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Did Municipal Stabilization Funds Effectively Smooth Expenditures During the Great Recession?

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Executive Summary

Budget stabilization fund (BSF) is a general term for rainy day funds, contingency funds, and reserves. Historically, researchers have studies BSFs at the state level. However, after the Great Recession municipalities have increasingly adopted BSFs. So far, there are several unknowns surrounding municipal BSFs. The intent of this paper is to start addressing some of these unknowns. The paper seeks to answer the question, did municipal BSFs smooth expenditures over the Great Recession? This study uses data from Lexington-Fayette Urban County Government and eleven comparable municipalities.

The municipality BSF literature is in its infancy. Previous research has focused on state BSFs. The optimal size for state BSFs is inconclusive, and the literature agrees that there should not be a one size fits all BSF fund size for states. The literature also agrees that states should consider revenue volatility when establishing a BSF policy. Municipal BSF research is limited and only examines cities within the same state. This study will add to the literature by looking at cities across state lines.

Analysis for this capstone adopts a model that Justin Marlowe (2005) and Yilin Hou (2003) used to study if municipal BSFs smooth expenditures over the Great Recession. I created a unique trend line for each city using data from 1997 to 2001 to predict future spending. A positive expenditure gap is the result of a city spending more than predicted. A negative expenditure gap is created if the city spends less than predicted. Using a fixed effect model, I regressed the expenditure gap on four categories of explanatory variables: fund characteristics, financial measures, institutional factors, and demographic/ economic factors.

Results show that cities divide themselves into two groups: always positive expenditure gap cities, or always negative expenditure gap cities. Positive expenditure gap cities had BSFs that were 14 percent of total revenues, and negative expenditure gap cities BSFs were 6 percent of total revenues, on average.

Regression results indicate the size of a BSF is only statistically significant for negative expenditure gap cities, and as the BSF gets larger, the negative gap becomes more negative. The only variable that was statically significant for both positive and negative expenditure gap cities was income per capita. However, income per capital worked in opposite directions for the positive and negative expenditure gaps.

The small sample size limited the scope of the study, and future research should have a large sample of cities across several states. With a larger sample size, it will be possible to look at expenditure gaps before, during, and after the recession. Additionally, this study created one expenditure trend line using data from 1997 to 2001, which was a period of high growth. It is possible expenditures during this time was not a good predictor for future expenditures and should be explored further.

Over the course of this study, the number of cities with BSF policies increased from six to eleven. As more cities adopt BSF, the need for a better understanding of BSF and polices used to create and regulate becomes more pressing. There will not be a policy suitable for all cities, and when creating a policy, cities should consider the volatility associated with its top revenue sources, income per capita, and vulnerability to unemployment. While a withdrawal policy will be beneficial to limit excessive use of the fund, it should not be so restrictive that money cannot be accessed when needed. Along similar lines, establishing a minimum amount to be in a BSF will ensure there is money available during an economic downturn. However, the minimum needs to be flexible to allow the funds to be used during a recession. The minimum policy could include a plan to replenish the funds if they are drawn down.

Introduction

Rainy day funds, contingency funds, slack, reserves, and budget stabilization funds (BSFs) are often used interchangeably to describe monies that state and local governments keep as savings. BSFs can be used to enhance credit ratings, save money in preparation for an unforeseen event such as a natural disaster, or allow the city to have funds available to smooth expenditures during tough economic times.

During economic downturns, cities face an increased demand for services while revenues decrease. To compensate for the lower revenues, governments have a few options: raise taxes to increase revenues, reduce services offered, thus decreasing expenditures, issue debt, or utilize BSFs (Vasche & Williams, 1987). Politicians like to refrain from increasing taxes, since this may reduce their chance of being re-elected. Citizens come to expect a certain level of services, and if services are cut they will be dissatisfied. Issuing debt during economic downturns can be expensive. Ultimately, during trying economic times, these factors propel some local officials to attempt to smooth expenditures through the use of BSFs.

In order for local governments to be able to smooth expenditures, it is important BSFs are an appropriate size. If a fund is too large, then tax payer money is sitting in savings and there is an opportunity cost to not spending the funds. On the other hand, if the fund is too small, municipalities will be unable to smooth expenditures and may have to increase taxes, reduce services, or issue debt.

After the Great Recession, the Government Finance Officers Association (GFOA), *Governing*, the Pew Research Center, and local governments have given BSFs a great deal of attention. In September 2015, the GFOA published a best practice for “Appropriate Level of Unrestricted Fund Balance in the General Fund.” The best practice recommends that local governments maintain a minimum of two months, or 16 percent, of operating expenses as reserves (GFOA, 2015), but there is no evidence to

suggest that 16 percent is an appropriate or feasible level of reserves. *Governing*– a magazine providing news, insight, and analysis for state and local government leaders- has been publishing an increasing number of articles highlighting the importance and challenges of BSFs. In 2013, *Governing* published "What's the Point of Rainy Day Funds?" (Marlowe, 2013). The article highlights the idea that local and state governments do not know how large funds should be. Further underlining this concept, *Governing* published two more articles, one in 2014 (Farmer, 2014) and one in 2016 entitled "Having A Rainy Day Fund, But Not Knowing How to Spend It," (Farmer, 2016).

While there is an increased interest in local government BSFs, there is a void in the municipal finance literature examining BSFs. The goal of this paper is to start filling the void by asking the questions, did municipal BSFs effectively smooth expenditures during the 2007 to 2009 Great Recession? If the BSFs were not large enough to smooth expenditures, how large would the funds have needed to be in order to smooth expenditures? This paper will also contribute to the literature because previous municipal work focused on cities within the same state, or even suburbs of one metropolitan area. I study Lexington, Kentucky and eleven benchmark cities across the country from 1997 to 2015, looking at actual expenditures compared to predicted expenditures. The data is collected from Comprehensive Annual Financial Reports, city ordinances, and census data.

This paper is broken into four sections. Section one reviews the existing state and municipal literature with an emphasis on expenditure smoothing literature. Section two is the research design and results, section three contains the conclusion and policy implications, finally section four outlines limitations and areas for future study.

Literature Review

Overview of state and municipal literature

There is a vast collection of state-level BSF literature; however, the literature at the municipal level is in its infancy. Wolkoff published the first known work in 1987 and he argues rainy day funds and reserves are similar and municipalities might keep reserves as a type of rainy day fund. Tyer (1993) emphasizes the lack of literature and calls on scholars to conduct more research on municipal reserves. Using the assumption that the role of BSF is similar at the state and local level, state literature is used as a starting point for municipal research. The literature is broken into four broad categories: optimal level of reserves, impact on general obligation bond ratings, impact on general obligation bond ratings, and expenditure smoothing.

Optimal Level of Reserves

One field of study focuses on the optimal level of reserves, and scholars have used a variety of research methods to set an optimal reserve level. Vasche and Williams (1987) conduct a case study of California to measure volatility based on revenue shortfall. According to the authors, when states try to set an optimal size for their reserves, revenue forecasting errors are the most important factors to consider. The authors are also concerned about creating a balance between having enough reserves to allow sustainability through a revenue shortfall and realizing the opportunity cost of keeping large reserves.

Nelson and Cornia (2004) introduce a risk management technique known as value at risk[1] to BSF literature. States can use this risk management technique to determine their optimal BSF size by looking at their specific revenue and expenditure risk. Another way to look at risk is to create a volatility index. Joyce (2001) uses state revenue volatility from 1997 to create a volatility score. The volatility index looks

[1] Value at risk is a simulation technique looking at the worst possible scenario

at the volatility in revenue from corporate income tax, economic environment, reliance on federal aid, gambling revenue, and Medicaid expenditures. Then, Joyce compares the volatility score with the actual size of fund to conclude that each state needs to determine their own unique optimal reserve size. Joyce also concludes most states do not have large enough reserves to be prepared for an economic downturn because of their high volatility scores (Joyce, 2001).

Research varies in trying to determine the optimal size of BSFs. In a study of Ohio, Navin and Navin (1997) determine reserves of thirteen percent of own source revenues[2] are appropriate for a large revenue shortfall. Thirteen percent stems from fluctuation in personal income and revenue forecasting errors (Navin & Navin, 1997). In a case study of Georgia, Sjoquist (1998) uses personal income as a revenue collection proxy and finds that reserves of twenty-seven percent own source revenue will be sufficient for a large revenue downturn. Finally, Lav and Berube (1999) determine eighteen percent of current expenditure is the optimal level. These authors' conclusions provide a wide variety of recommendations ranging from thirteen percent to twenty-seven percent of own-source revenues, leaving states to continue to guess at the best optimal reserve size.

Kriz (2002) examines whether the optimal size of municipal reserves is the same for state and local governments, and what factors are taken into account for fund levels. He uses a Monte Carlo simulation and, like Joyce (2001), determines the five percent goal for states is too simplistic. Rather, fund sizes are dependent on the revenue history and mix, and by his calculations, should be around thirty percent (Kriz, 2002). It is unknown where the original five percent goal comes from, though Navin and Navin (1997) explain that that National Conference of State Legislatures quote "Wall Street analysis" for recommending a five percent target.

[2] Own source revenues are revenues generated by charges for services or the collection of local taxes. For example, property tax, local income tax or local option sales tax for example

Similar to the literature focused on optimal reserve levels, Gianakis and Snow (2007) highlight the risk associated with relying on intergovernmental revenues. Intergovernmental revenues are revenues from either the federal or state government. Gianakis and Snow focus on local governments in Massachusetts to see if BSFs are the first funds to be used in the event of an economic downturn. The authors do not find evidence to support the hypothesis that governments use BSFs first and suggest this could be because funds are hard to access; governments must secure a two-thirds vote from the legislature to use the funds. Additionally, they conclude the size of the fund is largely attributable to an increase in demand for services from a high population growth rate and an increase in the birth rate. As the demand for services increase, so does the size of the BSF (Gianakis & Snow, 2007).

Table 1 below summarizes literature addressing optimal reserve levels. Revenue volatility-caused by revenue source and forecasting errors - is the main determinate of the optimal reserve size. It is vital that my study accounts for different types of revenue sources.

Impact on GO Bonds

According to theory, default risk is lower if states have more reserves. Therefore, credit ratings should be higher with larger reserves. There is little empirical support for this proposition; Grizzle (2010) finds the size of fund has a minimal impact on credit ratings. Similar to Knight & Levinson (1999) and Wagner (2003), Grizzle (2010) determines it is the characteristics of the funds that have the largest impact on bond ratings. For example, weaker withdrawal rules lead to higher credit ratings and weak deposit rules are associated with lower credit ratings (Grizzle, 2010).

In 2011 Marlowe took a different approach and tried to determine the optimal size of local reserves by looking at crediting ratings. Similar to state literature (Grizzle, 2010), he concludes slack resources matter, but it is impossible to determine the optimal size based on credit ratings. Credit ratings are largely influenced by factors out of the government's control (Marlowe, 2011). Because past

research has found little empirical evidence linking bond ratings to the size of BSFs, this research will not include bond ratings.

Table 1. Optimal Level of Reserves

Authors	Research Method	Findings	Implications for Research
Vasche and Williams (1987)	State of California case study examining revenue volatility.	Reserves should be formed based on the size of revenue forecasting error. For California, that is around 5%	Revenue volatility determines forecasting errors
Nelson and Cornia (2004)	Value at Risk for state budgeting	Utah has a 5% chance of having a deficit of $135 million or greater	Value at Risk is another method to consider revenue.
Joyce (2001)	Volatility Index based on 1997 state revenues.	There is no one size fits all BSF size for states. Most states do not have a large enough reserve to be prepared for an economic down turn.	Revenue source and the volatility of the revenue source matters for setting a BSF policy.
Navin and Navin (1997)	State revenue short fall relative to changes in personal income.	The state of Ohio would require a BSF of 13% of own source revenue to protect against a large revenue short fall.	Personal income is a key variable when determining the size of BSF.
Sjoguist (1998)	State revenue short fall relative to changes in personal income.	The state of Georgia would require a BSF of 27% of own source revenues.	Personal income is a key variable when determining the size of BSF.
Lav and Berube (1999)	Examines state revenue fluctuations.	States should maintain a BSF of 18% of current expenditures.	Revenue volatility drives the demand for BSF.
Kriz (2002)	Monte Carlo simulation	Historical revenue mix and volatility drive the need for BSF. States should have BSFs of 30% of total revenue.	There is less need for BSF when there is a less volatile source of revenue.

Impact on Savings

Another body of literature assesses whether BSFs increase a state's savings. Wager (2003) argues that monies in stabilization funds are substitutable with general fund reserves. He researched if the creation of BSFs increases savings or just moves savings from the general fund to the BSF. Ultimately, he determines BSFs do increase savings, but only marginally. Wagner (2003) emphasizes

characteristics of the fund and establishes a widely used scale for deposit and withdrawal rules. Knight and Levinson's (1999) research finds a stronger relationship between the presence of rainy day funds and increased savings. They find states that have rainy day funds have more savings with BSFs than they did without the funds. The funds' rules are an important factor in the amount of savings an entity keeps on hand; funds with rules requiring more savings do save more, and funds with strict withdrawal rules save more than funds without strict withdrawal rules (Knight &Levinson, 1999).

Hendrick (2006) uses the Chicago suburbs to examine the role of slack (spare resources) in local governments. She makes a distinction that is not in other BSF literature: economic theory versus organizational theory. In what she describes as economic theory, BSFs are a poor political strategy because they focus on the long term, whereas politicians are focused on the short term. From an organizational theory perspective, however, reserves are a good management practice because they provide a buffer for tough economic times. Hendrick (2006) runs three different regressions with three different dependent variables: unreserved fund balance, current fiscal condition measured by operating surplus or deficit, and change in own source revenue. She concludes slack resources are interchangeable during economic downturns and local governments might not realize the risk involved with relying on intergovernmental revenue (Hendrick, 2006).

Wagner (2003) and Hendrick (2006) proposed BSF money is interchangeable with money in the general fund. This finding is important because some cities have fiscal policies designating BSFs while others simply use the unassigned fund balance as its BSFs. Based on these author's results, I will compare money designated for budget stabilization purposes with general fund money. Table 2 summarizes the literature examining the on the impact of BSFs on savings.

Table 2. Impact on Savings

Authors	Research Method	Findings	Implications for Research
Wagner (2003)	State level time series scale for withdrawal and deposit policies.	The presence of BSF minimally increases savings.	Characteristics of the BSF are important. BSF money is interchangeable with general fund money.
Knight and Levinson (1999)	Time series analysis of states' savings.	The presence of BSF increases state savings.	The control variables are broken into three categories: fund characteristics, economic and demographic, and institutional factors.
Hendrick (2006)	Three models studying the accumulation of reserves in the suburbs of Chicago.	From an organizational theory perspective, reserves provide a buffer for tough economic times.	Slack resources are interchangeable

Expenditure Smoothing

Another component of the literature examines whether the presence of BSFs smooths expenditures. To do that, it must first be determined whether BSFs fluctuate in a counter-cyclical manner; in other words, to determine whether BSFs grow in strong years and are spent during economic downturns to smooth expenditures. Sobel and Holcombe (1996) take this approach and analyze state BSFs during the 1990-1991 recession. They established a fiscal policy of neutrality to study expenditure smoothing. A fiscal policy of neutrality means expenditures grow at the same rate over time and tax rates are kept the same. The authors use the fiscal policy of neutrality as their benchmark and then they calculate the actual expenditure short fall, or the difference between fiscal neutrality. Next, they add the expenditure short fall to any increase in taxes to create a measure of fiscal stress. Controlling for characteristics of the rainy day fund, they find the presence of a savings requirement leads to lower fiscal stress. Sobel and Holcombe then determine how large the rainy day fund would have needed to be prior to the recession to maintain fiscal neutrality during the recession. The fund size depended on how hard the state was hit by the recession, but overall states did not have large enough funds to maintain the same level of expenditures (Sobel & Holcombe, 1996).

In 2003, Hou uses data from state's Comprehensive Annual Financial Reports to determine if BSFs are able to smooth expenditures and, if so, by how much. First, Hou has to determine if the expenditure gaps are pro-cyclical or counter-cyclical. Using a Prais-Winsten regression[3], Hou regresses the expenditure gap on a three-year lag of gross state product. If it is determined the gap is pro-cyclical it is possible for reserves to be used to smooth expenditures. The expenditure gap is then regressed on BSF characteristics, socioeconomic factors, balanced budget requirements, and political factors. Hou examines the results by separating the data selection to compare coefficients during economic upturn years to economic downturn years. Hou's research concludes BSFs are an effective counter cyclical measure, narrowing the negative gap but unassigned reserves are not effective counter cyclical reserves (Hou, 2003).

Marlowe (2005) takes a similar approach with local government reserves. He creates an expenditure linear trend line and uses a Prais-Winston regression model to determine pro-cyclicality of expenditures. However, rather than lagging gross state product like Hou (2003), Marlowe (2005) uses a one, three, and five year lag of the change in current revenue. After Marlowe determines expenditures are in fact pro-cyclical, he regresses the expenditure gap on a variety of control factors: revenue considerations, institutional factors, and budgeting practices. Evaluating the upturn years against the downturn years, Marlowe (2005) concludes slack resources do smooth expenditures, with smaller municipalities observing more robust smoothing. Table 3 summarizes the expenditure smoothing literature.

The methods and results from previous work provide guiding lessons for this paper. The optimal size literature finds that revenue volatility is a key factor when determining the size of a BSF. If revenue is more volatile, then BSFs need to be larger in order to be prepared for an economic downturn. The

[3] A Prais-Winston regression controls for auto-correlation in time series data.

impact on savings literature determines that funds committed to BSFs and unassigned funds are interchangeable. This finding is critical because it will allow me to count all unassigned funds as a part of a BSF. Finally, Hou (2003) and Marlowe's (2005) methods are used this paper. The research design section outlines the expenditure gap method in more detail.

Table 3. Expenditure Smoothing

Authors	Research Method	Findings	Implications for Research
Sobel and Holcombe (1996)	Calculate a measure of fiscal stress based on the difference between the fiscal policy of neutrality and actual expenditure plus tax increases.	If the state has a policy requiring savings deposits, there was lower fiscal stress. Overall, BSF were not large enough to have a fiscal state of neutrality.	Should control for policy characteristics.
Hou (2003)	State expenditure gap based on expected expenditures and actual expenditures.	Designated BSFs narrow the expenditure gap during economic downturns but unassigned funds are not an effective reserve mechanism.	This paper will use the expenditure gap model.
Marlowe (2005)	Municipality expenditure gap based on expected expenditures and actual expenditures.	Slack resources do reduce the expenditure gap, and the results are more robust in small municipalities.	This paper will use the expenditure gap model.

Research Design

This study seeks to answer two questions: Did municipal BSFs effectively smooth expenditures during the Great Recession of 2007 to 2009? If the BSFs were not large enough to smooth expenditures, how large would the funds have needed to be to smooth expenditures?

Data Collection

This study focuses on Lexington-Fayette County, Kentucky and eleven comparable cities. The selected cities are cities Lexington-Fayette Urban County Government typically uses for benchmarking. They are similar in population and also home to a major university. The presence of a university is

essential for comparison because the schools are often economic drivers for the cities and provide a more stable revenue base. Appendix A lists the comparable cities.

The time period of interest is 2002 through 2015, but expenditure data is collected back to 1997 in order to create an expenditure trend line. Data is collected from Comprehensive Annual Financial Reports (CAFRs), municipal ordinances, financial policies, and the census. If data from ordinances or policies needed clarification, emails were made to the finance commissioners.

The expenditure gap is the dependent variable, and explanatory variables can be put into four categories: fund characteristics, financial measures, institutional factors, and demographic/ economic factors.

Method- Did Municipal BSFs Smooth Expenditures during the Great Recession?

The method is largely based off of Marlowe (2005) and Hue (2003). To determine if the BSFs were large enough to smooth expenditures during the great recession I created a unique linear expenditure trend line for each city using expenditure data from 1997 to 2001.

(I) $E^*_{it} = \alpha_i + \beta_i T_1$

Where E^*_{it} is equal to the expected total expenditures in municipality i at time t, α_i is the constant for municipality i, β_i is the slope of the predicted expenditures for municipality i, and T_1 is the value of the year in year 1.

The expenditure gap is the dependent variable and is expressed as a percentage, and is calculated in equation II. E is actual expenditures and E* is expected expenditures based on the trend line. There is a positive expenditure gap if actual expenditures are greater than expected expenditures and a negative expenditure gap if actual expenditures are less than the predicted expenditures.

(II) Expenditure Gap = $\frac{E-E^*}{E^*}$

Using panel data, I used a fixed effect model to regress the expenditure gap on the explanatory variables. The variables can be broken into four categories: fund characteristics, financial measures, institutional factors, and demographic/ economic factors. After the model was run, tests were done to ensure there was not heteroskedasticity

(III) $E_{gap}{}^*_{ij}=\alpha_i+\beta_0 FundChacteristics+\beta_1 FinancialMeasures+\beta_2 InstitutionalFactors+\beta_3 Demo\_EcoFactors+\varepsilon_{it}$

Explanatory Variables

The four categories of explanatory variables are: fund characteristics, financial measures, institutional factors, and demographic and economic characteristics. I chose the explanatory variables based on findings in past literature.

Fund Characteristics

From 2002 to 2009, the size of a city's BSF is measured as the unreserved fund balance as a percentage of general fund revenues. From 2010 to 2015, the BSF is measured as the sum of unassigned fund balance, committed funds when committed to BSF purposes, and assigned fund balance, as a percentage of general fund revenues. The BSF has to be measured two different ways because the Government Accounting Standards Board (GASB) implemented standard 54 in 2009. The unreserved fund balance, used from 2002 to 2009, is money that is legally available for any purpose. In 2009, the GASB passed standard 54, replacing parts of standard 34, removing the classification of unreserved and developing the unassigned fund balance. The unassigned fund balance is the amount that is spendable and not assigned to specific uses (GFOA, 2009). Under both methods, the funds for the BSF are funds that are legally eligible for any use.

Some cities have a designated fund within the unassigned fund balance which use is specified for use during economic downturns. Governments earmark the money for use during economic downturns, but is still legally eligible to be used for any use so is classified as unassigned. A dummy variable indicates the presence of such fund. If a designed fund is present, it is typically associated with a withdrawal and deposit policy.

Past research has found that a withdrawal policy is significant in the functioning of a BSF (Wagner, 2003., Grizzle, 2010., Knight & Levinson, 1999). For the purpose of this paper, a withdrawal policy can be a legal ordinance or just a part of the city's fiscal policies that outlines how money that is set assigned for rainy day can be accessed. If the policy is too restrictive, governments cannot access the monies during an economic downturn. If the policy is overly relaxed, governments will use the frequently and the BSF will not be large enough to have an impact on expenditure gaps. A dummy variable is used to indicate if the government has a withdrawal policy of any kind. Additionally, a dummy indicates the presence of a deposit policy and another dummy indicates the presence of a minimum reserve level to control for cities have a minimum level. The minimum reserve level is not predicted to limit the negative expenditure gap completely, because not all of the funds will be used to smooth the gap.

Table 4 outlines the fund characteristics variables, where the data comes from, and the hypothesized relationship with the expenditure gap.

Financial Measures

The financial measures are intergovernmental revenue, property tax revenue, and revenue from an income based tax. These measures are picked based on the reviewed literature indicating that revenue instability, based on the type of revenue, is important when determining the size of a BSF.

Intergovernmental revenues, funds from the state or federal government, are volatile because state governments cut funding to local governments during economic downturns. I will calculate Intergovernmental revenues as a percent of total revenues, and it is expected to increase the positive and negative expenditure gap. Property tax revenue is measured as a percentage of total revenue and is expected to limit the expenditure gap. Policy makers have the ability to increase property taxes or increase the assessed value of property to ensure a set amount of revenue is collected.

Income tax revenue is also measured as a percentage of total revenue, and is expected to widen the expenditure gap. The gap is expected to widen because income tax revenue is exposed to business cycle volatility. In an expansion, more people are employed and have higher paying jobs, thus producing more revenue. The opposite is true during a recession.

Table 5 outlines the fund characteristics variables, where the data comes from, and the hypothesized relationship with the expenditure gap.

Table 4. Fund Characteristics

Variable	Data Source	Theory	Source
Budget Stabilization Fund (% of total revenue)	CAFR	The set of cash used to balance expenditures rather than increasing taxes or issuing debt. The larger the fund, the smaller the expenditure gap.	Hou (2003) Marlowe (2005)
Presence of Designated Contingency Fund (Dummy)	Ordinance or finance policy	Having specific funds saved for economic downturns should allow for smoothing of expenditures allowing for a smaller negative gap. The gap will be smaller if there is a designated fund because cities have prepared to use the funds.	Hou (2003) Marlowe (2005)
Withdrawal Policy (Dummy)	Ordinance or finance policy	A dummy indicates the presence of a withdrawal policy. If there is a withdrawal policy, the gap is expected to be smaller because it is harder for the city to access the funds.	Wagner (2003)
Deposit Policy (Dummy)	Ordinance or finance policy	A dummy variable indicates the presence of a deposit policy. The presence of a deposit policy is expected to bring the gap closer to zero because there would be money in the fund to access in downturns.	Wagner (2003)

Table 5. Financial Measures

Variable	Data Source	Theory and Hypothesis	Source
Intergovernmental Revenue (% of total revenue)	CAFR	Intergovernmental funds are risky because they are dependent on the state or federal government. As the percentage of revenue from intergovernmental sources increase, the negative gap is expected to increase. .	Marlowe (2005)
Property Tax Revenue (% of total revenue)	CAFR	As property tax as a percentage of total revenue increases, the expenditure gap is expected to be closer to zero.	Marlowe (2005)
Income Tax Type Revenue (% of total revenue)	CAFR	As income type tax revenue as a percentage of total revenue increases, the expenditure gap is expected to widen.	

Institutional Factors

Institutional factors include the type of government and whether the municipality owns an electric or water utility. Marlowe (2005) cited authors for finding evidence that council-manager governments plan and save more for the long term whereas mayor-council governments spend more. He found evidence that council-manager governments had smaller negative gaps during downturn years and this paper is expected to replicate that result.

A dummy variable indicates the presence of a municipal owned electric utility and another dummy variable indicates if the municipality owns a water utility company. Municipalities owning their own electric utility and water utility are expected to impact the expenditure gap because during tough economic times, the city still has to pay to keep the two utilities operational. There is not expected to be an impact on the upturn years' gap, but the presence of either is expected to increase the negative gap because the services have to be provided, but the downturn will harm revenue collection. Table 6 displays the institutional factor variables, where the data will come from, and the hypothesized relationship with the expenditure gap.

Table 6. Institutional Factors

Variable	Data Source	Theory and Hypothesis	Source
Municipality Owned Electric Utility (Dummy)	CAFR	Governments that own electric companies have smaller general funds and funds can be moved between utility funds and the general fund and act as another reserve fund. The expenditure gap will be limited.	Marlowe (2005) Tyer (1993)
Municipality Owned Water Utility (Dummy)	CAFR	Governments that own water companies have smaller general funds and funds can move between utility funds and the general fund and act as another reserve fund. Decreases the expenditure gap.	Marlowe (2005) Tyer (1993)
Council-Manager or Mayor Council (Dummy)	CAFR	Council-manager governments plan and save more for the long term whereas mayor-council governments spend more. There will be a smaller expenditure gap.	Marlowe (2005)

Demographic and Economic Factors

The final group of explanatory factors is demographic and economic factors. These factors reflect the demand for services. An increase in population growth rate and unemployment rate are expected to increase the positive and negative expenditure gap because all of these factors represent an increase in demand for government services. Finally, a higher personal income per capita will decrease the demand for social services, and results in a decrease positive and negative expenditure gaps. Table 7 outlines the variables, where the data will come from, and the hypothesized relationship with the expenditure gap.

Table 7. Economic and Demographic Characteristics

Variable	Data Source	Theory	Source
Population Growth	CAFR	Demand for services. A higher growth rate will increase the demand for services, increasing the expenditure gap.	Hou (2003)
Unemployment Rate	CAFR	The higher the unemployment rate, the larger demand for social services and the larger the expenditure gap.	Hou (2003)
Personal Income Per Capita	CAFR	As personal income increase the demand for services will decrease shrinking the expenditure gap.	Hou (2003)

Summary Statistics

Cities divided themselves into two groups: positive expenditure gap cities and negative expenditure gap cities. All of the cities expect for Nashville remained either a positive gap city or a negative gap city from 2002 to 2015. The mean expenditure gap for cities with a negative gap was -0.33, meaning these cities spent, on average 33 percent less than the trend line. The mean expenditure gap for cities with a positive expenditure gap was 0.26, meaning they spent 26 percent more than the trend line. Negative cities had, on average, a smaller BSF with the mean BSF being six percent of revenues and the positive gap cities had a mean BSF of 14 percent of total revenues. Positive gap cities relied far more on intergovernmental revenues and property tax revenues.

Cities with Positive Expenditure Gaps:

- Chapel Hill, North Carolina
- Knoxville, Tennessee
- Lincoln, Nebraska
- Madison, Wisconsin
- Nashville, Tennessee

Cities with Negative Expenditure Gaps:

- Ann Arbor, Michigan
- Chattanooga, Tennessee
- Cincinnati, Ohio
- Columbus, Ohio
- Lexington, Kentucky

Note: Data for Indianapolis and Louisville was collected, but the city and county governments merged in the middle of the data set.

Table 8. Summary Statistics

	Positive Expenditure Gap				**Negative Expenditure Gap**			
	Mean	**S.D.**	**Min**	**Max**	**Mean**	**S.D.**	**Min**	**Max**
Expenditure Gap	0.26	0.12	0.02	0.53	-0.33	0.17	-0.64	0
BSF	0.14	0.08	0.03	0.32	0.06	0.02	0.03	0.1
Population Growth	0.01	0.01	-0.03	0.07	0	0.02	-0.06	0.09
Unemployment Rate	0.05	0.02	0	0.09	0.06	0.02	0.03	0.09
Income Per Capita($)	52,739	23,513	32,351	107,726	55,671	35,736	3,891	128,867
Intergovernmental	0.21	0.14	0.05	0.52	0.11	0.03	0.05	0.21
Property Tax	0.42	0.16	0.08	0.66	0.21	0.16	0.06	0.6
Income Type Tax	0.02	0.04	0	0.15	0.16	0.18	0	0.4
Designated Fund	0	0	0	0	0.46	0.5	0	1

Source: Data compiled by author, Comprehensive Annual Financial Reports

As mentioned in the introduction, there has been a lot more attention to municipal BSFs in recent years and the increased attention could be driven by an increased use of BSF. In 2002, only six of the cities in the study had any sort of policy guiding use and maintenance of the BSFs. By 2015, five additional cities adopted policies to guide the use of funds, bringing the total to 11 of the 12 cities. The only city without any BSF policy is Nashville, and Nashville was the only city to move between a positive expenditure gap and a negative expenditure gap. Appendix A shows what year each city adopted a minimum BSF balance.

Findings

A fixed effect regression was used to control for characteristics of cities that could not be controlled for with specific variables. Regression results are broken into two categories: positive expenditure gap (spending more than the trend) and negative expenditure gap (spending less than the trend). The only variable that is significant for both positive and negative gap cities is income per capita. For a positive gap city, if the average income per capita increases by $1,000, expenditures are 0.014 percentage points higher than expected. Meaning, for Knoxville, if income per capita increases from $39,500 to $40,500 a year, total expenditures would increase by $3 million a year. For the negative gap, if the income per capita increases by $1,000, the gap becomes more negative by 0.0028 percentage points. For example, if Columbus' per capita increases from $43,500 to $44,500, expenditures would decrease by $4 million.

The other statistically significant variables for positive gap cities are property tax revenue as a percentage of total revenue and the presence of a withdrawal policy. Looking at property tax revenue, if property tax revenue as a percentage of total revenues increases by one percentage point, the expenditure gap decreases by 0.513 percent, meaning expenditures are closer to predicted expenditures. This result might be explained by the fact that governments have greater ability to adjust property tax rates or property values in order to generate a set amount of money. The presence of a

withdrawal policy means that a city with a withdrawal policy has a smaller expenditure gap (closer to zero) than if there was no policy. The smaller expenditure gap with the presence of a withdrawal policy might mean the withdrawal policy restricts the city from spending more money than it would have otherwise. The rho value for the positive expenditure gap cities is 0.9622, meaning the city fixed effect caused 96 percent of the variance. The R-squared for the remaining four percent is 0.37, so the model is not a good fit for positive expenditure gaps.

Moving to negative expenditure gap cities; the statistically significant variables other than income per capita are BSF, unemployment rate, and a policy requiring a minimum BSF. If the BSF increases by one percentage point, the gap gets more negative by 2.289 percentage points. For example, if Columbus were to increase its BSF by one percent of total revenues, its expenditures would decrease by 2.289 percent, or $37 million. Uncertainty among policy makers on how and when BSFs should be used could cause the gap to become more negative as the BSF gets larger. The unemployment rate is also significant. As the unemployment rate increased by one percent, the expenditure gap becomes more negative by 1.536 percent. Finally, a presence of a minimum balance makes the gap even more negative (spending less) by 0.0107 percent, compared to cities without a minimum policy. One possible explanation is if there is a minimum requirement, and the BSF is close to the minimum when a recession hits, the city cannot access the funds. According to the rho value, characteristics of the cities explain 95 percent of the variance. The R-squared value of 0.818 indicates the model better fits cities with a negative expenditure gap. Table 10 displays the regression outputs.

The literature supports the results presented below. The literature on optimal reserves stresses the importance of personal income per capita, and income per capita is the only variable that is significant in the positive and negative gap models. Literature studying the impact on savings and

smoothing expenditure shows that BSF policy characteristics are important and in this model, the withdrawal policy and minimum reserve policy matter.

Table 10. Regression Outputs

	Positive Expenditure Gap		**Negative Expenditure Gap**	
VARIABLES	Coefficient	Standard Error	Coefficient	Standard Error
BSF	-0.418	-0.263	-2.289***	-0.448
Population Growth	-0.987	-0.789	-0.181	-0.396
Unemployment Rate	1.467	-0.917	-1.536***	-0.482
Income Per Capita $1000	0.0143***	-0.0037	-0.0028**	-0.0010
Intergovernmental Revenue	0.321	-0.238	0.638*	-0.376
Property Tax Revenue	-0.513*	-0.274	0.56	-0.449
Income Type Tax Revenue	-0.138	-0.708	-0.954	-0.626
Designated Fund	-		-	
Withdrawal Policy	-0.141**	-0.055	-0.047	-0.043
Deposit Policy	-		-	
Minimum Policy	-		-0.107***	-0.033
Mayor Council	-		-	
Own Water	-		-	
Own Electric	-		-	
Constant	-0.329	-0.211	0.0748	-0.138
Observations	59		50	
Number of Cities	5		5	
Variance Explained by Cities	0.9622		0.9592	
Prob > F	0.0039		0	
R-squared	0.37		0.818	

Significance: *** p<0.01, **p<0.05, *p<0.1

Source: Data compiled by author, Comprehensive Annual Financial Reports

Cities in the study are split evenly between positive and negative gap cities, and do not move between categories during the recession, showing the BSFs did not smooth expenditures during the recession. Marlowe's (2005) research supports the lack of expenditure smoothing in these large cities. His results showed BSF had an effect on small cities and not much of an impact on large cities. Additionally, Hou (2003) determined that BSF that were made of unassigned fund balances did not smooth expenditures. All of the cities, expect Lexington, BSF's are within the unassigned fund balance and the BSFs did not smooth expenditures.

Method- How Large would the BSFs have needed to be to Smooth Expenditures?

The second purpose of this paper is to determine how large BSFs would have needed to be in order to smooth expenditures during the Great Recession if there was a negative expenditure gap. After reviewing the summary statistics and the regression results, it is not possible to determine how large BSFs should be. The cities were equally split between positive and negative gaps, and did not change overtime. The size of the BSF was only significant when there was a negative expenditure gap, and the larger the fund, the larger the expenditure gap.

Conclusion and Recommendations

While BSFs did not effectively smooth expenditures during the Great Recession, they are becoming more popular as evidenced by five cities creating policy over the course of the study. The following recommendations are based on or inferred from findings. It is important that policy makers understand how to create and regulate a BSF that will allow the city to continue to provide services during economic downturns. However, characteristics of the city determine if cities were able to smooth expenditures or not, and thus each city will need to create a policy specific to its needs.

> ***Recommendation 1:*** *There should not be a uniform BSF for all cities, rather every city should create a BSF policy specific to its needs and should consider its main revenue sources when creating the policy.*

Current BSF policy appears to limit cities' ability to smooth expenditures, making the creation and alteration of policies extremely important. The intended use of the fund should drive the make-up of the policy.

> ***Recommendation 2***: *Cities may consider multiple reserve funds with different policies based on their intended use. For example, there could be a reserve fund for natural disasters that is separate from a reserve fund for revenue downfall.*

Having separate funds will allow for policies to be more specific and not hinder cities' ability to access funds with needed. Once governments establish separate reserves, reserves specific to revenue downfall should have a flexible minimum reserve policy.

> ***Recommendation 3:*** *Minimum reserve policies should be designed to enable the fund to utilized during the recession. The policy should include a plan to re-build the fund once the recession has passed.*

If a negative expenditure gap city has a minimum reserve policy the expenditures become more negative. Therefore, a flexible minimum reserve policy will encourage a city to save during economic upturns, while at the same time, allowing the city to access the funds when they are needed during an economic downturn.

Limitations and Areas for Future Study

There are data limitations to this study. Data was collected over nineteen years, and over that time, reporting standards changed several times, precautions were made to ensure that all data was collected based on full accrual accounting. Also, data before 2002 was difficult to gather because it was not online and resulted in some missing data. Some observations were lost because Indianapolis and Louisville changed types of governments. Indianapolis and Louisville both form some type of merged government with their respective counties, making it impossible to create a viable expenditure trend using data from 1997 to 2001.

All cities that were studied were large cities with universities. Having all similar cities helps for comparison within the study, but results cannot be extrapolated to other types of cities. University cities generally are less affected by recessions because University's provide a lot of jobs and enrollment in universities is counter-cycle. There is a need for research that examines serval types of cities in one study. With more cities, it will be possible to run regressions that can be separated by recession and non-recession years.

The expenditure gaps in this study were based on a trend line created from1997 to 2001, and this period was a period of high growth. The gaps created based on this trend line could be purely driven by the expenditures from 1997 to 2002 and not accurately reflect the true effect of BSFs. More studies should be done with different years as the base year. This study also did not control for the 2001 recession.

This study only looked at expenditures as a whole. Future research should look at specific expenditure categories to see where cities cut spending during the recession. If spending is cut from infrastructure or economic development, how does that affect the state of the city after a recession? Municipal BSFs require a lot more research, and as an increasing number of cities adopt BSF policies there will be more data available for future research.

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Appendix A. List of Comparable Cities

City	University	Year Minimum Balance Policy was Adopted (%)
Lexington, Kentucky	University of Kentucky	Always (10%)
Ann Arbor, Michigan	University of Michigan	2010 (12%)
Chapel Hill, North Carolina	University of North Carolina	Always (12%)
Chattanooga, Tennessee	University of Chattanooga	2006 (15%)
Cincinnati, Ohio	University of Cincinnati	2015 (17%)
Columbus, Ohio	The Ohio State University	Always (15%)
Indianapolis, Indiana	Butler University	2011 (10%)
Knoxville, Tennessee	University of Tennessee	2011 (20%)
Lincoln, Nebraska	University of Nebraska	Always (20%)
Louisville, Kentucky	University of Louisville	Always (8%)
Madison, Wisconsin	University of Wisconsin	Always (15%)
Nashville, Tennessee	Vanderbilt University	Never

Source: Compiled by Author

"Always" means for the duration of the study

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