry when nonprofit providers cut services. Thus, the imperative to improve nonprofit financial performance—especially among contract recipients—is not confined to the nonprofit sector but extends to government agencies as their performance becomes inextricably linked (Smith and Grønbjerg 2006).

This chapter covers four broad areas. The next section provides a general discussion of budget stabilization tools and patterns among human service nonprofits toward providing a rough picture of countercyclical financial management. The analysis provided here is essentially descriptive in character and draws on data from the Form 990 tax data from the National Center for Charitable Statistics. Section 10.3 lists and describes the various forces from the external environment that constrain the ability of nonprofit organizations to stabilize their budgets through the accumulation of surplus revenue. Here, the focus is on bringing a fuller understanding of nonprofit behavior in the context of the multiple stakeholders and their preferences. Insights are culled form the literature and organized to articulate a set of barriers. Section 10.4 considers a follow-up question related to the consequences of financial vulnerability in light of the evidence of recovery strategies adopted during the 2007–2009 economic recession. Here, the focus is on whether insufficient countercyclical reserve funds are associated with a reduction in service delivery or whether organizations are able to balance their budget through other means. This analysis contributes to a larger question regarding the need for countercyclical finance tools in the nonprofit sector if organizations with low reserve capacity can manage to be resilient. An exploratory analysis of expenditures from Form 990 data is used here to describe the tendencies and patterns that emerge as organizations responded to the fiscal crisis. Section 10.5 sheds light on normative implications and considers policy interventions. Three major directions for practice and policy initiatives are considered: (1) the proposal that nonprofit networks and intermediary organizations make more

deliberate effort to educate funders about their role in limiting nonprofit countercyclical financial capacity and encouraging positive evaluation of reasonable surplus margins, (2) increase use of funding instruments like multiyear grants and contracts and funds for operating support, and (3) advocate for the adoption of government budget stabilization funds designed to explicitly stabilize nonprofit human service delivery to vulnerable populations during an economic downturn like New York City's Communities of Color Nonprofit Stabilization Fund. These sorts of practice and policy interventions are options for changing the behavioral tendencies of both managers and the broad set of stakeholders in the organization environment.

10.2 Patterns of Nonprofit Surplus Revenue

The most common misconception about nonprofit organizations—which paradoxically stems from the terminology used to identify the sector—is that they cannot earn a profit. Like their for-profit counterparts, the sustainability of nonprofit organizations requires annual surpluses sufficient to maintain or grow programs and to develop resilience to external economic shocks (Bowman 2011; Chang and Tuckman 1990). There are no legal regulations barring nonprofits from earning a profit (surplus). Earning surplus and holding reserves has the benefit of financial security and gives organizations the ability to hedge against revenue uncertainty. In addition to being good business practice, surplus funds can help to advance the nonprofit mission by giving organizations the ability to subsidize services for those who may not be able to afford them, to grow and diversify into new programs areas, and to gain some independence from donors allowing for a greater degree of managerial discretion (Tuckman and Chang 1992).

Analyses conducted by Tuckman and Chang (1992) and later by Calabrese (2013) provide evidence that nonprofits do seek to accumulate surplus revenue. The issue, as both studies point out, is that a significant portion of nonprofit organizations are unable to achieve budget surplus and for those that do, they tend to accumulate insufficiently low levels. In the national sample analyzed by Calabrese, the median organization with surplus reserves had a little more than 4 month of reserves, but when the top quartile group was excluded, the median level dropped to about 2 months of operating expenditures. This level is less than the industry recommendation of 3 months of expenditures in reserve (Blackwood and Pollak 2009). An updated description of median surplus revenue is provided in Table 10.1 below.[1]

[1] For comparison purposes, it is important to note that the methodology used to measure surplus is different in the Tuckman and Chang (1992) and Calabrese (2013) articles. Tuckman and Chang measure the surplus margin as (total revenue less total expenditures)/total revenue. Calabrese uses a measure endorsed by the Nonprofit Operative Reserves Initiative Workgroup (Blackwood and Pollak 2009), which measures operating reserves as (unrestricted net assets-property, plant, and equipment, net of long-term debt/total expenses-depreciation). The analysis in Table 10.1 uses the Tuckman and Chang measure of surplus margin because of limitations in availability of unre-

Table 10.1 Median surplus margin by organization size

Year	<25k	25k–100k	>100k–1 million	>1–10 million	>10 million
2000	0.171	0.045	0.031	0.030	0.020
2001	0.177	0.035	0.022	0.023	0.013
2002	0.204	0.029	0.014	0.016	0.008
2003	0.147	0.026	0.010	0.013	0.009
2004	0.138	0.025	0.013	0.014	0.015
2005	0.135	0.028	0.018	0.019	0.017
2006	0.147	0.034	0.024	0.024	0.021
2007	0.145	0.036	0.027	0.027	0.021
2008	0.142	0.025	0.016	0.017	0.014
2009	0.153	0.016	0.008	0.012	0.012
2010	0.098	0.018	0.013	0.017	0.016
2011	0.000	0.013	0.014	0.016	0.014
2011 mean	–51.960	–0.061	0.006	0.041	0.032

The data are from the Core 990 dataset from the National Center on Charitable Statistics (NCCS). This database covers all public charities with gross receipts greater than $25,000[2] (excluding religious organizations and private foundations) are required by the Internal Revenue Service to annually file a Form 990. The analysis was restricted to organizations categorized as human services organizations (with a sample size ranging 87,834 in 2000 to 127,268 in 2011), which is the largest nonprofit subsector.

In Table 10.1, the annual median surplus margin is separately provided for different size categories of human service nonprofits. These data support previous findings of consistent yet low levels of surplus and adds that this pattern is observable across the size spectrum of human service organizations, suggesting that it is not limited to small organizations who may be less professionalized and therefore have lower financial management capacity.

Figure 10.1 compares the surplus margin level of human service organizations to other nonprofit subsectors. The 3 years (2000, 2008, and 2011) that are shown to be pivotal in terms of shifts in the overall median for human services organizations from Table 10.1 are included here. In all 3 years, human services have the lowest median surplus level. This comparison gives some indication of industry distinctions in surplus attainment related to the unique institutional environments across the nonprofit subsectors. As Kearns (2010) points out, this variation may be related to

stricted net asset data after 2003 (see overview of NCCS data files at http://nccs.urban.org/database/overview.cfm).

[2] Before tax year 2010, nonprofits with gross receipts of $25,000 or more were required to file a Form 990 or Form 990-EZ. Beginning in 2010, only organizations with $50,000 or more in gross receipts were required to file a Form 990 or Form 990-EZ. Organizations with less than $50,000 are required to file an information return known as the Form 990-N (e-Postcard).

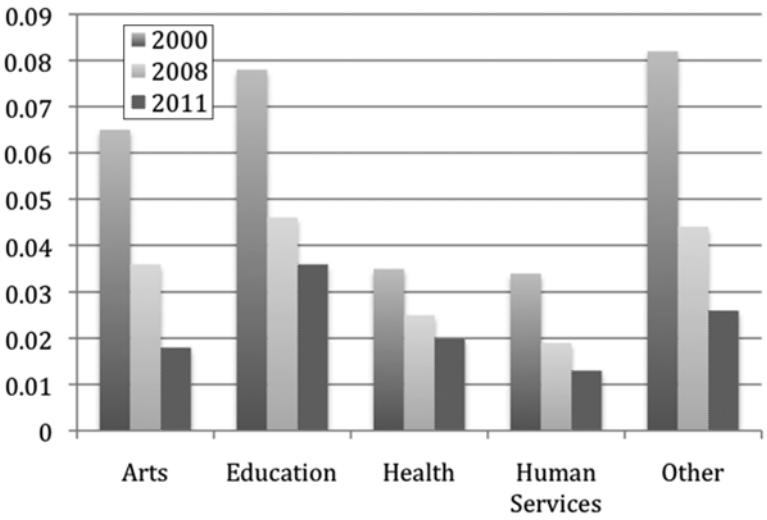

Fig. 10.1 Median surplus margin by subsector

the variation in the reliability of funding sources across the subsectors. Disaster relief organizations, as an example, face a more cyclical donation environment so they may need a higher surplus margin to build up reserves in comparison to causes that rely on more reliable funding sources (e.g., government contracts).

10.3 Institutional Barriers to Human Service Nonprofit Surplus Attainment

10.3.1 Barrier 1: Breakeven Budgets

Certainly nonprofits are not unique in the need to demonstrate financial solvency, but breaking even is not adequate for accumulating capital for the purposes of having working capital, emergency operating reserves, or building an endowment. The primacy that funders give to annual budgets over the balance sheet focuses attention to balancing the budget through the fiscal year instead of budgeting over the business cycle. The adoption of multiyear budgets in nonprofits similar to what Hou (2006) advises for state governments will help to encourage fiscal stability. It is worth noting that the types of services offered by nonprofit human services can make achieving breakeven a significant challenge because of the need to subsidize programs that have high mission value but low financial return (Young et al. 2010). Boards and staff may be stretched to achieve breakeven and adding the burden of earning a surplus to this challenge may feel impossible.

10.3.2 Barrier 2: Every Day Is a Rainy Day

Human service organizations, especially those that receive government grants contracts, regularly face unpredictable and disrupted cash flow cycles (Boris et al. 2010) that make it difficult for any surplus revenue that might be attained to be stored away for the economic downturn. These dynamics may cause organizations to reserve insufficient levels of funds because they use them too often in a daily struggle for survival that pulls resources away from maintaining longer-term financial security.

10.3.3 Barrier 3: Eye on the Wrong Ball

Accountability standards and watchdog groups that evaluate organizations on their program-spending ratio (Sloan 2009) serve to emphasize spending over profitability or savings. This contributes to what Gregory and Howard (2009) termed the "nonprofit starvation cycle" where organizations skimp on developing capacity to achieve sustainability.

10.3.4 Barrier 4: Penalties for Wealth Accumulation

A significant concern for surplus accumulation is the impact that being perceived as being too wealthy can have on future donations. Calabrese (2011) found that donors do withhold donations from organizations when they have "excessive" reserves (anywhere from 2 years of expenses and beyond depending on subsector). Research also indicates that public agencies, in particular, look negatively on nonprofit reserves (Smith and Lipsky 2009). Calabrese (2013) found a negative association between operating reserves and government funding that did not hold for individual donors. Tuckman and Chang (1992) explain this negative perception on the part of donors using contract failure. They point out that when a nonprofit is free to build excessive wealth, the donor's ability to control or be aware of how funds are being used is reduced.

10.3.5 Barrier 5: Current Services Trap

The barrier concerns both internal and external expectations about the motivations of nonprofit managers. The current services trap relates to having a preference for service maximization—increase income to spend on core nonprofit activities, over a preference for budget maximization—increase the size of the budget ignoring costs (Brooks 2005; Steinberg 1986). As service maximizers, nonprofits undermine financial stability by using all of their available resources to maximize service

provision in the short run. There is a tendency to increase programming rather than saving. This preference has an ethical and historical dimension, especially for managers of human services organizations, who are oriented toward serving needs.

10.3.6 Barrier 6: The Bailout Syndrome

Handy and Webb (2003) found that nonprofit organizations that had an expectation that government would help during difficult times had lower levels of savings. Similarly, nonprofits with a broad base of individual donors can double down on their fundraising efforts to appeal to donors to save them in desperate times. These perceptions that donors will come to the rescue of organizations in crisis prevent organizations from taking countercyclical budgeting seriously.

10.4 Budget Balancing Strategies in the 2007–2009 Recession

The main question considered here is whether human service organizations reduced their services as a result of the sector-level patterns of insufficient surplus margins. Aside from the organizational costs of nonprofit fiscal instability, there are significant public consequences for disruptions to service delivery during economic downturns when there is increased demand for those services. Vulnerable families may be denied services or added to long waiting lists, making the recovery effort more difficult.

The economic recession of 2007–2009 created conditions that resulted in significant fiscal stress for many of the nation's nonprofit organizations. Revenue from all sources either declined or became more difficult to access. To cope, fiscally pressured nonprofits have had to make choices to, essentially, either increase revenue or cut costs in a number of ways. According to recent surveys, nonprofits report simultaneously using a range of coping strategies, including: launching new fundraising efforts, drawing on reserves, cutting administrative costs, instituting salary freezes, postponing new hires, relying more on volunteers, increasing marketing and advocacy activity, reducing program services, and creating collaborative relationships among others (Boris et al. 2010; Bridgeland et al. 2009; Golensky and Mulder 2006; Harrison et al. 2011; Mosley et al. 2012; Never 2010; Salamon et al. 2009). If human service organizations are able to maintain service levels through an economic downturn through the use of stopgap measures other than reserve funds, it calls into question the necessity to build reserves for organization resilience.

The 990 Core dataset described in Sect. 10.2 is used here again to explore patterns that indicate whether or not there were service reductions during the recession period. Figure 10.2 provides the median expenditure levels for human service nonprofits over the 2000–2011 period. The data reveal a downward sloping trend in the expenditure of the average organization well before the 2007–2009 recession. There was an uptick in the average expenditure in the previous recession in 2001, which is an expected response to increased demand. However, the data indicate that for the

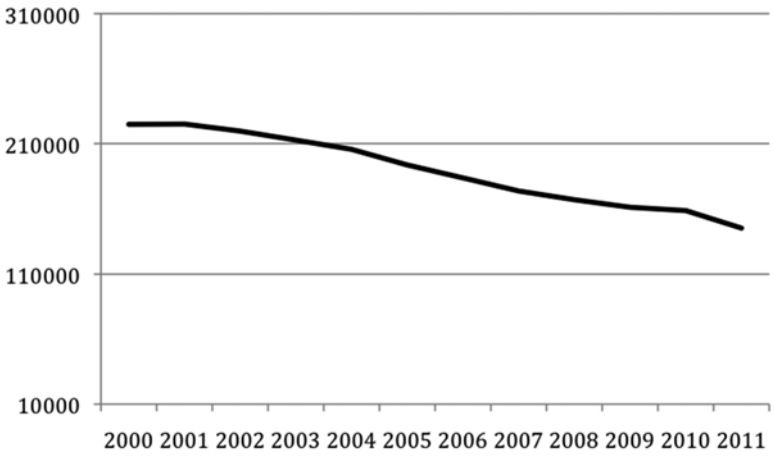

Fig. 10.2 Median expenditures by year

Table 10.2 Number of human service organizations by size

Year	<25k	25k–100k	>100k–1 million	>1–10 million	>10 million
2000	2,846	28,056	39,783	15,084	2,065
2009	5,120	43,736	51,515	19,142	3,768
2010	4,534	43,867	62,761	19,338	4,007
2011	15,131	37,500	52,751	19,670	4,131

2007–2009 the rate of decrease in expenditure did not increase, but the decline did slow in comparison to the previous period up until 2011. These data provide some evidence that nonprofit human service organizations were able to stave off significant declines in services during the recession. However, these results are quite possibly attributable to the infusion of resources from the American Recovery and Reinvestment Act of 2009 (ARRA), which provided funding to nonprofits to address revenue volatility. The sharp decline in expenditures in 2011 may be a sign of delayed recession effects on service delivery after the expiration of ARRA funding.

Although service provision did not dramatically decline during the recession period, the change in the size distribution of organizations shown in Table 10.2 provides some evidence that organization capacity was reduced to compensate for revenue cuts. Between 2000 and 2011, there was a steady increase in the number of human services nonprofit organizations from 87,834 in 2000 to 127,268 in 2011 as a response to new entrants into the market. However, the shifts in the size distribution show a mix of new entry, but also indicate some substantial downsizing especially from 2010 to 2011. This suggests that while organizations were able to maintain services, some were forced to maintain service levels with less organizational capacity. This strain on organizations is a consequence of inadequate reserves to stabilize budgets that will have continued and costly effects as organizations try to rebuild capacity during the recovery.

10.5 Practice and Policy Recommendations

The descriptive analysis of trends in surplus margin levels, along with the expenditure levels and sector composition prior to and through the recession period, shows patterns of budget instability and resilience in service provision but at a cost to organizational capacity. These patterns point to the need for budget stabilization strategies in the nonprofit sector, but the barriers to the attainment and accumulation of surplus by these organizations are significant constraints.

Practice and policy interventions targeted at reducing these barriers are needed to create an institutional environment in human services that supports and encourages budget stabilization strategies. The overarching theme for the policy and practice recommendations offered here is that they are oriented toward recognition among funders of the ways in which they contribute to the chronic undercapitalization of the nonprofit sector.

Three interventions are highlighted to demonstrate how policy and practice can shift the institutional culture. The first recommendation is a practice intervention directed toward nonprofit managers. Although the point of this chapter is to bring attention to dynamics in institutional environment that shape nonprofit behavior, nonprofit managers are not considered to simply be victims to these institutional dynamics. To the contrary, nonprofit managers and, in particular, the nonprofit networks and intermediary organizations that advocate for nonprofit organizations have a role in shaping their institutional environment. The recommendation is that these groups make more deliberate efforts to educate funders about their role in limiting nonprofit countercyclical financial capacity and encouraging positive evaluation of reasonable surplus margins. Groups like the Nonprofit Finance Fund and the Center on Nonprofits and Philanthropy at the Urban Institute have been leading efforts to raise awareness of undercapitalization of human services and funding practices that encourage financial vulnerability, but more voices need to join the cause to make system level changes.

The second recommendation concerns changes in funding practices and government contracting policy. An increase in the use of funding instruments like multiyear awards and funds for operating support is a way of creating a longer time horizon for budget planning and offering the kind of flexible funding needed for organizations to invest in their financial health. The final recommendation encourages advocating for the adoption of government budget stabilization funds designed to explicitly stabilize nonprofit human service delivery to vulnerable populations during an economic downturn like New York City's Communities of Color Nonprofit Stabilization Fund. The data from the 2007–2009 recession showed that service delivery was continued with limited disruption relative to pre-recession levels. The infusion of stabilizing funds from the federal stimulus (ARRA) contributed to this result. Since government funding plays a dominant role in the human services subsector, better stabilization of government funding during economic downturns could result in less revenue contraction for nonprofit service providers. Therefore, nonprofits, and their stakeholders, should play a more active role in shaping budget stabilization fund policies in their states and localities.

10.6 Conclusion

The analysis in this chapter points to a need for reserve funds to ensure that services can be provided across the business cycle to prevent "wobbly" or unstable nonprofits without the need for severe cuts to nonprofit organizational capacity. But, the discussion of barriers in the institutional environment raises the caution that increasing reserve funds in these organizations cannot simply be done by encouraging better financial management practices. Consideration has to be given to reducing the barriers created by the host of complex perspectives and norms that affect the legitimacy of surplus accumulation. While surplus attainment is good business practice, it is important to realize that there are real tradeoffs in the decision to reserve funds (e.g., opportunity costs of serving additional clients, perceptions of donors, risk assessment of the availability of emergency funds from stakeholders and costs of other strategies like debt financing) and that the decision to save is, perhaps, determined as much by the institutional environment as it is by the manager's preferences. As long as these barriers persist, the instability or "wobbling" of nonprofit human service organizations will remain an inherent characteristic that limits the effectiveness of the sector.

References

Blackwood A, Pollak T (2009) Washington-area nonprofit operating reserves Charting Civil Society. Center on Nonprofits and Philanthropy, Washington

Boris ET, de Leon E, Roeger KL, Nikolova M (2010) Human service nonprofits and government collaboration: findings from the 2010 National Survey of Nonprofit Government Contracting and Grants. Urban Institute, Washington

Bowman W (2011) Financial capacity and sustainability of ordinary nonprofits. Nonprofit Manag Leadersh 22(1):37–51

Bridgeland JM, McNaught M, Reed B, Dunkelman M (2009) The quiet crisis: the impact of the economic downturn on the nonprofit sector. W.K. Kellogg Foundation, Washington

Brooks AC (2005) What do nonprofit organizations seek? (and why should policymakers care?). J Policy Anal Manage 24(3):543–558

Brown MS, McKeever B, Dietz N, Koulish J, Pollak T (2013) The impact of the great recession on the number of charities. Research brief. Urban Institute, Washington

Calabrese TD (2011) Do donors penalize nonprofit organizations with accumulated wealth? Public Adm Rev 71(6):859–869

Calabrese T (2013) Running on empty: the operating reserves of US nonprofit organizations. Nonprofit Manag Leadersh 23(3):281–302

Chang CF, Tuckman HP (1990) Why do nonprofit managers accumulate surpluses, and how much do they accumulate? Nonprofit Manag Leadersh 1(2):117–135

DiMaggio PJ, Powell WW (1983) The iron cage revisited: institutional isomorphism and collective rationality in organizational fields. Am Sociol Rev 48(2):147–160

Frumkin P (2009) On being nonprofit: a conceptual and policy primer. Harvard University Press, Cambridge

Golensky M, Mulder CA (2006) Coping in a constrained economy: survival strategies of nonprofit human service organizations. Adm Soc Work 30(3):5–24

Gregory AG, Howard D (2009) The nonprofit starvation cycle. Stanf Soc Innov Rev 7(4):49–53

Harrison D, Eleveld J, Ahern P (2011) Resilient nonprofits: how Western Washington nonprofits have been coping with the impact of the economic downturn. Evans School of Public Affairs, University of Washington, Seattle

Hou Y (2006) Budgeting for fiscal stability over the business cycle: a countercyclical fiscal policy and the multiyear perspective on budgeting. Public Adm Rev 66(5):730–741

Jones TM (1995) Instrumental stakeholder theory: a synthesis of ethics and economics. Acad Manage Rev 20(2):404–437

Kearns KP (2010) Accountability in the nonprofit sector. In: Dubnick M, Frederickson HG (eds) Accountable governance: problems and promises. M.E. Sharpe, New York, pp 197–210

Krashinsky M (1997) Stakeholder theories of the non-profit sector: one cut at the economic literature. Voluntas 8(2):149–161

Miller C (2010) The four horsemen of the nonprofit financial apocalypse. Nonprofit Q 17(1):23–29

Morreale JC (2011) The impact of the "great recession" on the financial resources of nonprofit organizations. Wilson Center for Social Entrepreneurship. http://digitalcommons.pace.edu/wilson/5/?utm_source=digitalcommons.pace.edu%2Fwilson%2F5&utm_medium=PDF&utm_campaign=PDFCoverPages

Mosley JE, Maronick MP, Katz H (2012) How organizational characteristics affect the adaptive tactics used by human service nonprofit managers confronting financial uncertainty. Nonprofit Manag Leadersh 22(3):281–303

Nelson S (2009) Getting beyond breakeven: a review of capitalization needs and challenges of Philadelphia-area arts and culture organizations. GIA Reader 20(3):1–36

Never B (2010) Understanding constraints on nonprofit leadership tactics in times of recession. Nonprofit Volunt Sect Q 40(6):990–1004

Salamon L, Geller SL, Spence KL (2009) Impact of the 2007–2009 economic recession on nonprofit organizations. The John Hopkins Listening Post Project (14)

Sloan MF (2009) The effects of nonprofit accountability ratings on donor behavior. Nonprofit Volunt Sect Q 38(2):220–236

Smith SR, Grønbjerg KA (2006) Scope and theory of government–nonprofit relations. In: Powell WW, Steinberg R (eds) The nonprofit sector: a research handbook. Yale University Press, New Haven, pp 221–242

Smith SR, Lipsky M (2009) Nonprofits for hire: the welfare state in the age of contracting. Harvard University Press, Cambridge

Steinberg R (1986) The revealed objective functions of nonprofit firms. Rand J Econ 17(4):508–526

Suchman MC (1995) Managing legitimacy: strategic and institutional approaches. Acad Manage Rev 20(3):571–610

Tuckman HP, Chang CF (1991) A methodology for measuring the financial vulnerability of charitable nonprofit organizations. Nonprofit Volunt Sect Q 20(4):445–460

Tuckman HP, Chang CF (1992) Nonprofit equity: a behavioral model and its policy implications. J Policy Anal Manage 11(1):76–87

Van Slyke DM, Roch CH (2004) What do they know, and whom do they hold accountable? Citizens in the government–nonprofit contracting relationship. J Public Adm Res Theory 14(2):191–209

Young DR, Jung T, Aranson R (2010) Mission—market tensions and nonprofit pricing. Am Rev Public Adm 40(2):153–169