The Financial Condition of American's Large Cities

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THESIS
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SUMMARY

Since the Great Recession, declining revenues and increasing needs for public goods and services has become a growing concern for municipalities that serve as a key provider for citizens' local services. In this sense, local governments' ability to sustain a healthy fiscal structure and meet service obligations is critical to avoid financial hardships and relieve tension between public administrators and citizens, especially when facing recessions. Financial condition reflects a government's capacity to meet both short/long-term and service obligations, and it is related to different characteristics of the government's internal fiscal structure and external fiscal and political environment. This dissertation measures municipal financial condition in three dimensions (cash, budget and long-term solvencies) and specifically examines three intergovernmental and institutional factors (state-imposed TELs on local governments, fiscal decentralization, and intergovernmental aid) on municipal fiscal condition.

This dissertation contributes to a better theoretical understanding of the complexities of financial condition process. Also, this dissertation uses data from government-wide financial statements to measure municipal financial condition, which can better evaluate the overall fiscal health of the governments as well as compare, analyze, and explain the financial condition in a more accurate and comprehensive manner.

The results from the panel two-ways fixed-effects regression show that cities with more stringent state-imposed TELs tend to have smaller government-wide cash reserves in the short-term but are more likely to excessively rely on debt, therefore facing difficulty in the payment of long-term liabilities. Second, an increased degree of state-local revenue decentralization is significantly associated with

lower budget solvency and higher long-term solvency among cities; while an increased degree of state-local expenditure decentralization leads to higher levels of city cash solvency and lower levels of city long-term solvency. Finally, municipalities with more intergovernmental aid are likely to increase cash holdings but may experience unbalanced budgets and more financing responsibilities in the future.

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Chapter 1 Introduction

1.1 Research Background

In the past few decades, American local governments experienced economic downturns, debt crises, and municipal bankruptcies (e.g., Bridgeport in Connecticut declared bankruptcy in 1991; Detroit in Michigan filed bankruptcy in 2013). Especially, with the advent of tax revolts and suburbanization in the mid- to late- 1970s, municipalities have faced a considerable loss of property tax revenues, resulting in fiscal challenges and financial panic. Conversely, citizens' demands for public services continue to climb, and the like holds true for stakeholders' expectations for government spending. Meanwhile, from the perspective of intergovernmental relationship, local governments must perform a variety of functions mandated by federal and state governments, but they have been constrained by stringent fiscal institutions (e.g., Mullins & Joyce, 1996; Mullins & Wallin, 2004; Johnston, Pagano & Russo, 2000; Maher & Deller, 2013). For instance, municipalities receive funding from the federal government to provide certain public services, such as community development block grants and homeland security grants. Also, they are required to comply with Tax and Expenditure Limitations (TELs) imposed by state governments, which might be a potential contributor to their fiscal stress.

Since the Great Recession between December 2007 and June 2009, the fiscal health of local governments has become a hot research topic of discussion among academic scholars and government practitioners. Declining revenues and increasing needs for public goods and services have become a growing concern for municipalities which serve as a key provider of local public services. In this sense, local governments' ability to maintain a healthy fiscal condition and meet

service obligations is critical to avoid financial hardships and relieve tension between public administrators and citizens, especially when facing recessions. Therefore, a deeper understanding of municipal fiscal condition and its determinants can assist state and local decision-makers and public managers in evaluating and monitoring their governments' financial performance and undertaking corrective actions when fiscal health of their jurisdictions is deteriorating.

1.2 Statement of the Problem

Financial condition (FC) is a broad and multidimensional concept reflecting a government's capacity to meet both short-term and long-term financial and service obligations. Although much literature is dedicated to investigating financial condition (e.g., Clark & Ferguson, 1983; Ladd & Yinger, 1989; Brown, 1993; Nollenberger, Groves, & Valente, 2003), most of studies use data from governmental fund-based reporting (Brown, 1993; Maher & Deller, 2013; Hendrick, 2004). After the implementation of GASB Statement No. 34 in 1999, state and local governments have been required to provide extensive government-wide financial information using an accrual basis. This development of standardized financial reporting and evolution of government accounting methods have influenced the assessments of government financial condition (Mead, 2012). The GASB Statement 34 added two accrual-based statements (one is the consolidated operating statement— statement of activities, and another one is the balance sheet— statement of net assets) for the government as a whole. This leads to a more transparent governmental reporting, thus making it possible to compare, analyze, and explain the state and local government financial condition more accurately and comprehensively, rather than at the separate fund levels. To maintain financial accountability and efficiency, it is essential for

citizens, creditors, city managers, and other stakeholders to assess government financial condition using more understandable and meaningful fiscal information, which can be retrieved from the government-wide financial statements.

Moreover, as different dimensions of financial condition are related to different characteristics of a government's internal fiscal structure and external fiscal and political environments (Nollenberger, Groves, & Valente, 2003), local decision-makers need to understand the interconnections between a government's own fiscal position and its external fiscal context (LaPlante, 2012). It is therefore essential to explore the complex forces influencing the fiscal health of local governments. This not only helps municipal government officials to manage their revenues and expenditures but also enables them to react effectively to the external fiscal challenges. However, to date, most of these studies have relied on data from the government fund level statements to assess financial condition. Surprisingly, no study has utilized government-wide financial statement data to systematically explore the factors affecting government fiscal condition in multiple dimensions. To fill this research gap, my dissertation mainly examines the intergovernmental and institutional determinants of municipal fiscal condition, particularly about the three solvency dimensions (cash, budget, and long-run solvencies).

1.3 Research Questions

Based on the existing literature, government financial condition is influenced by both internal fiscal structure and external context. Internally, the fiscal structure is created by financial responsibilities that governments must carry (McDonald, 2015) and fiscal decisions that public officials make over time (Hendrick & Crawford, 2014). Therefore, the underlying government

structures, such as revenue diversification and the level of fund balance, may be changed by government officials and endogenously influence financial policies. Externally, governments are viewed as open systems, in which unexpected environmental conditions constrain the range of financial policies government officials can establish or implement (Hendrick & Crawford, 2014; Hendrick, 2004; Scorsone, Levinne & Justice, 2013). This set of exogenous parameters that can determine the allowable fiscal policy choices for city governments that encompass the "fiscal policy space" (FPS) (Pagano & Hoene, 2010; Pagano, Hoene & Wu, 2013). Conceptualized in the FPS framework, the key parameters of a confined decision environment include "the intergovernmental context," "the underlying economic base," "the local legal context," "the demands and preferences of citizens," and "the local political culture" (Pagano & Hoene, 2010). In this research, I investigate how the political, institutional, and socioeconomic factors affect local governments' financial condition using the 100 large American cities as a sample. Specifically, I focus on testing the effects of the three intergovernmental and institutional factors on municipal fiscal condition , including state-imposed TELs on local governments, fiscal decentralization, and intergovernmental aid. My research questions are the following:

1. *Whether state-imposed tax and expenditure limitations (TELs) exert a significant effect on municipal fiscal condition?*
2. *Whether fiscal decentralization between states and their local governments is significantly associated with municipal fiscal condition?*
3. *Whether federal and state intergovernmental transfers play an important role in affecting municipal fiscal condition?*

1.4 Significance of the Study

Although there is growing research on investigating state and local financial conditions (e.g., Wang, Dennis & Tu, 2007; Kioko, 2013; Hendrick, 2004; Sohl et al., 2009), many of them exclusively focus on budgetary and short-term information and most often analyze the governmental funds or just some special revenue funds, which cannot assess the overall financial condition of the government (Mead, 2012). As GASB 34 statement was adopted in 1999, it has standardized reporting and eliminated varying accounting methods. The unique government-wide statements required by GASB 34 capture the information about long-term debts and capital assets and make it possible to compare comprehensive financial condition across local governments. Moreover, several measures from the government-wide financial statements have been found to be valid and reliable in the scholarly literature. For example, Wang et al. (2007) analyze the data of 50 U.S. states for the fiscal year 2003 and find not only financial condition indicators within each of the four dimensions (cash, budget, long-term and service solvencies) are highly associated with each other, but also the four-dimension indices are associated with each other. Stone et al. (2015) utilize these indicators in his case study of Detroit City for the years 2002 to 2012, and they report that high correlation coefficients exist in the indicators of cash, long-term, and service solvencies. Johnson et al. (2012) find government-wide financial statements are associated with state credit rating levels. However, studies using government-wide financial statements to assess financial condition are very limited in the literature (Maher & Deller, 2013). This research adds to the body of government financial condition literature by using more comprehensive and consolidated government-wide financial statement data that may be important to meet a variety of informational needs of local government managers. Besides, this research particularly tests the impacts of fiscal and intergovernmental institutions on city fiscal condition while controlling for a set of political, socio-economic, fiscal characteristics of

municipalities. It should be noted that although TELs, fiscal decentralization (usually defined as devolution of federal and state revenues and expenditure responsibilities to local government), and intergovernmental aid have been found to largely affect both governments' revenues and expenditures. Yet, very few studies have explored whether these fiscal and intergovernmental institutions affect municipal fiscal condition that is measured by government-wide financial statement data. This dissertation advances our knowledge and understanding of the determinants of municipal fiscal health from the institutional and intergovernmental perspectives using the unique government-wide financial statements data in Comprehensive Annual Financial Reports (CAFRs) that "report all assets (both financial and capital), liabilities, revenues, expenses, gains and losses" for the "overall government" (GASB 1999, p. 9).

Besides academic contributions, my dissertation research provides insightful implications for practitioners and policymakers to monitor municipal fiscal condition. Public officials at all levels of governments are concerned about the fiscal sustainability of municipal governments, which are the primary entities committing service obligations on behalf of federal and state governments. Some states have established legislations to monitor their cities' fiscal health. For instance, North Carolina creates the Local Government Commission (LGC) to provide regulatory oversight for cities with a financial trouble. It especially controls the issuance of all local government debt (Coe, 2007, p. 41). Ohio develops the Fiscal Watch Program to oversee its local governments' financial activities and prevent them from entering a fiscal emergency. Pennsylvania requires municipalities to report on 27 indicators related to their financial conditions under the law of Municipalities Financial Recovery Act of 1987 (47). Pennsylvania local governments facing fiscal troubles are qualified for state technical assistance and grants/loans. Likewise, Michigan identifies 30 indicators to determine local governments' fiscal

distress and fiscally healthy conditions, with the intent to provide early warnings and alerts for those cities on the edge of fiscal emergency (Weikart, 2013). Through investigating the reliability of multiple indicators within each financial condition dimension, my dissertation helps state and local government officials to select sound measures to assess local financial condition. It also helps public officials to diagnose financial problems and develop proactive approaches to deal with possible fiscal distress.

To better improve the fiscal outlook of municipalities, government officials need empirical evidence to know whether their local governments are in a better financial condition, or whether restrictive state and local fiscal institutions improve or hurt municipal fiscal health. For example, if the stringency of TELs limits a government's ability to respond to changes in service demands, state policy makers may consider relieving the fiscal institutions to avoid negative effects on municipal financial condition. In this sense, my doctoral study provides empirical evidence for state and local public officials to improve their fiscal decision-making, especially when they consider new fiscal institutions. Understanding the intergovernmental and institutional influences on municipal financial condition can guide elected officials and financial managers to be more cautious and prudent on their fiscal actions. Additionally, the research findings can help state and local policy-makers devise sound strategies to cope with municipal fiscal stress, react to serious fiscal problems, reform harsh state and local fiscal institutions, and improve the long-run fiscal sustainability of municipalities.

1.5 Overview of the Dissertation

This dissertation is organized into five chapters. Chapter 1 depicts research background, research questions, and the contributions of this study. Chapter 2 summaries relevant literature, presents a theoretical framework, and develops research hypotheses regarding the effects of TELs, fiscal decentralization, and intergovernmental aid on municipal financial condition. Chapter 3 discusses econometric models, variable measurements, data sources, and outlines the methodology to test the research hypotheses. Chapter 4 summarizes empirical results. Finally, Chapter 5 outlines research implications and potential future research avenues.

Chapter 2 Literature Review and Theoretical Framework

2.1 Government Financial Condition: Definition and Measurement

2.1.1 Government Financial Condition: Definition

There are various definitions of government financial condition in the literature. Generally defined, a financial condition is a government's ability to adequately provide services to meet current and future obligations (Mead, 2001). More specifically, a financial condition is defined as a level of solvency that could be measured by a set of financial indicators (Nollenberger, Groves & Valente, 2003). Different from Clark and Ferguson (1983) who regard financial condition as a balance or equilibrium between local government policies and the private sector environment (p. 44), Jacob and Hendrick (2012) claim that financial condition is not static but a dynamic process and should be conceptualized in multiple time frames. Furthermore, Hendrick (2011) emphasizes the continuing nature of financial condition, which is evaluated by whether a government can quickly respond to the changing environment and sustain this equilibrium not only in the short-term but also in the long-term.

2.1.2 Government Financial Condition: Measurement and Indicators

2.1.2.1 Development of Government Financial Accounting and Reporting Standards

Different from business accounting, the foundation of government accounting is based on fund system, including governmental funds (general, special revenue, debt service, and capital project funds) and proprietary funds (enterprise and internal service funds). Each fund presents its own assets/liabilities and resource inflow/outflow. However, the governmental funds are

reported on a modified accrual basis of accounting, which contain the information only on current assets and liabilities. When comparing governmental financial condition, the traditional governmental accounting methods have certain weaknesses. One of the most apparent issues is their exclusive focus on budget and short-term information. The statements demonstrate how governments use different individual funds to finance their current operation and fail to include the reporting of long-term debts and capital assets related to general governmental activities. Given the outdated reporting practices of governments, the traditional analyses of fiscal condition are not able to depict the overall governmental fiscal health. This is because they were frequently limited to governmental/special revenue funds or just a general fund (Mead, 2012).

The passage of GASB Statement No. 34 in June 1999 has yielded significant changes in government financial reporting standards. Prior to the implementation of GASB 34, government financial statements reported various funds based on different accounting standards. The standards by GASB 34 require state and local governments to consolidate and report their funds within governmental activities and all enterprise funds within business activities. Users of state and local government financial statements can analyze full accrual information presented for the entire government and assess the governments' overall financial condition.

GASB Statement No. 34 provides a new and important framework for developing the measurement of state and local government financial condition (Mead, 2012; Wang, Dennis & Tu, 2007). First, before the issuance of GASB Statement No. 34, the focus of traditional government financial statements was on fund-level statements and activities. This reflected only part of a government's transactions. The new reporting model under GASB No. 34 requires the preparation of government-wide financial statements using the full accrual basis of accounting and the economic resources measurement focus (Mead, 2012). The Statement of Net Assets and

the Statement of Activities are two new consolidated government-wide financial statements that provide comprehensive information about expenses, revenues, assets, liabilities, net assets for a government taken as a whole. Second, because government-wide financial statements under GASB No. 34 are prepared on the accrual basis, reported expenses and revenues provide information about the true costs of public services and more accurately reflect government financial condition. Third, government-wide financial statements employ the economic resources measurement focus and account for the value and depreciation of capital assets as well as long-term obligations. This enables to assess the effects of long-term resources and obligations on financial condition. In sum, government-wide financial statements reported under the requirement of GASB Statement No. 34 provide useful, accurate, and comprehensive information to evaluate the financial condition of state and local governments.

2.1.2.2 Measurements of Government Financial Condition

In the current literature, numerous approaches have been developed to measure government fiscal condition. In this section, I focus on describing and assessing four popular approaches that have been used to analyze, interpret, and compare financial conditions of state and local governments.

One of the most comprehensive financial assessment tools is the Financial Trend Monitoring System (FTMS) developed by the International City Management Association (ICMA) in 1980. The ICMA handbook recognized four components of financial condition (cash, budget, long-run and service level solvency) proposed by Groves, Godsey, and Shulman (1981). Also, this guide created a model incorporating twelve factors that may constitute and affect the

financial condition. To illustrate, six financial factors (revenues, expenditures, operating position, debt structure, unfunded liabilities, and condition of capital assets) are influenced by five environmental factors (community needs and resources, external economic conditions, intergovernmental constraints, natural disasters/ emergencies, and political culture) and two organizational factors (management practices and legislative policies).

The Financial Trend Monitoring System (FTMS) can guide local officials in collecting much useful information, not only from government budgets and financial reports but also from economic and demographic data. Thus, the FTMS diagnoses the government's financial strengths and weaknesses for the audiences of elected officials, citizens, credit-rating firms, and other groups. They are interested in analyzing the fiscal performance of governments (Nollenberger, Groves & Valente, 2003). However, the existence of many financial indicators in the FTMS increases the complexity of implementation and interpretation of financial condition in the real world. First, the FTMS does not include any concrete measures for political culture and external economic conditions, which are important environmental factors. Second, as Nollenberger et al. (2003) admitted, some indicators in the FTMS are not mutually exclusive and can be applied to more than one factor. For example, although intergovernmental revenue is classified as a revenue factor, it could also be classified as an intergovernmental constraint factor. In sum, the two major shortcomings of the improved FTMS are: (1) an emphasis on individual indicators that are viewed and interpreted in isolation, and (2) the oversimplification of relationships between and among factors (LaPlante, 2012). Additionally, the FTMS is not able to form an aggregate index to rate and compare government financial conditions.

Second, Brown's (1993) ten points approach provides a total score to compare fiscal conditions across similarly sized cities. He creates ten ratios associated with operating positions,

debt structures, revenues, and expenditures (total revenues per capita, percentage of general fund revenues from own sources of the total general fund revenues, percentage of general fund sources from other funds of the total general fund sources, percentage of operating expenditures of total expenditures, percentage of total revenues of total expenditures, percentage of unreserved general fund balance of total general fund revenues, percentage of total general fund cash and investments of total general fund liabilities, percentage of total general fund liabilities of total general fund revenues, long-term debt per capita, and percentage of debt services of total revenues). Each ratio was compared with that of the similar city group and was graded as -1, +1, and +2 depending on the relative quartile ranking in its group. Therefore, Brown's approach provides each city with a final score, which can be perceived as its financial position in comparison with other cities.

As Stone et al. (2015) point out, Brown's major innovation is the aggregation of these ratios into a single score, which represent overall financial condition. Using benchmarking, each financial ratio is assigned a score based on the comparison of one city with other cities of similar size. Therefore, the financial performance of one local government is determined by an overall index aggregating all benchmarked scores. Higher aggregate scores indicate better financial conditions relative to others. This 10-point test was updated by Mead (2006) in response to the new reporting standard by incorporating ratios calculated from the government-wide financial statements. Despite the simplicity and easiness of the 10-point test, it is still potentially problematic. Brown's 10-point test concerns short-term financing, such as the adequacy of cash relative to immediate financial obligations, while ignoring long-term issues that ensure the fiscal health of the community in the prospect (McKinney, 1995). Another major disadvantage is that Brown's ten-point test is designed for governmental funds only, and it does not address

enterprise funds (Rivenbark, Roenigk & Allison, 2010). The third potential weakness is that it is a static tool that provides a picture at one given time and may oversimplify interpretations (Honadle & Lloyed-Jones, 1998). More importantly, it focuses on governmental funds and activities, and therefore cannot reflect a big picture of overall governmental financial condition.

Third, as one of the disaggregated approaches to measure financial condition (Stone et al., 2015), four different types of solvency (long-run, service level, budget, and cash) proposed by Nollenberger, Groves, and Valente (2003), have been investigated empirically by a few scholars. For instance, Wang et al. (2007) consolidate eleven financial condition indicators into four categories for all 50 American states in the year of 2004. Their results demonstrate that the financial condition measure is relatively reliable and valid, and state financial conditions vary greatly. It should be noted that their study excludes some socioeconomic factors, such as population growth, employment, housing, and poverty, and these nonfinancial factors can affect the financial condition. Kioko (2013) uses a similar set of financial condition indicators to measure the financial condition of 50 states during the nine years from 2002-2010. Her results show that state governments with smaller population size have robust operating and financial positions while state governments with a larger population size consistently report weaker operating and financial positions. Similar to that of Wang et al. (2007), one of the advancements of Kioko's (2013) research is to use the government-wide financial statements under the new financial reporting model. Another advancement of Kioko's (2013) research is that it employs eleven indicators for measuring state financial condition for the period before, during, and after the Great Recession. Her analysis of state financial condition across the nine years enables us to see the wide variation of financial condition in four dimensions across states and by years. However, Kioko's (2013) study does not test the measurement reliability and validity as Wang et

al. (2007) did. This makes it unclear whether the grouped financial indicators are associated with each other in four different dimensions of financial condition. More importantly, Kioko (2013) does not take a further step to examine the determinants of changes in state government financial condition.

Fourth, Hendrick (2004) develops a "systems approach" to understand diverse dimensions of factors affecting government fiscal health. She further recognizes changes to fiscal health within these dimensions in different time frames. The three dimensions include properties of the government's environment, the balance of fiscal structure with environment, and properties of the government's fiscal structure (Hendrick, 2004). Her study focuses on the four dimensions including revenue wealth, spending needs, fiscal balance, and fiscal slack. Applying this framework to 264 suburban municipalities in the Chicago metropolitan region, Hendrick (2004) argues that the dimensions are related but must be measured separately rather than combined into a comprehensive indicator of fiscal health. There are a few new features of Hendrick's (2004) approach compared with previous fiscal condition measures. First, it is based on an ecological and systematic view of governments, and further specifies different dimensions of the concept. Second, the framework also recognizes that changes to fiscal health within these dimensions occur in short-term and long-term time frames (Hendrick, 2004, p. 80). The major contribution of Hendrick's (2004) research is the suggestion of the complexity and indirect nature of the relationships among different dimensions of fiscal health. She also recommends valuable future research directions, including studying the effects of particular environmental and structural changes on the fiscal health and exploring the relationship between fiscal slack and short-term/long-term operating functions.

A review of the extensive literature on the measurement of fiscal health yields three observations. First, there does not exist a single composite measure that captures the full dimensions of financial condition. The measurement of financial health is often done with the use of multiple financial indicators that recognize the complexity and multi-dimensional nature of government financial condition. Second, each of the measurement systems provides a different perspective of a government's financial condition and has its own strengthens and weaknesses. There is no consensus on what approach is the best to measure government financial condition (Hendrick, 2011; Jacob & Hendrick, 2012). Third, government financial condition cannot be evaluated independently of its context. The suitable approach of measuring financial condition is contingent upon the unique circumstance of the government as well as the target audience of performing a financial condition analysis (McDonald, 2015).

Table 1. Measurement and Index of Government Financial Condition

Authors	Financial Statement and Accounting Basis	Indicators (Measurement)		Method	Sample	Unit Analysis
Ladd & Yinger (1989)	Governmental Funds (Modified Accrual Basis)	revenue-raising capacity	per capita residents' income, tax burden to residents and nonresidents	Fiscal health index	U.S. cities	Local Governments
		costs and spending needs for general, police, and fire	cost of public service quality, city population and density, disadvantaged residents and hold housing, relations with suburbs, composition			
Brown (1993)	Governmental Funds (Modified Accrual Basis)	total revenues per cap, % own-source revenue, % transfers in, % capital expenditures, operating deficits, % unreserved fund balance, cash and investment/liabilities (liquidity), % liabilities, debt per cap, % debt service		Benchmark	Small local governments	Local Governments
Maher and Deller (2013)	Governmental Funds (Modified Accrual Basis)	Revenue capacity	own-source revenue divided by taxable property	Cross-sectional study	U.S. cities	Local Governments
		Expenditure capacity	general fund expenditures as a percentage of taxable property			
		operating position	general fund revenues relative to general fund expenditures			
		fiscal slack	the sum of general fund unreserved undesignated and unreserved designated funds divided by general fund revenues			
Hendrick (2004)	Governmental Funds (Modified Accrual Basis)	spending needs	median age of housing, weighted crime rate per capita, population density, fire district	Indices comparison	Chicago municipalities	Local Governments
		revenue wealth	income per capita, EAV per square mile, weighted sales receipts per capita			
		balance with the environment	wealth index minus need index			
		slack	% unreserved fund balance, % capital expenditures, %enterprise income, % debt service			
Wang, Dennies, and Tu (2007)	Statement of Net Assets and Statement of	Cash Solvency	cash ratio	Correlation analysis	50 U.S. states	State governments
			quick ratio			
			current ratio			

	Activities (Accrual Basis)	Budget Solvency	operating ratio			
			surplus (deficit) per capita			
		Long-run Solvency	net asset ratio			
			long-term liability ratio			
			long-term liability per capita			
		Service Solvency	tax per capita			
			revenue per capita			
			expenses per capita			
Rivenbark, Roenigk, and Allison (2010)	Governmental Activities and Enterprise Funds (Accrual Basis)	Resource Flow	total margin ratio	Case Study	The village of Pinehurst, Camden County, and Chatham County in NC	Local Governments
			percent change in net assets			
			charge to expense ratio			
			debt service ratio			
		Resource Stock	quick ratio			
			net assets ratio			
			debt to assets ratio			
			capital assets condition ratio			
	Governmental Funds (Modified Accrual Basis)	Resource Flow	operations ratios			
			intergovernmental ratio			
			debt service ratio			
		Resource Stock	quick ratio			
			fund balance as a percentage of expenditures			
			debt as a percentage of assessed value			

2.2 Government Financial Condition: Relevant Determinants

As discussed in the last section, despite the difficulty of defining the financial condition, a generally accepted definition is the ability of governments to meet its current and future obligations (e.g., Wang, Dennis & Tu, 2007; Nollenberger, Groves & Valente, 2003; Jacob & Hendrick, 2012). This definition recognizes that government fiscal condition is multidimensional with varying time frames (short-term and long-term). Defined in this manner, government financial condition can be further measured as the level of solvency.[1] Four levels of solvency are widely used (Wang, Dennis & Tu, 2007; Nollenberger, Groves & Valente, 2003; Hendrick, 2011; Jacob & Hendrick, 2012; Hendrick & Crawford, 2014). Cash solvency is the ability to generate sufficient cash to pay for current liabilities. Budgetary solvency means the ability to collect sufficient revenues to pay for expenditures during a normal budget cycle. Service-level solvency indicates the ability to financially provide a desirable level of public services demanded by citizens. Long-term solvency refers to the ability to pay off long-term obligations. The following review of literature on the relevant determinants of government financial condition builds upon this four-solvency framework.

2.2.1 Review of Literature on TELs and Government Financial Condition

Tax and Expenditure Limitations (TELs) is a common fiscal institution, and it has existed since the 1800s. For example, the first property tax rate limit was passed in 1875 in Missouri, while Arkansas enacted the first state-level TEL in 1934 (Kioko & Martell, 2012). Proposition 13 in California is generally marked as the beginning of the recent tax limitation movement

[1] Solvency in finance generally refers to the ability to pay (Wang, 2014).

(Mullins & Wallin, 2004). It changed the distribution of authority and responsibility between state and local governments as state rules restricted local property taxation. Until now, over 50 TELs have been passed in the U.S. states since the 1970s, and they are currently implemented in most states (Seljan, 2014). In general, states have imposed limits on property tax rates, assessment growth, property tax levies, and the level of general revenue collected by local governments in some states. Among three types of TELs, limits on property tax levy growth rate are the most common form of state limitation. However, TELs may vary across states and even localities within the same state. Colorado's Taxpayer's Bill of Rights ("TABOR") is regarded as the most restrictive TELs in the U.S. (Amiel, Delller & Stallmann, 2009; Poulson, 2005; Stallmann et al., 2017).

TELs' fiscal impacts have been examined over the last four decades. For the purpose of simplicity, I discuss the effects of TELs on the indicators related to each of the four solvencies, respectively. First, regarding the fiscal impact of TELs on cash solvency, Maher and Deller (2013) find a positive relationship between TEL stringency and the size of government's unreserved fund balances. Their study incorporates a variety of indicators to measure local government financial condition, including own-source revenues, general-fund expenditures, operating position, fiscal slack, and future obligations. Based on an analysis of more than 1,000 municipalities in 47 states for the fiscal year 2005, they identify the effects of the severity of TELs imposed by states on municipalities. One of the fiscal slack measures used in their research is the percent of an unreserved fund balance divided by general-fund revenues. This is closely related to cash solvency – a measure of governments' ability to meet short-term fiscal obligations. Their findings suggest a positive association between the severity of TELs and the size of a government's unreserved fund balance. Yet, in another study on the effects of TELs on

local government savings, Kioko (2015) concludes with an opposite argument. In her study, using an unbalanced county-level panel data from 47 states for the period 1970 through 2004, she estimates the effects of several TEL dummy variables (e.g., property tax rate limits, property tax levy limits, limits on assessed values, potentially biding limits, property tax limits) on county governments' unrestricted cash and security holdings. Kioko (2015) finds that "local governments subject to the TELs reported significantly lower levels of reserves" (p.164). Although state-imposed TELs on local governments are found to have a significant influence on unreserved general fund balance, self-imposed state TELs seem to have little impact on state fiscal reserves. Maher et al. (2017) analyze all states (except Alaska) for the years of 1992-2010. The dependent variables in their research are the percentages of total state revenues, end of year general fund balances, and the budget stabilization funds of expenditures. The key independent variables include the revenue TEL, expenditure TEL, and revenue and expenditure TELs constructed from the Amiel et al.'s (2009) indices. Their overall findings demonstrate that there is no significant effect of TELs on their dependent variables of fiscal reserves.

In one of Jimenez's (2018) recent articles investigating the effects of TELs on budgetary solvency, he utilizes data from government-wide financial statements and measures budgetary solvency with two variables: change in net position standardized by expenses and unrestricted net position standardized by expenses. Based on data of 560 cities with populations of 50,000 or more for fiscal years 2006 to 2012, he concludes that more stringent state-imposed TELs on local governments not only restrict resource flows deteriorating municipal financial conditions but also shift cities' burdens of current commitments to future taxpayers.

Turning to long-term solvency, Maher and Deller (2013) reveal that TEL stringency is positively associated with "the extent to which pension obligations are funded," but negatively

associated with "overall general-obligation debt" (p.19). The authors explain that this is because "TELs force communities to more effectively manage their resources by building reserves, better funding future obligations and controlling debt" (p.19). Kioko and Zhang (2019) use county-level data from 1970 to 2004 to investigate TELs' impact on local government use of tax-supported debt, which is regarded as "debt guaranteed with the tax authority of the government" (p.6). In the form of principal and interest payments, tax-supported debt can be paid by levying new or higher taxes by local governments. The authors contend that TELs significantly decrease local government tax-supported debt burden by 11 to 10 percent. Specifically, the limits on assessed valuation and property tax levy limits have the largest negative effects. With regard to another type of long-term liabilities, other post-employment benefits (OPEB) are found to decrease by TELs severity. Maher et al. (2016) examine the impact of municipal TELs on pension and OPEB funding ratios respectively. Their results indicate although TELs stringency is found to have an expected negative impact on both pension and OPEB funding ratios, the effect is only significant for the OPEB ratio. The authors further explain that "OPEB benefits are generally less regulated than pension benefits" (p. 135), and "OPEB payments may be easier to reduce if necessary" (Peng, 2013).

In addition, numerous studies have confirmed that TELs play an effective role in changing the revenue composition of local governments. Only a few studies discuss the effects of TELs on local governments' overall revenues. Preston and Ichniowski (1991) explore the effects of different limitations on total municipal revenues based on a large panel data containing 1,368 US municipalities over the ten years from 1977 to 1986. Their empirical results show that overall property tax rate limits coupled with assessment limits can decrease the growth of total municipal revenue per capita by 13%. Using both direct legislation rules and the rate at which

voters can pass citizen referenda as instrumental variables, Shadbegian (1999) reports that state-imposed TELs reduce per capita local taxes by analyzing 2,955 counties from 1962 to 1987.

Moreover, Shadbegian (1999) finds more stringent TELs reduce more own-source revenues than less stringent TELs because restrictive TELs prevents local governments from increasing the level of miscellaneous revenues to offset the decline in taxes. A study by Chapman and Gorina (2012) reach a similar conclusion regarding the effects of TELs on local revenues by investigating 278 cities from 44 states with a population over 50,000. Sun (2014) addresses the TELs' endogeneity problem by using the passage rate of citizen initiatives as an instrumental variable but reaches a different conclusion. Her results from 724 US cities between 1970 to 2006 suggest that TELs led to considerable increases in sales taxes, income taxes, and user chargers per capita. The increase in these alternative revenues not only offset the loss in property taxes, but also generate a net gain of $855 in per capita municipal general own-source revenue.

TELs are empirically found to affect government expenditures. Dye et al. (2005) and Dye et al. (2006) examine the response of municipalities and school districts in Illinois to the growth caps of property tax from the year 1989 to 2000. By selecting the treatment and control groups who are subject to TELs and who are not, they conclude that a property tax cap is effective in restraining school expenditures, and such an effect becomes weaker in the long term. Using the degree of monopolization of government as an instrumental variable, Shadbegian (1998) investigates whether state-imposed local TELs reduce both the level and growth of local government revenues and expenditures. Utilizing a panel data set on local government budgets from 1972 to 1992, the author confirms the expected negative effects of TELs on both revenues and expenditures. Maher and Deller (2013) examine more than 1,000 municipalities in 47 states

for the fiscal year 2005 and find a significant negative relationship between TELs' stringency and general fund expenditures as a percentage of property valuation. However, a more recent study by Park, Park, and Maher (2018) find that there is no effect of TELs on reduction in general expenditures.

Several key themes emerged from reviewing he extensive literature on the fiscal impacts of TELs. First, most empirical studies on TELs analyze the fiscal effects of TELs on government fiscal outcomes such as government property taxes, revenue structures, and expenditures. The main purpose of these studies is to investigate whether restrictive fiscal institutions (TELs) are effective in constraining the growth of government revenues or spending. There is a considerable amount of evidence about the constraining effects of TELs on state and local expenditures or revenue levels or growth rates. Second, due to the growing literature on measuring government financial condition, in recent years, a few scholars have turned to explore the impact of TELs on one single solvency of government fiscal health. For instance, Kioko (2015) examines the impact of state-imposed TELs on the fiscal indicator of county government cash solvency (cash reserve). Jimenez (2018) analyzes the effects of state-imposed TELs on city budgetary solvency. Maher et al. (2016) investigate the impact of municipal TELs on long-term solvency (pension and OPEB funding). Third, to date, there is no study to comprehensively explore the fiscal impact of TELs on all four solvencies of municipal governments using the government-wide financial statement data. Maher and Deller (2013) analyze the relationship between fiscal condition of cities and state-imposed TELs using a cross-sectional data of 2005. However, their fiscal condition measures simply rely on government fund statements. Although Jimenez (2018) employs more comprehensive and consistently reported government-wide statement data to measure city financial condition, his research only focuses on one single solvency—the

budgetary solvency. In fact, Jimenez (2018) calls for future studies to examine whether state-imposed TELs influence other types of solvency in municipal governments. To fill this gap, my dissertation has provided an empirical investigation on the impact of state-imposed TELs on the four fiscal solvencies of municipal governments (cash, budgetary, service, and long-term solvencies) using the government-wide financial statements.

2.2.2 Review of Literature on Fiscal Decentralization and Government Financial Condition

Kee (2004) defines fiscal decentralization as "the devolution by the central government to local governments (states, regions, municipalities) of specific functions with the administrative authority and fiscal revenue to perform those functions" (p. 166). On the one hand, higher levels of governments find it difficult to meet diverse preferences and needs of their various constituents; on the other hand, local governments demand more autonomy and more flexibility and capacity to customize the provision of public services.

Most of the public finance research investigates the economic and social welfare consequences of fiscal decentralization. Of the literature mostly related to the impact on government financial condition, three key observations can be made. First, many empirical studies confirm the positive relationship between fiscal decentralization and budget balance. For example, Eyraud et al. (2012) and Governatori & Yim (2012) find the positive nexus between fiscal decentralization and budget balance for the European Union Member States. Neyapti (2010) also supports this finding based on a panel of countries in Africa, Asia, North and South America, and Europe. Sow and Razafimahefa (2017) find that a large share of decentralized expenditure is associated with a stronger fiscal balance. On the contrary, a few studies find a

negative effect. De Mello (2000) asserts that subnational tax autonomy increases subnational deficits and contend that decentralization might aggravate soft budget constraints and coordination failures. Rodden (2002) finds that both expenditure and revenue decentralization tend to increase total government deficits.

Second, there is a more recent body of the empirical literature on the impact of fiscal decentralization on public debt. For instance, Baskaran (2010) explores the link between fiscal decentralization and public debt in a panel of 17 OECD countries between 1975 and 2001. He finds that more devolution of spending and taxation authority to local governments tends to motivate sound fiscal policies and reduce public indebtedness. Horváthová et al. (2012) find the reductive effect of fiscal decentralization on public debts in 27 member countries of the European Union. Recently, using panel data from all 50 states in the U.S. from 1962 to 2012, Shi, Hendrick, and Park (2018) find that fiscal decentralization is positively associated with state and local government capacity to service debt outstanding.

Third, although a empirical examination of the direct link between fiscal decentralization and service-level solvency is rare, a growing number of cross-country studies tend to confirm the positive effects of fiscal decentralization on public service delivery, such as education service (Faguet, 2004; Barankay & Lockwood, 2007; Faguet & Sanchez, 2014), and public health service (Falch & Fischer, 2012).

In sum, though there is a large body of the theoretical and empirical literature on fiscal decentralization, the question of how fiscal decentralization is related to the fiscal health of municipal government remains little explored in the empirical literature. Current studies provide mixed evidence about the effects of fiscal decentralization on budget balance and debt. More future empirical studies to examine the financial consequence of fiscal decentralization are

warranted. In particular, does fiscal decentralization matter for the fiscal health of local governments? Does fiscal decentralization influence all four solvencies of municipal governments? Answering this question is important because states have devolved many programs and services to local governments over the past decades, and local governments have assumed an even greater proportion of fiscal responsibility (Stone, 2015).

2.2.3 Review of Literature on Intergovernmental Transfers and Government Financial Condition

Local governments exist in complex intergovernmental environment. Fisher (2007) noted that state aid is "substantially more important than direct federal aid for all types of local governments except special districts," revealing the fact state aids have played an important role in financing public services provided by local governments. The main purpose of grants is to redistribute resources among jurisdictions and correct for externalities of costs and benefits across localities. I review extant studies that examine the link between intergovernmental aid and government financial condition using the four-solvency framework.

First, intergovernmental aid may potentially affect municipal cash holding. Gore (2009) examines the determinants of municipal cash holdings and finds that cities obtaining relatively more state transfers accumulate less cash. Maher et al. (2017) reveal that the more dependent states on intergovernmental aid, the less state fiscal reserves. On the contrary, Kioko (2015) confirms that federal and state intergovernmental transfers are positively associated with county government cash reserves because of grant volatility.

Second, two empirical studies confirm the negative association between intergovernmental aid and the budget solvency. Jimenez (2018) finds intergovernmental revenue

transfers have a negative and significant effect on both unrestricted net position ratio and change in total net position ratio, which are two measures of budget solvency. Hendrick (2006) also finds that the percentage change of intergovernmental revenue is negatively associated with operating surplus/deficit.

Third, concerning the long-term solvency, the empirical literature consistently supports the positive relationship between intergovernmental grants and long-term debt. For instance, Clingermayer and Wood (1995) find that states with intergovernmental revenues borrow more money annually than those with lower intergovernmental revenues. Martell and Smith (2004) assert that both federal matching and non-matching grants stimulate the issuance of the full faith and credit debt by state governments. Recently, Wang and Kriz (2015) also reveal a positive relationship between California county government debt burden (debt per capita) and federal and state intergovernmental transfers to counties.

Fourth, concerning the service-level solvency, empirical research has shown that local governments incline to spend those transfers rather than pass them to local communities in the form of tax cuts. For example, Brennan and Pincus (1996) and Strumpf (1998) find lump-sum transfers from the central government tend to have a greater stimulatory effect on local government spending than the equivalent increase in median voters' incomes. Under the assumption of the "flypaper effect," grants received from a higher level of governments are likely to stimulate local spending more than an equivalent increase of personal income. A moderate number of studies have indicated that the share of grants in local revenues has an expansionary effect, both on the size of local public sector (Shadbegian, 1999) and the entire public sector (Stein, 1998).

In sum, three key points can be made after the review of the above studies. First, there is a consensus that intergovernmental aid plays an important role in local government financial condition because a significant portion of local government revenues comes from federal and state intergovernmental grants. Second, a growing number of studies have presented empirical evidence that intergovernmental grants influence the short and long-term solvencies of local recipient governments. Third, it is important to note that in the fiscal health literature, intergovernmental aid is often modeled as a control variable to account for the variation of local government financial condition. There is no study to specifically focus on the role of intergovernmental grants to municipalities and explore the fiscal impact of intergovernmental aid on all four solvencies of municipal governments using the government-wide statement data.

2.2.4 Review of Literature of Other Determinants of Government Financial Condition

Besides the aforementioned fiscal institutions and intergovernmental factors, a set of political, socio-demographic variables are empirically found to affect local government financial condition. First, political factors' impact on fiscal choices and financial condition is also implied in Hendrick's (2004) study, in which she mentions that the government's political culture "may limit acceptable fee levels or fund balances" (p. 81). Political leaders and relevant stakeholders can manipulate fiscal structures and institutions that may affect municipal fiscal condition. A prominent political party and its preference are found to be associated with certain types of fiscal policy. For example, ideological preferences of the governing parties usually determine the levels of government spending (e.g., Tufte, 1978). This is because policymakers' own perceptions about the appropriateness of local tax burden, the ability of local citizens to afford tax increases, and tax competitiveness affect their willingness to increase taxes and spending

(Berne, 1996). Cusack (1997) further illustrates that "parties to the left, favoring redistribution, provide greater government spending while parties to the right, favoring the untrammeled workings of the market system, reduce government spending" (p. 4). However, the effect of political ideology on local financial condition is mixed. When it was empirically examined in a sample of 153 of Spain's largest municipalities during the 1988-2008 period (Garcia-Sanchez, Mordn & Prado-Lorenzo, 2012), the results suggest that municipalities governed by progressive political parties are financially worse off than those governed by conservatives, and strong citizen support improves greater budgetary solvency. When this effect was tested in 434 Norwegian municipalities from 1991 to 1998, whether left-wing or right-wing parties dominated the local council did not seem to have any significant effects on fiscal performance (Hagen & Vabo, 2005).

Second, the form of government has been suggested to be associated with local government financial conditions. Maher and Deller (2013) state that "council-manager forms of government generally have less general obligation debt and pay less debt service than mayor-council forms" (p.18). From this perspective, professionally managed rather than politically administered governments are more likely to be more long-term solvent. Accordingly, the council-manager government is expected to be positively related to long-term solvency. A recent study by McDonald (2015) investigates the effect of the home-rule constitution on fiscal health using Florida county data from 1980 to 2012. The empirical evidence demonstrates that a release from the state control and the freedom of self-governance for county governments improves their overall financial conditions because charted counties have more discretion to determine service provision and more easily meet their residents' demands and needs.

Third, demographic factors are treated as controls in financial condition research. First, population size and growth are claimed as two important factors on needs-based expenditure pressures (LaPlante, 2012). For example, Kloha, Weissert & Kleine (2005) find population growth is positively associated with financial condition. As Hendrick (2011) notes, "poor municipal governments and those with declining population are less able to absorb declines in sales taxes, and intergovernmental revenues and so have greater fiscal stress when this happens" (149). A second demographic factor that might influence fiscal condition is personal income, although its effect is mixed. Mercer and Gilbert (1996) show higher personal income can improve the financial condition, as it tends to enlarge a government's revenue base. However, Wang et al. (2007) assume higher income populations may also demand higher public spending in certain areas (e.g., education, libraries, parks, and recreation), which may ultimately deteriorate the government's financial condition. The third demographic variable placing boundaries and demands on government official's choices is the taxpayers' preferences for public services (e.g., Hendrick, 2004; LaPlante, 2012). Their spending needs largely determine the level of public service expenditures, such as health, safety, and welfare. Their preferences for specific public spending may vary across economic cycles and by income and educational level, age, employment, (LaPlante, 2012). Citizens with higher educational levels and greater abilities to pay, tend to be more willing to finance such services (Berne & Schramm, 1986; Steel & Lovrich, 1998).

In conclusion, the above literature suggests that the political environment, internal governing structure, and socio-demographic characteristics of local governments affect the financial condition of local governments. Therefore, it is necessary to account for these factors when modeling the determinants of municipal fiscal health. Also, it is important to note that the

current literature has not informed how these factors affect the different solvencies of municipal governments. This is a knowledge gap that deserves more attention and has been explicitly addressed in my dissertation research.

Table 2: Key Findings of Recent Empirical Literature on Determinants of Government Financial Condition

Authors	Determinants	Key Independent Variables	Control Variables	Main Findings	Sample
Maher and Deller (2013)	State-imposed TELs on local governments	TEL severity index	% population age 18 or less, per capita income, taxable property per capita, population change, change in taxable property, government structure	TEL severity is negatively associated with own-source revenues and general fund expenditures, but positively associated with unreserved fund balance and pension obligations.	1746 municipalities from 47 states in 2005
Stone (2015)	Fiscal decentralization	Ratios of revenues, expenditures, and debt at the local level relative to the state	City population, state gross domestic product per capita	The decentralization of own source revenues and long-term debt issued result in weaker FC, while the decentralization of direct expenditures results in improved FC.	Nation's 150 largest cities from 2005 to 2008
McDonald (2015)	Government structure	Charter form	Citizens' party affiliation, per capita personal income, education, unemployment, minority population, population density, unincorporated population	The presence of a charter improves the overall fiscal health of the county through reductions in the efficiency ratio, IGR dependence ratio, and debt service ratio.	67 Florida county data from 1980 to 2012
Jimenez (2018)	State-imposed local TELs	TEL stringency index	Unemployment rate, housing values, population, population growth, median household income, policy conservatism index, % own-source revenues, per capita operating and capital grants, home rule index, one-year lags of per capita expenses, council-manager governments	TELs not only hurt the fiscal position by reducing resource flows, they also force cities to shift the burden of paying for current services to the past or future generation of taxpayers.	More than 50,000 cities from 2006-2012

2.2.5 Conceptual Framework and Hypotheses

2.2.5.1 Conceptual Framework of Municipal Government Fiscal Health

Hendrick's (2011) financial condition process model (Figure 1) provides a useful conceptual framework for this study (pp. 24-29). First, in this model, the financial condition is composed of four different types of solvency—cash solvency, budgetary solvency, service-level solvency, and long-term solvency. These four categories of solvency are used to conceptualize the fiscal health of municipal governments in my study. In particular, municipal government cash solvency is defined as the ability of municipal governments to generate enough cash to pay bills over thirty or sixty days. Municipal government budgetary solvency is defined as the ability of municipal governments to balance the budget and generate enough resources to cover expenditures over a normal budget cycle. Municipal government service-level solvency is defined as the ability of municipal governments to provide adequate public services to meet the health, safety, and welfare needs of its citizens given available resources. Municipal government long-term solvency is defined as the ability of municipal governments to balance revenues and spending, meet future obligations, and deal with unexpected financial challenges in the long run (Hendrick, 2011).

In sum, my study recognizes that municipal government fiscal condition is complex and multidimensional with varying time frames. These four types of municipal government solvency reflect the abilities of municipal governments to meet their short and long-term fiscal obligations. Moreover, municipal government short-term solvencies (the cash and budgetary solvencies) may affect the long-term solvencies (the service and long-term solvencies). For example, the current level of revenues and short-term assets, such as cash on hand, may affect future revenue streams and long-term asset investments, such as capital infrastructure and major equipment. In terms of

spending and liabilities, the current level of expenditures and the current decisions about debt or pension may determine future obligations. To be specific, if one government has a poor revenue base and a high amount of spending needs, it is unlikely for the government to meet future liabilities, as the factors affecting revenue sizes and spending needs are quite constant over time (Hendrick, 2011). Concerning the service-level solvency, although one government with a constrained revenue base seems unlikely to meet citizens' service needs, it also could be due to political pressure—the government can choose to only spend on what citizens need most, still improving service-level solvency.

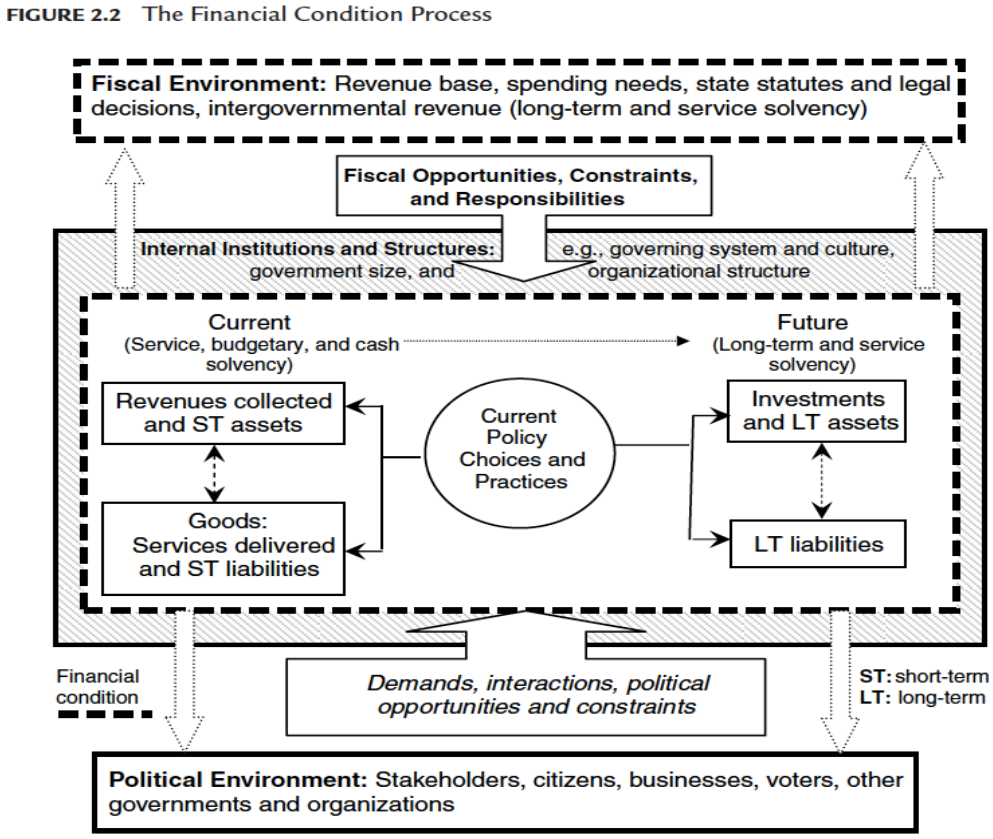
However, measuring the service-level solvency with the government-wide financial statement data is the most challenging and controversial. The service-level solvency is defined as "the government's ability and willingness to meet its commitments to provide services on an ongoing basis" (Mead, 2012, p. 114). Different measurements have been used to estimate it, such as the percentage of program revenues of expenses and the percentage of business-type activities revenues of total government expenses (Johnson, Kioko, and Hildreth, 2012); the percentage of general revenues and transfers of expenses (Chaney, 2005); total taxes per capita, total revenues per capita, and total expenses per capita (Wang, Dennis, and Tu, 2007).However, as citizens' satisfaction of services largely determines the service-level solvency, this concept is relatively subjective and related to their perspectives and basic needs, which cannot easily be captured by the fiscal numbers in government-wide financial statements. To improve the accuracy of the measurement of overall fiscal condition, my dissertation only employs the three solvencies (the cash, budget, and long-term solvency) to measure municipal fiscal health.

Second, Hendrick's fiscal process model (2011) shows that municipal fiscal condition is a process shaped by the external fiscal environment and political environment (p.26). Municipal

fiscal environment consists of elements such as revenue bases, spending needs, state statutes/legal decisions, and intergovernmental revenues. The municipal political environment defines local fiscal preferences and policy choices. It not only consists of external stakeholders (e.g., residents and businesses within government boundaries), but also includes neighboring and overlapping governments and other organizations. Both fiscal and political environments are not a component or dimension of government financial condition, but they can influence municipal government financial condition via the capacities and opportunities they present and the constraints and threats they impose (Hendrick, 2011, p. 26). From this viewpoint, Hendrick's fiscal process model is very useful to inform my investigation. The main purpose of my dissertation is to examine the effects of state-imposed TELs, fiscal decentralization, and intergovernmental grants on municipal government fiscal health. In particular, state-imposed TELs are one type of state statutes that directly constrain municipal government revenue capacities and expenditures. Fiscal decentralization involves the devolution of fiscal authority and service delivery responsibility (e.g., revenue generation, spending responsibility) to lower levels of governments. Municipalities under the fiscally-decentralized arrangement are more responsive to the needs and preferences of residents and can improve the efficiency of public service delivery (Shi, Hendrick & Park, 2018). Intergovernmental revenues such as grants and shared revenues from other governments are a major revenue source of municipalities. Jacob and Hendrick (2012) contend that "Because a significant portion of most local governments' total revenues is from state governments, it is an important factor in their financial condition" (p. 22). In sum, state-imposed TELs, fiscal decentralization, and intergovernmental grants represent three notable features of the fiscal environment of municipal governments. According to Hendrick's

fiscal process model (2011), they can constrain or expand the fiscal actions and financial management practices of municipal governments and, therefore, affect their financial condition.

Figure 1. Financial Condition Process



Source: Hendrick, R. M. (2011). Managing the fiscal metropolis: The financial policies, practices, and health of suburban municipalities. Georgetown University Press. p. 25.

2.2.5.2 Research Hypotheses of State-Imposed TELs on Municipal Fiscal Health

TELs are widely regarded as one type of financial institutions that constrain the fiscal policy choices made by government officials. Institutional constraints intend to limit policy

alternatives (Von Hagen, 2002) and establish regulations to be followed in distributing resources (Poterba and Von Hagen, 1999). The impact of state-imposed TELs on municipal financial condition is inconclusive. The theoretical argument is that actual adherences to TELs could be affected by the extent to which government administrators follow enforcement procedures. Considering the two government forms, manager-council government is more professional in financial management and exposed to less political influences, compared to mayor-council government. Therefore, TELs' impacts on municipal financial condition may be moderated by the form of governments.

With regard to cash solvency, on the one hand, state-imposed TELs may hinder municipal governments' efforts to maintain adequate cash reserves. With the growth in service demands and emergent anti-tax movements, local government officials have less ability to hold a higher level of cash reserves, which would result in less public spending. On the other hand, as Hendrick (2006) argued, "local governments with tax limitations face more risk because these conditions reduce their ability to compensate or adapt to shocks" (p.18). Since municipal policymakers may be aware of unexpected financial risks, especially during economic downturns, they are more likely to retain sufficient levels of financial reserves that could be redeemed in the short-term to ensure fiscal flexibility. In addition, as TELs tend to restrict property taxes, local governments are likely to shift their revenue structures, making the revenue structure more volatile that requires more reserves. This study proposes the following hypothesis:

Hypothesis 1: TELs are expected to affect the cash solvency of municipal governments.

Brennan and Buchanan (1980) first developed the Leviathan model of government and contend that governments are assumed to act as a monopolist that maximizes tax revenues and a rent seeker that needs more income beyond what is necessary to provide the optimum level of services. They point out that the constitutional provisions that may hinder the Leviathan in its drive to appropriate taxpayers' resources (Padovano, 2004). One of such constitutional provisions is tax and expenditure limits (TELs), which are created to promote fiscal discipline in government. TELs function as ex-ante rules constraining public officials' tax and spending policy choices and limiting the extent to which they can increase property tax levies or spending. As Jimenez (2018) noted, TELs "prescribe what politicians can do and cannot do" by limiting the range of budget policies. Even during economic downturns when demands of public spending increase, it is unlikely for local governments to increase revenues to meet more service needs due to restrictive TELs. As a result, TELs may intensify budget deficits, especially during economic recessions. From the above assumption, this study specifies the following hypothesis:

Hypothesis 2: TELs are expected to negatively affect the budget solvency of municipal governments.

State-imposed TELs not only exert a short-term effect but also have a long-term impact on municipal governments. TELs generally decrease governments' reliance on property tax revenues. To meet increased service demands, local governments are inclined to expand revenues from other sources. A growing number of empirical studies confirm an increased reliance on user charges and fees following the adoption of TELs (e.g., Sun, 2014; Jung & Bae, 2011; McCubbins & Moule, 2010). However, in the long term, an increasing reliance on user fees is not a sustainable approach because frequent fee increases will lead to citizens' opposition.

Therefore, local governments resort to issue debt or sell government assets to finance service provisions (Jimenez, 2018). Similarly, Mullins, Hayes, and Smith (2014) argue that TELs force governments to find alternative financial resources to satisfy the demands for services. Debt financing is one of the common alternatives. In light of these above considerations, state-imposed TELs may force municipal governments to issue more debt. Therefore, this study formulates the following hypothesis:

Hypothesis 3: TELs are expected to negatively affect the long-term solvency of municipal governments.

2.2.5.3 Research Hypotheses of Fiscal Decentralization on Municipal Fiscal Health

In the U.S., local governments are creatures of states and are granted certain levels of autonomy from the state governments. Fiscal decentralization generally involves the devolution of fiscal authority and service delivery responsibility (e.g., revenue generation, spending responsibility) to lower levels of governments (Shi, Hendrick & Park, 2018). It can be measured with respect to both expenditure and revenue assignments. In my dissertation, revenue decentralization is defined as local tax revenue as a percentage share of state and local revenues. Expenditure decentralization is defined as local expenditure as a percentage share of state and local expenditures (Shi et al., 2018). The degree of fiscal decentralization varies widely across states. Despite widespread recognition of the contribution of fiscal decentralization to government size in theoretical works within the U.S. federalist system, few researchers have studied the link between fiscal decentralization and municipal fiscal health.

Considering the impact of state fiscal decentralization on municipal cash solvency, under a high degree of expenditure decentralization, local governments will assume more spending responsibilities (Wang, 2012). In this setting, municipalities tend to have strong incentives to save cash in anticipation of adequate spending on local public services (Gore, 2009). Thus, it is expected that the more state expenditure decentralization, the higher levels of municipal cash solvency. Revenue decentralization facilitates fiscal autonomy of local governments and leads to enhanced local revenue capacity (Dabla-Norris, 2005; Wang 2012). Under a decentralized revenue system, municipalities often have access to a variety of revenue sources. Due to the availability of multiple local revenue sources, they can raise funds relatively faster and are less susceptible to adverse revenue shocks (Gore, 2009). Hence, there is less need to maintain higher levels of cash reserves. In light of this consideration, the relationship between revenue decentralization and cash solvency is hypothesized to be negative.

Hypothesis 4: Expenditure decentralization is expected to have a positive impact on the cash solvency of municipal governments; while revenue decentralization is expected to have a negative impact on the cash solvency of municipal governments.

Revenue decentralization facilitates fiscal autonomy of local governments. With the availability of multiple revenue sources, municipal governments have enhanced local revenue capacity to provide public services (Dabla-Norris, 2005). Therefore, revenue decentralization is assumed to improve the budgetary solvency of municipal governments. However, the impact of state expenditure decentralization on the budgetary solvency of municipal governments is indeterminate. On the one hand, expenditure decentralization can help reduce government expenditures. Under the scheme of fiscal (expenditure) decentralization, local governments are financially responsible for providing many types of public services. The geographical closeness

to local citizens to monitoring local finance, as well as the competition from peer local governments will foster stronger accountability and fiscal discipline and put pressures on local governments to improve the provision of public services with minimum costs (Eyraud et al., 2012; Governatori & Yim, 2012). On the other hand, Brennan and Buchanan (1980) argue that having many differentiated and specialized local governments in a fiscally decentralized state does not by itself ensure there will be allocative and productive efficiency. In fact, Shi et al. (2018) contend that when local governments are separately observed, those in states with higher degrees of fiscal decentralization tend to have larger expenditures as responsibility for public services is devolved to local governments. Furthermore, the loss of economies of scale may explain larger expenditures in a decentralized system. In line with the aforementioned theoretical consideration, it is hypothesized that state expenditure decentralization affects the budget solvency of municipal governments.

Hypothesis 5: Revenue decentralization is expected to have a positive impact on the budgetary solvency of municipal governments; while expenditure decentralization is expected to affect the budgetary solvency of municipal governments.

The Tiebout model (1956) argued that citizens are mobile and they "choose to locate in a community whose taxes and services most closely match their own individual tastes" (p.422). By shopping around across communities, mobile citizens increase the efficiency and the responsiveness of local governments. Under the circumstance of fiscal decentralization, there are many differentiated and specialized local governments in a fiscally decentralized state. Local governments compete with each other for the mobile citizens. These people can leave jurisdictions where the government behaves as a revenue-maximizer. This will cause the

government to further refrain from excessive taxation (Brennan & Buchanan, 1980). This competitive pressure generated by fiscal decentralization will force local government officials to be fiscally responsible over the long run. Consequently, it is expected that the levels of long-term debt and obligations should be lower when citizens take future tax burdens into account in their mobility decisions (Baskaran, 2010). Therefore, I hypothesize that both expenditure and revenue decentralization are positively associated with the long-term solvency of governments.

Hypothesis 6: Both expenditure and revenue decentralization are expected to have a positive impact on the long-run solvency of municipal governments.

2.2.5.4 Research Hypotheses of Intergovernmental Aid on Municipal Fiscal Health

The effect of the intergovernmental aid on municipal cash solvency is unclear. On the one hand, in anticipation of the availability of large amounts of grant funding from federal and state governments, cities may have less need to maintain higher cash levels (Gore, 2009). On the other hand, intergovernmental aid may be a volatile revenue stream for municipalities. If there exists volatility or uncertainty in receiving federal and state grants, municipal governments are more likely to hold higher cash reserves to compensate for potential aid cuts during an economic downturn (Kioko, 2015). Given these considerations, it is not possible to determine a specific direction of the relationship between intergovernmental aid and municipal cash solvency. Therefore, the hypothesis is as follows:

Hypothesis 7: Intergovernmental aid is expected to affect the cash solvency of municipal governments.

Theoretically, intergovernmental aid can be an important determinant of municipal budget solvency. On the revenue side, federal and state intergovernmental transfers are a key determinant of municipal revenue capacity (Downes, 1987). A significant cut in intergovernmental aid can be a cause of a city budget crisis (Bartle, 1996). However, McKinney (1995) argues that "aid does not help local governments avoid fiscal strain because over time external assistance may cause local governments to increase the use of their own resources" (p. 302). First, intergovernmental transfers stimulate local government expenditures, resulting in a higher level of spending than would exist without receiving aid (Sacks, Palumbo & Ross, 1980). Second, intergovernmental aid yields the flypaper effect, which means that a grant from higher levels of government to a recipient municipality increases the level of local government expenditure more than an equivalent increase in local citizen income (Hines & Thaler,1995). In this sense, intergovernmental aid makes it hard for a recipient municipality to allocate resources efficiently (McKinney, 1995). Third, some types of intergovernmental grants are phased-out over a short period, leaving the recipient governments with full financing responsibility in the future (Douglas & Hartley, 2011). In sum, the positive revenue-enhancing effect of federal and state intergovernmental aid may be overwhelmed by its negative consequence on increasing municipal government expenditures. Furthermore, a reliance on intergovernmental aid makes local governments vulnerable to changing economic conditions and policies, thus causing municipal budget deficits when a higher level of governments cut aid (Bartle, 1996; LaPlante, 2012).

Hypothesis 8: The more reliance on intergovernmental aid, the weaker the budget solvency of municipal governments.

In theory, the effect of intergovernmental aid on municipal long-term solvency is unclear. On the negative side, federal and state grants encourage local government borrowing through the stimulating effect of intergovernmental aid. As stated before, intergovernmental aid not only yields revenues but also may stimulate local governments to spend more on grant-subsidized services and activities. Many federal and state grants are intended to support local capital projects. The increased spending responsibility induced by intergovernmental transfers can stimulate local demands for long-term debts (Clingermayer & Wood, 1995; Martell & Smith, 2004). On the positive side, due to the substitution effect, an increase in federal and state grants will reduce municipal demands for debt issuance because of the availability of grant funding sources (non-debt) for expenditures (Denison, Hackbart, & Moody, 2009; Martell & Smith, 2004). Based on the above discussions, it is not possible to establish a priori sign of the relationship between intergovernmental aid and municipal long-term solvency. Therefore, the next hypothesis is expressed as follows:

Hypothesis 9: Intergovernmental aid is expected to affect the long-term solvency of municipal governments.

Chapter 3 Methodology

3.1 Measurement of Dependent Variable and Data

3.1.1 Dependent Variable—Municipal Fiscal Condition

3.1.1.1 Definition, Indicator Selection, and Data Source of the Three Solvencies

Cash solvency is defined as a government's ability to generate sufficient financial resources to pay its current bills over 30 to 60 days (Wang, Dennis & Tu, 2007; Norcross & Gonzalez, 2017). Cash solvency consists of three ratios: the cash ratio, quick ratio, and the current ratio. The cash ratio is calculated by dividing the sum of the most liquid assets (e.g., cash, cash equivalents, and investments) by current liabilities. The quick ratio includes one more item (receivables) in the numerator, dividing the sum of the four items (cash, cash equivalents, investments, and receivables) by current liabilities. The third indicator, current ratio, is perceived as the most comprehensive measure of short-term solvency (Norcross & Gonzalez, 2017). It is the percentage of current assets of current liabilities. All three indicators of cash solvency show the amounts of available liquid assets relative to short-term liabilities. Although larger values of these indicators predict a higher level of cash solvency, the extent to which cities may obtain current assets should be considered. The report of "Ranking the States by Fiscal Condition" indicates that healthy cash and current ratios should exceed two, and the quick ratio should be greater than one (Norcross & Gonzalez, 2016, p.12). All the data for calculating the cash solvency indicators are collected from the "Statement of net assets (net position)."

Budget solvency refers to "the ability to balance the budget and generate enough resources to cover expenditures over a normal budget cycle" (Hendrick, 2011, p. 22).Budget solvency is measured with two indicators: the operating ratio is measured as the percentage of

total revenues of total expenses/expenditures, while the surplus or deficit per capita is measured as the difference between revenues and expenses/expenditures divided by the city's population. An operating ratio of more than one suggests that total revenues can cover total expenses and the city can pay budgeted spending in that fiscal year. In contrast, an operating ratio that is less than one indicates that the city may have a budget shortfall and may not meet increasing spending pressures. Second, the surplus or deficit indicates the difference between revenues and expenditures, and it captures the change in the net balance from the previous year and the current year. A larger value for both operating ratio and surplus/deficit per capita represents higher budget solvency, and cities with weak economic growth should be especially watchful for budget solvency.

In terms of data collection to calculate operating ratios and surplus/deficit per capita, I collect data from both government-wide financial statements (statement of net positions and statement of activities) and governmental fund statement (statement of revenues, expenditures, and changes in general fund balances). Consistent with the measurement of budget solvency by Wang et al. (2007) and Ranking the States by Fiscal Condition Report (Arnett, 2014; Norcross, 2015; Norcross & Gonzalez, 2016), I collect two items from the statement of activities to calculate operating ratio: total expenses and total revenues (program revenues and general revenues), and use their difference divided by population to calculate the surplus/deficit per capita. The statement of activities is designed to "provide useful information about the cost of public services and how they are financed" (Mead, 2012, p. 94). Program revenues include charges for services, and grants and contributions. General revenues include all taxes and other sources. The amount of expenses in government-wide statement represents the full costs of providing government services, which is a more comprehensive measure including " employee

benefits that are earned during the period but are not required to be paid until a future date, the cost of supplies used up during the year to operate the government, as well as a portion of the original purchase cost of long-lived assets (Mead, 2001, p. 19). Both indicators use full accrual information emphasizing the long-term perspective in budgeting (Chan, 2001), which can better examine the fiscal condition for the government as a whole.

However, other studies (e.g., Hendrick, 2004; Maher & Deller, 2013) claim that the normal municipal budgeting process often focuses on the general fund, which is mainly reflected by cash and other current financial resources in the statement of revenues, expenditures, and changes in fund balance. Therefore, I also collect revenues and expenditures from this statement to measure operating ratio and surplus/deficit per capita in an alternative way. I compare these two measurements in terms of their internal consistency and examine the impact of key independent variables on each of them separately.

Long-run solvency is related to municipalities' ability to "balance revenues and spending, meet future obligations, and handle unknown financial challenges in the long run" (Hendrick, 2011, p. 22). Net asset ratio, long-term liability ratio and long-term liability per capita are used to measure long-run solvency. Net assets are part of total assets and represent a government's residual resources after paying its debts. Net asset ratio is measured by the portion of net assets to total assets. The larger amount of net assets relative to total assets provides the government more resources on hand to cover long-term liabilities. As Wang et al. (2007) noted, "because capital assets generally are not used to pay off long-term obligations, the amount of capital assets does not affect a government's ability to pay for these obligations" (p. 14). Therefore, I exclude "net investment in capital assets" from net assets, and only restricted and unrestricted net assets are used to calculate the net asset ratio. The second indicator of long-run solvency is a long-term

liability ratio representing the percentage of non-current liabilities relative to total assets. The third indicator is long-term liability per capita, which is to use non-current liabilities divided by a city's population. Non-current liabilities include "outstanding bonds, loans, claims, and judgments, pensions, OPEB, and compensated employee absences" (Norcross & Gonzalez, 2017, p. 20). While a larger value of net asset ratio predicts sufficient economic resources on hand, a larger value of long-term liability ratio/per capita signals more obligations in the long run for a city government. The items used to calculate long-run solvency ratios are collected from "restricted and unrestricted net assets" and "non-current liabilities" in the government-wide financial statement of net position.

Table 3. Measurement of Municipal Fiscal Health Indicators

Dimension	Indicator	Definition	Financial Data Source
Cash solvency	Cash ratio	(Cash + Cash Equivalents + Investments) / Current liabilities	Statement of net asset
	Quick ratio	(Cash + Cash Equivalents + Investments + Receivables) / Current liabilities	Statement of net asset
	Current ratio	Current assets / Current liabilities	Statement of net asset
Budget solvency	Operating ratio	Total revenues / Total expenses (Total expenditures)	Statement of activities Statement of net asset
	Surplus (deficit) per capita	Total surpluses (deficits) / Population	Statement of Revenues, Expenditure, and changes in Fund Balance
Long-run solvency	Net asset ratio	Restricted and Unrestricted net assets / Total assets	Statement of net asset
	Long-term liability ratio	Long-term (non-current) Liabilities / Total assets	Statement of net asset
	Long-term liability per capita	Long-term (non-current) Liabilities / Population	Statement of net asset

3.1.1.2 Index Construction for Each Financial Condition Dimension and Overall Financial Condition

To construct three dimensions of solvency (cash, budget, and long-term solvency), as well as the overall financial condition index, two methods are utilized. The first approach is the use of standardized z-scores.

First, as described in Table 3, this study calculates eight financial metrics, which are grouped together according to the relevant solvency dimensions to which they contribute. For most indicators, a higher value represents a higher level of solvency. These indicators include cash ratio, quick ratio, current ratio, operating ratio, surplus/deficit per capita, and net asset ratio. In contrast, for the other two indicators—long-term liability ratio and long-term liability per capita, a lower value of these indicators implies a higher level of long-term solvency. To make the long-term solvency be consistent in the direction with the other solvencies, I transform these two metrics by taking the inverse of these values. The higher the values of the transformed two long-term financial indicators, the better the long-term solvency.

Second, as a standardized score, the z-score measures how far the value for one city's fiscal indicator is from that indicator's mean value for all 100 cities. The reason to transform these indicators into z-scores is due to large differences in the financial condition metrics. For example, the values of the operating ratio range from 0.42 to 5.24, while the values of surplus/deficit per capita range from $-1,993.61 to $2,493.82. Therefore, the raw values of eight indicators are standardized to allow for equal weighting for those indicators and make the comparisons more meaningful. The z-score is calculated by subtracting the mean of the sample from the raw value of certain fiscal indicators and dividing by the standard deviation of the sample. Considering the panel data structure, I compute z-scores for all indicators in each of the

ten years and then take average of the ten z-scores across ten years to generate final z-scores for each indicator. The Z-score formula is as follows:

$$\mathbf{z = (x - \mu) / \sigma}$$

Note: x: raw value of a fiscal indicator

μ: mean value of a fiscal indicator

σ: standard deviation of a fiscal indicator

Finally, a measurement reliability analysis is necessary and can be tested by associations of individual indicators within each financial condition dimension, as well as the association among three financial condition dimensions. The following formulas are used to compute cash solvency index score, budget solvency index score, long-term solvency index score, as well as the overall financial condition index score:

cash solvency index score = Σ (z-scores for cash ratio, quick ratio, current ratio)/3

budget solvency index score = Σ (z-scores for operating ratio, surplus(deficit) per capita)/2

long-term solvency index score = Σ (z-scores for net asset ratio, inversed long-term liability ratio, inversed long-term liability per capita)/3

financial condition index score = Σ (z-scores for cash solvency, budget solvency, long-term solvency)/3

The second approach to create indices for the three solvency dimensions and the overall financial condition is a principal component analysis (PCA). PCA is one of the most popular multivariate statistical techniques developed in the early 20th century (Hotelling, 1933) to

aggregate information and reduce the redundant dimensions of data with many interrelated variables. This means that some variables may measure the same construct and therefore could be correlated with one another. In this case, it is possible to reduce this redundancy and generate a smaller number of principal components that are uncorrelated but can still account for most of the variance in the observed variables. To determine the variable redundancy, I present the correlation results among several corresponding variables in the form of a correlation matrix. If several indicators show a relatively high correlation coefficient with one another, I expect the observed variables measure the same financial concept, and it is necessary to extract principal components that "represent a set of new orthogonal variables" (Abdi & Williams, 2010, p. 433). The central idea of PCA is that observed correlated variables are optimally weighted to produce components, with a goal to account for a maximum amount of variation in the data set. This statistical procedure has been largely described and explained in many dedicated textbooks (Anderson, 2003; Mardia, Kent & Bibby, 1980; Flury, 1988; Jolliffe, 2011; and Rencher, 2002), and has been applied in the social science research (Filmer & Pritchett, 1998, 2001; Webster, 2001; Shan et al., 2011; Chen, 2016). In the e-government area, Shan et al. (2011) conducted PCA to generate five principal components that capture the multidimensional and interdependent nature of e-Government. In the area of public finance, Chen (2016) applied this approach to construct the fiscal stress index consisting of fiscal slack, fiscal shock, tax burden, and unemployment rate. I use PCA to construct a set of solvency indices and a composite financial condition index in the following steps:

First, I use Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity to determine whether it is appropriate to proceed with a PCA. The KMO measure suggests the amount of variance in the relevant variables that may be triggered by the

underlying factors. The KMO value ranges from 0 to 1, with a higher value indicating PCA is useful to analyze the data. Bartlett's Test is performed to decide whether variables are unrelated and whether it is valid to run PCA. If the significant level of Barlett's Test is lower than 0.05, the result suggests certain variables are related; therefore, it is suitable to conduct PCA.

The next step is to extract the components and decide to retain those meaningful components. In PCA, the same number of components is created as the number of original variables being analyzed. However, usually, only the first few components are enough to account for a large amount of variance. Each succeeding component only contributes to a progressively smaller portion of the variance. To solve the number-of-components problem, one of the most commonly used approaches is the eigenvalue-one criterion, also called the Kaiser criterion (Kaiser, 1960). An eigenvalue denotes the amount of variance that is explained by a given variable. Each observed variable accounts for one unit of variance to the total variance in the dataset. Any component with an eigenvalue larger than 1 contributes to a greater amount of variance than each observed variable; therefore, it is a meaningful component and worthy of being retained. However, components with an eigenvalue smaller than one can only account for trivial variance and should not be retained. In this way, PCA can effectively reduce the number of observed variables into a relatively smaller but reasonable number of meaningful components. Regarding the accuracy of the eigenvalue-one criterion, Stevens (1986) recommended its use when analyzing less than 30 variables with correlations greater than 0.70or analyzing more than 250 observations with a mean value greater than 0.60.

Finally, I identify variables demonstrating high loadings for a given component and consider the common characteristics these variables share. In the output of the factor pattern matrix, the rows of the matrix show the observed variables being analyzed, and the columns

indicate the components extracted. The numbers in the matrix are factor loadings, indicating the correlation between each variable and each component. Kaiser's varimax rotation is one of the most widely used orthogonal rotations in social science and allows each variable to be associated with one or a small number of factors (Kaiser, 1958). To determine whether loading is large enough in the matrix, Stevens (1986) provided some guidelines to test the statistical significance of factor loading. I regard a loading to be large enough if its absolute value is greater than 0.40. For each retained component, I review whether the observed variables demonstrate significant loadings on the retained component and whether these variables share the same conceptual meaning.

3.2 Empirical Model

Based on the literature review and my proposed hypotheses in Chapter 2, I specify that the municipal financial condition is a function of state-imposed TELs on local governments, fiscal decentralization, intergovernmental transfer, and a set of political, economic and socio-demographic variables. The model is specified as follows:

$$
\begin{aligned}
&City\ Fiscal\ Health_{it} \\
&\quad = \beta_0 + \beta_1(TELs\ Stringency\ Index)_{it-1} + \beta_2(Fiscal\ Decentralization)_{it-1} \\
&\quad + \beta_3(Intergovermental\ Aid\ )_{it-1} + \beta_4(Political\ Controls\ )_{it} \\
&\quad + \beta_5(Economic\ Controls)_{it} + \beta_6(Socio\_Demographic\_Controls\ )_{it} + \gamma\theta_i + \psi\omega_t \\
&\quad + \varepsilon_{it} \qquad (1)
\end{aligned}
$$

where $Fiscal\ Health_{it}$ represents the three solvencies of the municipal fiscal condition of the city *I* in year *t*. $TELs_{it}$ is a variable measuring the stringency of state-imposed TELs on local

governments in the state. *FiscalDecentralization* $_{it}$ represents the fiscal decentralization variables measured by two sides. On the revenue side, revenue decentralization is measured in terms of local revenues as a percentage share of state and local tax revenues. On the expenditure side, expenditure decentralization is measured in terms of local expenditure as a percentage share of state and local expenditures.[2] *IntergovernmentalTransfer* $_{it}$ refers to the intergovernmental aid variables that are measured by the log of intergovernmental transfers from both federal and state per capita for the city I in year t. All three key independent variables are lagged for one year for two reasons: First, when making financial decisions, the most up-to-date data might not be available to policy makers, and historical fiscal information are likely used. Second, the lagged form is able to deal with possible contemporaneous endogeneity of these three variables with other explanatory variables in the model.

The control variables capture the demographic, political, and economic characteristics of municipalities that might affect their overall fiscal condition. Social-demographic controls include population density, percentage of population aged 18 years and below, percentage of the population aged 65 years and over, percentage of the white population, percentage of the population with a bachelor's degree or above, unemployment rate, homeownership rate, and real personal income per capita. Political variables include the share of Democratic presidential voters and the form of government. θ_I is the city fixed effect to control for unobservable municipal attributes. ω_t is the time-specific effect to control for changes in the business cycle. ε is the stochastic error term.

[2]The formula for intrastate revenue decentralization is Revenue Decentralization = Local Total Revenues / Combined State and Local Total Tax Revenues; The formula for intrastate expenditure decentralization is Expenditure Decentralization = Local Total Expenditures / Combined State and Local Total Expenditures

3.2.1 Measurement of State-Imposed Tax Expenditure Limits (TELs)

According to the literature, some studies operationalize TELs with either dummy variables (e.g., Mullins & Joyce, 1996; Mullins & Wallin, 2004; Preston & Ichniowski, 1991) or indices to measure the stringency of a state's TELs. One of such indices was developed by Amiel, Deller, and Stallmann (2009), and the index ranks the restrictiveness of both state and local level TELs from 1969 to 2005. They construct TELs stringency index based on the type of TELs (revenue and/or expenditure, appropriations, tax revenue, and general fund expenditure limits), whether TELs are statutory or constitutional, growth restriction, methods of approval (constitutional convention, legislative referendum, citizen initiative, and legislative vote), and whether they provide exemptions and have override provisions. The overall score of TELs restrictiveness ranges from zero to 38, and a higher score indicates more stringent TELs in the given state. One advantage of this TELs index is that it considers different components of TELs and varies across states and over time. However, their index was constructed at the state level; it fails to distinguish the limitations specific to municipalities or recognize the more important nature of overall revenue and expenditure limitations at the municipal level.

To address these issues with Amiel, Deller, and Stallmann's (2009) index, Park, Park and Maher (2018) modified Amiel et al. (2009) index weighting, extended timeframes, and considered specific municipal TEL constructs. For example, Park, Park and Maher (2018) assigned more weight to general revenue and expenditure limits than Amiel et al. (2009) did, since overall revenue and/or expenditure limits are more difficult to avoid (Brown, 2000; 2006); they also extended the TEL index to 2016 and assigned additional values to more specific types of TELs. I therefore, use Park, Park and Maher's (2018) TELs stringency index as one of my key independent variables.

3.2.2 Measurement of Fiscal Decentralization

Fiscal decentralization is defined by Stone (2015) as "the share of fiscal activities undertaken by local governments relative to the state government" (p.457). Ideally, the measure of fiscal decentralization should include both financial and administrative aspects. Decentralization measurements (sub-national revenues and the actual degree of autonomy delegated to local governments over tax and spending decisions) vary by different research. Many empirical studies measure fiscal decentralization from a budgetary perspective by calculating ratios of revenues and expenditures of local governments relative to the combined state and local revenues and expenditures. Most analyses rely on OECD fiscal decentralization data and the IMF's Government Finance Statistics' (GFS) yearbooks to obtain combined regional/ local shares of revenues and/or spending to the like in total government (e.g., Falch & Fischer, 2012; Escaleras & Register, 2012; Neyapti, 2010).

However, Rodden (2004) criticizes the traditional GFS measurement of fiscal decentralization as it might "provide an inaccurate picture of the 'true' level of decentralization." To clarify, this measurement does not take mandated laws and rules into account. As Rodden (2004) explains, if subnational expenditures are largely mandated by federal government regulations, the resulting expenditure decentralization may be overestimated. Equally, a high level of revenue decentralization may be due to delegated responsibility for tax collection from federal/state governments to local governments, rather than resulting from sub-national governments' discretion or autonomy.

Following Stone (2015) and Shi et al. (2018), I measure fiscal decentralization by using the percentages of revenues and expenditures at the local level relative to the combined state and

local tax revenues/expenditures. The data is obtained from the State and Local Government Finance Data from the U.S. Census Bureau website.

3.2.3 Measurement of Intergovernmental Transfers

Based on the literature, the real impacts of intergovernmental grants on local governments vary by different types of intergovernmental aid, leading to different local governments' revenue collection and spending behaviors. Different scholars have proposed different classifications of intergovernmental grants. For example, Pfiffner (1983) identified three types of grants. Block grants are allocated for specific purposes narrowly or loosely defined, which may involve several service areas, such as community development. Therefore, recipients are granted some flexibility. For categorical grants, however, restrictions are attached to the money, and they are intended for a specific type of service (e.g., education). Another type is matching grants that require local governments to spend on certain areas matching intergovernmental money. Matching grants have some spending or tax effort requirements for lower levels of governments. Regarding the effects of different types of intergovernmental grants, for example, the empirical findings show that lump-sum transfers of central government tend to have greater stimulatory effects on local government spending than the equivalent increase in median voter income (Brennan & Pincus, 1996; Strumpf, 1998). Ideally, it is reasonable to examine the impacts of different types of intergovernmental revenues (e.g., block grants and matching grants) on municipal financial condition. However, most local governments have not classified intergovernmental revenues in their government-wide financial statements; it is, therefore, difficult to obtain such data.

There are a set of utilized intergovernmental aid ratios including the share of federal, state, and combined federal and state aid relative to local governments' total revenues.

Alternatively, instead of using the shares of intergovernmental transfers to local governments, I use the amount of real per capita federal and state aid to a city to measure intergovernmental transfer. Data about intergovernmental aid is obtained from the State and Local Government Finance Data from the U.S. Census Bureau website.

3.2.4 Control Variables

Several social-demographic variables are employed in this study to control for city variation in socio-demographic conditions, as the literature suggests that local fiscal condition is typically associated with demographic attributes (Berne & Schramm, 1986; Hendrick, 2004; McDonald, 2015; Jimenez, 2018). They include population density, percentage of population aged 18 years and below, percentage of the population aged 65 years and over, percentage of the white population, percentage of the population with a bachelor's degree or above, unemployment rate, homeownership rate, and per capita income.

Population proxies for service demand and larger cities are expected to confront more expenditure pressure (Jimenez, 2013, 2016). However, large cities usually have more financial and management capacities to deal with national economic downturns (Jimenez, 2017). Therefore, the direction of the association is not clear between population and municipal financial condition. Population density and the percentage of the young or old population drive the need for more public spending for providing goods and services (Maher & Deller, 2013). The larger amount of youth and older population may lead to more service demands, resulting in a weaker community financial condition. Education attainment is operationalized as the percentage of residents who have achieved a bachelor's degree or above. The white population refers to the percentage of the white population of the total population. Berne & Schramm (1986) find

citizens with higher educational levels may be more willing to pay taxes and get more social services. I assume white people may also tend to do so. As such, cities with more educated citizens and white people may experience fewer pressures to levy taxes, which could contribute to more revenues. Meanwhile, I expect that the white population and the college-educated population have greater demands for public services. Unemployment is measured by the annual average of the unemployed share of the city's labor population and is collected from the U.S. Bureau of Economic Analysis (BEA). Higher unemployment rate results in fewer taxes that could be paid by residents, but at the same time increasing demand for local social services (Jimenez, 2013, 2017). Therefore, a larger amount of educated people and higher unemployment rate are expected to have a positive impact on local expenditures, decreasing the level of budget solvency. Per capita income is regarded as a proxy for local revenue wealth (Jimenez 2013, 2016), which may be positively related to local financial condition.

Political variables include the share of Democratic presidential voters and the form of government. The first political variable attempts to measure citizens' liberal ideology. Tausanovitch and Warshaw (2014) construct policy conservatism index to measure citizens' liberal or conservative preferences, and their study shows that liberal citizens tend to support higher spending, taxes, and debt. The second political variable is a dummy variable indicating whether the form of city government is a council-manager or mayor-council. Maher and Deller (2013) claim that professionally run cities financially perform better, compared to mayor-council governments with greater exposure to political pressures. It is reasonable to assume that the financial condition of cities with council-manager form is likely to be better than that of cities with mayor-council form, due to professional financial management. Due to the panel data

structure, and the form of government does not change over the years, the form of government is not included in the fixed-effect regression models.

3.3 Empirical Estimation

3.3.1 Units of Analysis, Sample and Data Sources

The financial data are mainly collected from the government-wide statements (statement of net assets/positions, and statement of activities) in Comprehensive Annual Financial Reports (CAFRs) of 100 large American cities from FY 2007 through FY 2016, which includes periods before, during, and after the Great Recession in 2008. To compare the budget solvency measured by government-wide financial data and general fund financial data, I collect general fund revenues and expenditures for all 100 cities from the Government Finance Officers Association (GFOA). I also incorporate the Fiscal Policy Space (FPS) dataset created by a research team at the University of Illinois at Chicago as another important data source. Data for FPS project are collected for 100 central cities of the largest metropolitan areas in the U.S. The data sources include the Census Bureau, Comprehensive Annual Financial Reports, state statutes, city ordinances, Newsbank-Access World News, and others (see Fiscal Policy Space Data Portal: http://www.srl.uic.edu/fiscalpolicyspace/index.php).

Finally, demographic data is obtained from other sources. I collect data from the U.S. Census Bureau's Census of Government, such as population density, percentage of population aged 18 years and below, percentage of the population aged 65 years and over, percentage of the white population, percentage of the population with a bachelor's degree or above, and homeownership rate. I collect unemployment rate and real personal income per capita from the

U.S. Bureau of Labor Statistics and U.S. Bureau of Economic Analysis. I collect the percentage of democratic voters and government form from the Fiscal Policy Space Database.

3.3.2 Estimation Method

Two models are used to test the proposed hypotheses: ordinary least squares (OLS) and fixed effects (FE). One statistical issue of OLS regression is that it fails to account for differences across years and cities for many unobservable predictors. Also, error variance may change over time (Wooldridge, 2005). In contrast, the fixed effects model includes year and city dummies, which can control for unchanged factors at the city level and the overall environmental change across the years.

Given the panel data structure, my dissertation utilizes a two-way panel estimator with city and year dummies to control both city and year-invariant unobserved heterogeneity. The variance inflation factor (VIF) test is conducted to detect multicollinearity. A series of panel unit root tests are used to determine whether a fixed-effect or random effect model is applicable. The Hausman tests are performed to test the specification of fixed-effect versus the random-effect model. Initial diagnostic tests are used before running the regression. First, the Breusch-Pagan/Cook-Weisberg test confirms that the estimated residuals are heteroskedastic. Second, the Wooldridge test confirms the existence of serial correlation in error terms. Third, the Pesaran's cross-sectional dependence (CD) test confirms the existence of cross-sectional dependence. Heteoskedasticity, serial correlation, and cross-sectional dependence yield biased standard errors of estimated coefficients. To correct the above issues, this dissertation uses the Driscoll and Kraay standard errors (Driscoll & Kraay, 1998).

Table 4. Description of Variables and Data Sources

Variable	Description	Data Sources
TELs	State-imposed TELs stringency index on local governments	Park, Park and Maher (2018)
Fiscal Decentralization	The percentages of revenues or expenditures at local level relative to the combined amounts of state and local governments	State and Local Government Finance Data in the U.S. Census Bureau
Intergovernmental Aid	The real amount of real per capita federal and state aid to a city (2012$)	U.S. Census Bureau
Population density	Population per square land mile	U.S. Census Bureau
Unemployment %	Percentage of unemployed labor force	U.S. Bureau of Economic Analysis (BEA)
Per Capita Income	Real per capita income (2012 $)	U.S. Bureau of Economic Analysis (BEA)
Elderly %	Percentage of population aged 65 or above	U.S. Census Bureau
Young %	Percentage of population aged 18 or below	U.S. Census Bureau
White Population %	Percentage of white population	U.S. Census Bureau
Homeowner %	Percentage of population are homeowners	U.S. Census Bureau
Bachelor's Degree %	Percentage of population with bachelor's degree or above	U.S. Census Bureau
Democratic Voter %	Percentage of voters who voted for Democratic Presidential candidates	Fiscal Policy Space Database
Government Form	whether the city is council-manager or mayor-council form of government	Fiscal Policy Space Database

Chapter 4 Empirical Results

In this chapter, I empirically examine the effects of TELs, fiscal decentralization, and intergovernmental aid on municipal cash, budget, and long-term solvencies, as well as overall fiscal health. I first present descriptive statistics for all variables and calculated indices in Section 4.1, and then present regression results for each solvency dimension and municipal fiscal health index in Section 4.2.

4.1 Descriptive Statistics and Correlation Analysis of Financial Indicators

4.1.1 Descriptive and Correlation Analysis of Financial Indicators for Cash Solvency

I begin by reviewing descriptive statistics for each fiscal health indicator. Table 5 presents descriptive statistics of all variables. I see that cities vary widely in their overall financial condition, as well as the individual financial indicators. For example, three indicators (cash, quick and current ratios) are used to measure cash solvency, indicating the government's most liquid assets relative to current liabilities. A larger value of these three ratios demonstrates a larger amount of cash available to pay bills over 30 to 60 days. The mean of the cash ratio is 2.62 with a standard deviation of 2.39. The maximum value of the ratio for all the 100 cities from 2007-2016 is 20.46, which was Knoxville, Tennessee in 2014. By contrast, the minimum value is 0.02 which was Philadelphia, Pennsylvania in 2016. The mean of the quick ratio is 3.49 with a standard deviation of 2.95. A quick ratio greater than one suggests that cities have sufficient cash reserves to cover the short-term liabilities. Only 57 out of 969 observations have a quick ratio below one. As the most comprehensive measure of short-term liabilities, the current ratio is the percentage of current assets relative to current liabilities. The average current ratio is 3.92,

indicating that short-term assets are four times as large as short-term liabilities, which may provide a buffer against short-term fiscal shocks. All these three indicators reveal that the majority of cities throughout 2007-2016 appear to have enough current assets to meet their short-term financial obligations.

Table 5. Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Individual Financial Indicators					
Cash Ratio	969	2.623	2.388	0.020	20.464
Quick Ratio	969	3.487	2.948	0.087	31.014
Current Ratio	966	3.920	3.047	0.317	31.473
Operating Ratio (government-wide)	971	1.053	0.178	0.421	5.238
Surplus (deficit) per capita (government-wide)	964	83.184	312.335	-1993.609	2493.823
Operating Ratio (general fund)	990	1.059	0.359	0.093	11.382
Surplus (deficit) per capita (general fund)	964	65.103	199.600	-1701.282	1552.544
Net asset ratio	971	-0.049	1.252	-37.897	1.534
Long-term liability ratio	965	0.510	0.366	0.024	4.073
Long-term liability per capita	929	4611.247	3788.978	182.898	30476.790
Three Solvencies: Standardized z scores					
Cash Solvency	966	-0.001	0.984	-1.117	7.178
Budget Solvency (government-wide)	935	-0.005	0.966	-5.187	7.606
Budget Solvency (general fund)	957	-0.004	0.938	-5.306	6.911
Long-term Solvency	929	-0.007	0.788	-3.863	5.573
Overall financial condition (government-wide)	927	-0.012	0.648	-2.302	3.875
Three Solvencies: PCA					
Cash Solvency	966	0.000	1.703	-1.935	12.434
Budget Solvency (government-wide)	935	0.000	1.349	-7.307	10.692
Budget Solvency (general fund)	957	0.000	1.332	-7.564	9.724
Long-term Solvency	929	0.000	1.379	-4.573	11.149
Overall financial condition (government-wide)	927	-0.013	1.050	-3.334	6.663
Key Independent Variables					
TELs Index	980	8.949	6.205	0.000	27.000
Revenue Decentralization	966	0.532	0.102	0.213	0.914
Expenditure Decentralization	966	0.531	0.073	0.328	0.675
Intergovtpc	964	1907.556	955.431	19.934	4956.853
Controls					
Unemployment (%)	964	5.772	3.083	1.00	14.70
Per Capita Income	964	25441.780	5585.124	14861.000	61343.000
PopDensity	957	4233.460	3733.151	163.541	27892.840
WhitePop (%)	964	0.610	0.169	0.107	0.937
Homeowner (%)	964	0.500	0.086	0.213	0.764
Bachelor's Degree (%)	964	0.299	0.090	0.113	0.604
YoungPop (%)	974	0.245	0.083	0.134	1.000
ElderlyPoP (%)	964	0.112	0.018	0.064	0.202
Democratic Voter (%)	818	56.772	14.998	9.000	87.000

Table 6 shows correlations among the three cash solvency indicators. The Pearson correlation I for cash ratio and quick ratio was 0.97 at the significance level of 1 percent. The association between the cash ratio and the current ratio is 0.94 ($p<0.001$), and that between the quick ratio and the current ratio is 0.97 ($p<0.001$). The results suggest that there is a statistically significant and strong positive correlation between any two indicators.

Table 6. Correlation Coefficients for Cash Solvency Indicators

	Cash Ratio	Quick Ratio	Current Ratio
Cash Ratio	1.00		
Quick Ratio	0.97 ***	1.00	
Current Ratio	0.94 ***	0.97 ***	1.00

Note: The measure of association is the Pearson correlation coefficient. Stars represent the significant levels: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

4.1.2 Descriptive and Correlation Analysis of Financial Indicators for Budget Solvency

Budget solvency is measured by an operating ratio (total revenues/total expenses) and surplus (deficit) per capita. Based on the past literature (Wang, Dennis & Tu, 2007; Hendrick, 2011), I utilized government-wide revenues/expenses and general fund revenues/expenditures to calculate two measures of budget solvency. If the operating ratio is greater than one, the total revenues exceed total expenses/expenditures, and the city can pay for budgeted spending in the fiscal year. On average, both the government-wide and general fund operating ratio is slightly larger than one with little variation across cities over the years 2007-2016. However, the second ratio, surplus (deficit) per capita varies across the two measures. The average total surplus

(deficit) per capita using government-wide statement data is a surplus of $83.18per capita with a standard deviation of $312.33; while the mean value of total surplus (deficit) per capita using general fund statement data is a surplus of $65.10per capita with a standard deviation of $199.60. As expected, the operating ratio and the surplus (deficit) per capita are highly correlated when using the government-wide financial data (Table 7 (a)), but the Pearson correlation coefficient is lower when using general fund financial data (Table 7 (b)).

Table 7 (a). Correlation Coefficients for Budget Solvency Indicators (Government-wide Financial Statements)

Government-wide financial data	Operating Ratio	Surplus (deficit) per capita
Operating Ratio	1.00	
Surplus (deficit) per capita	0.72 ***	1.00

Note: The measure of association is the Pearson correlation coefficient. Stars represent the significant levels: *** p<0.01, ** p<0.05, * p<0.1

Table 7 (b). Correlation Coefficients for Budget Solvency Indicators (General Fund Statements)

General fund financial data	Operating Ratio	Surplus (deficit) per capita
Operating Ratio	1.00	
Surplus (deficit) per capita	0.43 ***	1.00

Note: The measure of association is the Pearson correlation coefficient. Stars represent the significant levels: *** p<0.01, ** p<0.05, * p<0.1

4.1.3 Descriptive and Correlation Analysis of Financial Indicators for Long-term Solvency

Long-run solvency consists of three indicators (net asset ratio, long-term liability ratio, and long-term liability per capita). As explained in Chapter 3, while a larger value of net asset ratio indicates a higher level of long-run solvency, a lower ratio in both the long-term liability ratio and long-term liability per capita signals a higher level of long-run solvency. The average of net asset ratio is -0.05 with a standard deviation of 1.25, and 311 observations (32% of all observations) are found to have negative net asset ratios, indicating that no restricted and unrestricted net assets can pay for long-term liabilities. The mean of the long-term liability ratio is 0.51, with a standard deviation of 0.37, suggesting total municipal long-term liabilities on average are 51 percent of total assets. The third metric, long-term liability per capita, has a mean value of $4,611.25 with a standard deviation of 3,788.98. These three long-run solvency ratios are also highly associated with one another. The net asset ratio is negatively associated with the long-term liability ratio ($r=-0.49$, $p<0.001$) and with long-term liability per capita ($r= -0.1$, $p<0.001$). The long-term liability ratio has a positive association with long-term liability per capita ($r= 0.56$, $p<0.001$).

Table 8. Correlation Coefficients for Long-Term Solvency Indicators

	Net asset ratio	Long-term liability ratio	Long-term liability per capita
Net asset ratio	1.00		
Long-term liability ratio	-0.49 ***	1.00	
Long-term liability per capita	-0.1 ***	0.56 ***	1.00

Note: The measure of association is the Pearson correlation coefficient. Stars represent the significant levels: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

4.2 Construction of Financial Solvency Sub-index and Overall Fiscal Health Index

4.2.1 Construction of Z-Score and Correlation Analysis of Z-score Based Fiscal Health

As discussed above, the ratios within each dimension of financial condition are significantly associated with each other. Next, I examine the association of these dimensions themselves. To do this, I create the indices for cash, budget, and long-run solvency using the average z-scores of all ratios within each dimension, as well as using principal component analysis (PCA). Standardized scores of these indicators are weighted equally, while PCA allows original indicators to be weighted by their contribution to explain the variances in the variables. Before constructing the long-run index, the values of long-term liability ratio and long-term liability per capita are reversed to be in line with the direction of the net asset ratio, so that a higher value of long-run index signals a higher level of long-run solvency.

The first approach to construct solvency indices and the overall financial condition index is to use average z-scores. I standardized each relevant ratio within each solvency dimension based on the mean and standard deviation for the sample cities by year. Then, I compute the mean value of all the standardized individual indicators within each solvency dimension to generate three solvency indices (recall that budget solvency is measured by revenues/expenses in the government-wide financial statement and revenues/expenditures in the governmental fund financial statement, respectively). Finally, I calculate the mean value of all three standardized solvency indices to generate the overall financial condition index. Their descriptive statistics are demonstrated in Table 5. When using standardized scores to create cash, budget (government-wide), and long-run solvency indices, the bivariate analysis in Table 9 (a) shows that cash solvency is significantly associated with budget solvency ($r=0.15$, $p<0.001$) and long-term solvency ($r=0.37$, $p<0.001$). Also, budget solvency is associated with long-term solvency

(r=0.26, p<0.001). This result indicates that cities with higher cash solvency tend to have higher budget solvency and long-run solvency. Cities with higher budget solvency tend to have higher long-term solvency, when the budget solvency is measured by the government-wide financial statement data.

Table 9 (a). Correlation Matrix of Three Key Financial Condition Dimensions (Average Z-Scores from Government-Wide Financial Statements)

	Cash (Average Z-Score)	Budget-GW (Average Z-Score)	Long-Term Solvency (Average Z-Score)
Cash (Average Z-Score)	1.00		
Budget-GW (Average Z-Score)	0.15 ***	1.00	
Long-Term Solvency (Average Z-Score)	0.37 ***	0.26 ***	1.00

Note: Budget-GW refers to the budget solvency measured by revenues and expenses data in government-wide financial statements. The measure of association is the Pearson correlation coefficient. Stars represent the significant levels: *** p<0.01, ** p<0.05, * p<0.1

Table 9 (b) shows that when the budget solvency is measured by the data from the general fund financial statement, budget solvency is not significantly associated with cash solvency at the 0.1 level. Also, budget solvency has a negative association with long-term solvency, suggesting that cities with higher budget solvency are likely to experience a weaker financial condition in the long run.

Table 9 (b). Correlation Matrix of Three Key Financial Condition Dimensions (Average Z-Scores from General Fund Statements)

	Cash (Average Z-Score)	Budget-GF (Average Z-Score)	Long-Term Solvency (Average Z-Score)
Cash (Average Z-Score)	1.00		
Budget-GF (Average Z-Score)	-0.02	1.00	
Long-Term Solvency (Average Z-Score)	0.37 ***	-0.1 **	1.00

Note: Budget-GF refers to the budget solvency measured by revenues and expenditures data in governmental fund financial statements (I use general fund data).The measure of association is the Pearson correlation coefficient. Stars represent the significant levels: *** p<0.01, ** p<0.05, * p<0.1

4.2.2 PCA-Based Approach and Correlation Analysis of PCA-Based Fiscal Health Index

The second approach to construct solvency indices and the overall financial condition index is to use PCA. Before conducting PCA, Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test are used to determine whether the PCA approach is acceptable. The results show that the p-values of Bartlett's tests for indicators within each solvency dimension are lower than 0.01. The KMO values for indicators within the cash, budget, and long-term solvency dimension are 0.75, 0.50, and 0.50. Both results imply that it is appropriate to apply the PCA to construct three solvency indices. I use the same tests for these three solvency indices, the p-value of Bartlett's test is lower than 0.01, and the KMO value is 0.56, suggesting that it is also valid to apply the PCA to construct overall financial condition index.

Table 10 presents the findings of factor loadings matrix for cash ratio, quick ratio, and current ratio. The rows for relevant variables are intersected with the columns for extracted factors, and each factor loading represents the correlation coefficient between the variable and a given component. According to the eigenvalue-one criterion mentioned in Chapter 3, the first component with an eigenvalue greater than one is retained and used to generate the cash

solvency index. The values of cash solvency indices for the sample cities range from -1.93 to 12.43 (see in Table 5).

Table 10. Factor Pattern Matrix for Cash Solvency Sub-Index

Variable	Comp1	Comp2	Comp3
Cash Ratio	0.576	0.732	0.365
Quick Ratio	0.580	-0.051	-0.813
Current Ratio	0.576	-0.680	0.454

Table 11 (a) and Table 11 (b) display the results of factor loadings matrix for operating ratio and surplus (deficit) per capita that is separately measured by government-wide financial data and general fund financial data. The first component of each table is retained to construct budget solvency index based on the eigenvalue-one criterion.

Table 11 (a). Factor Pattern Matrix for Government-Wide Budget Solvency Sub-Index

Variable (Government-wide financial data)	Comp1	Comp2
Operating Ratio	0.707	0.707
Surplus (deficit) per capita	0.707	-0.707

Table 11 (b). Factor Pattern Matrix for General Fund Budget Solvency Sub-Index

Variable (General fund financial data)	Comp1	Comp2
Operating Ratio	0.707	0.707
Surplus (deficit) per capita	0.707	-0.707

Table 12 demonstrates the results of the factor loading matrix for net asset ratio, long-term liability ratio and long-term liability per capita. Similarly, the first component that is greater than one is used to construct long-term solvency. The values of long-term solvency indices for the sample cities range from -4.57 to 11.15 (see in Table 5).

Table 12. Factor Pattern Matrix for Long-term Solvency Sub-Index

Variable	Comp1	Comp2	Comp3
Net asset ratio	0.151	0.988	0.045
Long-term liability ratio (inversed)	0.701	-0.075	-0.709
Long-term liability per capita (inversed)	0.697	-0.138	0.704

After constructing PCA indices for cash, budget and long-term solvency, I investigate the association of these dimensions. Table 13 (a) presents results of the bivariate analysis for PCA indices, which is consistent with that using standardized average Z- scores. Cash solvency is positively associated with budget solvency and long-term solvency, and budget solvency is also positively associated with long-term solvency. All these associations are statistically significant at the 0.01 level. Table 13 (b) shows that when the budget solvency is measured by the data from the general fund financial statement, budget solvency does not show significant correlation with cash solvency. Also, the correlation between budget and long-term solvency becomes negative at the 0.10 significant level.

Table 13 (a). Correlation Matrix of Financial Condition Dimensions (PCA)

	Cash-PCA	Budget-GW-PCA	Long-Term Solvency-PCA
Cash-PCA	1.00		
Budget-GW-PCA	0.15 ***	1.00	
Long-Term Solvency-PCA	0.37 ***	0.25 ***	1.00

Note: Budget-GW refers to the budget solvency measured by revenues and expenses data in government-wide financial statements. The measure of association is the Pearson correlation coefficient. Stars represent the significant levels: *** p<0.01, ** p<0.05, * p<0.1

Table 13 (b). Correlation Matrix of Financial Condition Dimensions (PCA)

	Cash-PCA	Budget-GF-PCA	Long-Term Solvency-PCA
Cash-PCA	1.00		
Budget-GF-PCA	-0.02	1.00	
Long-Term Solvency-PCA	0.37 ***	-0.07 *	1.00

Note: Budget-GF refers to the budget solvency measured by revenues and expenditures data in governmental fund financial statements (I use general fund data). The measure of association is the Pearson correlation coefficient. Stars represent the significant levels: *** p<0.01, ** p<0.05, * p<0.1

Similarly, I create the composite financial condition index based on the three PCA solvency indices. Table 14 (a) presents the result of the factor loadings matrix for cash solvency, budget solvency (measured by government-wide financial data), and long-term solvency. From the STATA output, the eigenvalues for components 1, 2, 3 are 1.52, 0.88, and 0.61, respectively. The first component with an eigenvalue greater than one is retained and used to measure the overall financial condition. Table 14 (b) displays the outcomes of factor loadings matrix for cash solvency, budget solvency (measured by general fund financial data), and long-term solvency.

The eigenvalues for components 1, 2, 3 are 1.39, 0.99, and 0.62, respectively. Again, the component with an eigenvalue greater than one can account for a meaningful amount of variance, STATA skips the latter two components and automatically generates the composite financial condition index.

Table 14 (a). Factor Pattern Matrix for Overall Financial Condition Index

Variable	Comp1	Comp2	Comp3
Cash-PCA	0.594	-0.513	0.620
Budget-GW-PCA	0.476	0.845	0.243
Long-Term Solvency-PCA	0.648	-0.150	-0.746

Note: Budget-GW refers to the budget solvency measured by revenues and expenses data in government-wide financial statements. The measure of association is the Pearson correlation coefficient. Stars represent the significant levels: *** p<0.01, ** p<0.05, * p<0.1

Table 14 (b). Factor Pattern Matrix for Overall Financial Condition Index

Variable	Comp1	Comp2	Comp3
Cash-PCA	0.691	0.185	-0.699
Budget-GF-PCA	-0.173	0.981	0.089
Long-Term Solvency-PCA	0.702	0.059	0.710

Note: Budget-GF refers to the budget solvency measured by revenues and expenditures data in governmental fund financial statements (I use general fund data). The measure of association is the Pearson correlation coefficient. Stars represent the significant levels: *** p<0.01, ** p<0.05, * p<0.1

The above findings show that not only indicators within each financial condition dimension are significantly associated with each other, the financial condition dimensions themselves are also associated with each other, when each solvency is consistently measured by the government-wide financial statement data. This suggests that although these indicators and dimensions may assess different aspects of financial condition, they remain internally consistent and measure the same concept—financial condition.

4.3 Regression Analysis

Next, I investigate the effects of TELs, fiscal decentralization, and intergovernmental revenues using several different specifications which match the hypotheses presented in Section 2.2.5.2 of the dissertation. I begin by exploring the TELs' fiscal effects on each solvency dimension and the overall fiscal condition in Section 4.3.1. Section 4.3.2 examines the fiscal impacts of revenue and expenditure decentralization measures. Section 4.3.3 investigates the fiscal effects of intergovernmental aid. Section 4.3.4 discusses the overall results for control variables[3]. Section 4.3.5 presents the results from the panel two-ways fixed-effects regression in which principal component analysis is used to construct each financial condition dimension indicator and the overall financial condition index.

To use the correct type of panel regression analysis, several diagnostic tests for pooled ordinary least square (OLS) regression are conducted. First, a variance inflation factor (VIF) test is used to check for collinearity. Multicollinearity is a concern between independent variables

[3] The dataset includes many variables, and each one has missing values for different cities and fiscal years. For this reason, the number of observations in regression analyses is smaller than 1000.

when the VIF is higher than 10. The highest variance inflation factor (VIF) which measures the multicollinearity is 2.97, and the smallest is 2.96. This suggests that multicollinearity is not an issue among independent variables. Second, the Breusch-Pagan test is performed to detect the heteroskedasticity in the model. Heteroskedasticity produces biased standard errors and result in an incorrect significant test result. The p-value of the Breusch-Pagan testis less than 0.05 (0.0000), which rejects the null hypothesis of homoscedasticity and confirms the presence of heteroskedasticity. Last, the Breusch–Godfreyserial correlation LM test is used to check for autocorrelation in the errors. This test confirms the presence of autocorrelation and indicates the need to use robust and clustered standard errors. Therefore, the models are estimated with clustered robust standard errors by cities, as the residual of regression is likely to be correlated over time within local municipalities.

To avoid the problems of the OLS regression, I use the fixed-effects (FE) model for the following analysis. The FE model includes year dummies and city dummies. The city fixed effects help control location invariant effects and the year fixed effects help control unobserved variables (e.g., the yearly change in policy and business/economic cycle).

Table 15 reports the results from the two-ways fixed-effects panel regression. The dependent variables in Model 1 to Model 6 are cash solvency, government-wide budget solvency, general-fund budget solvency, long-term solvency, and the overall fiscal health index. All these indices are computed by averaging the standardized z-scores. I include all three key independent variables (TELs, fiscal decentralization, and intergovernmental aid) and all other control variables in each model. The key independent variables are all lagged for one-year in order to avoid the simultaneity issue.

Table 15. Fixed Effect Regression Results (Average Z-Score)

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Cash (Average Z-Score)	Budget-GW (Average Z-Score)	Budget-GF (Average Z-Score)	Long-Term Solvency (Average Z-Score)	Fiscal Health-GW (Average Z-Score)	Fiscal Health-GF (Average Z-Score)
Key Independent Variables						
TELs Index (t-1)	-0.00770***	-0.00469	0.0146***	-0.0118**	-0.00806***	-0.00168
	(0.00217)	(0.00672)	(0.00496)	(0.00547)	(0.00101)	(0.00233)
Revenue Decentralization (t-1)	-0.118	0.388	-0.732*	0.248*	0.159	-0.217*
	(0.0982)	(0.247)	(0.387)	(0.136)	(0.110)	(0.121)
Expenditure Decentralization (t-1)	0.599***	-0.00775	0.0278	-0.783**	-0.0453	-0.0135
	(0.218)	(0.717)	(0.734)	(0.298)	(0.210)	(0.195)
Ln Intergovtpc (t-1)	0.0651***	-0.129***	-0.129*	-0.159***	-0.0741***	-0.0722***
	(0.0197)	(0.0369)	(0.0676)	(0.0164)	(0.0134)	(0.0219)
Control Variables						
Unemployment (%)	-0.00456	-0.00801	0.00336*	-0.00145	-0.00450	-0.000621
	(0.00291)	(0.00530)	(0.00176)	(0.00124)	(0.00290)	(0.00109)
Ln Per Capita Income	1.468*	5.000**	1.501	0.900	2.535***	1.373***
	(0.830)	(2.264)	(0.916)	(0.888)	(0.795)	(0.360)
Ln PopDensity	-0.305	-0.695	2.044*	0.447	-0.153	0.782
	(0.763)	(2.173)	(1.194)	(1.470)	(0.470)	(0.803)
White Pop (%)	-2.980***	-4.167***	-0.773	-1.262***	-2.796***	-1.639***
	(0.305)	(0.585)	(0.639)	(0.421)	(0.324)	(0.266)
Homeowner (%)	-7.364***	1.765	-1.382	-1.991***	-2.538***	-3.542***
	(0.762)	(1.821)	(0.847)	(0.383)	(0.800)	(0.365)
Bachelor's Degree (%)	-1.847	-3.302	3.927**	3.938***	-0.429	1.863**
	(2.073)	(2.692)	(1.813)	(0.550)	(1.105)	(0.845)
Young Pop (%)	9.075**	-5.486	-4.023	0.230	1.458	1.919
	(4.146)	(5.423)	(3.236)	(1.149)	(2.075)	(2.007)
Elderly PoP (%)	-3.438	0.812	-4.252**	8.451**	1.718	-0.497
	(3.975)	(2.883)	(2.106)	(3.215)	(1.880)	(1.586)
Democratic Voter (%)	0.00252	-0.00505	0.00398*	0.000193	-0.00159	0.00150
	(0.00165)	(0.00629)	(0.00222)	(0.00136)	(0.00220)	(0.00115)
City Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-Square	0.1	0.05	0.04	0.10	0.10	0.10
Observations	790	790	787	786	786	783
Number of groups	88	88	88	87	87	87

Note:

Budget-GW refers to the budget solvency measured by revenues and expenses data in government-wide financial statements.

Budget-GF refers to the budget solvency measured by revenues and expenditures data in governmental fund financial statements (I use general fund data).

Robust clustered standard errors are shown in parentheses.

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

4.3.1 Effects of State-Imposed TELs on Municipal Financial Condition

To begin with, I investigate the effects of TELs' stringency on each financial condition dimension and the overall financial condition index. The results show that TELs stringency index is significant in four of the six models. As expected, State-imposed TELs, which is measured by the restrictiveness index of municipal TELs by state (Park, Park and Maher, 2018), has a significant and negative effect on the cash solvency, long-term solvency, and the overall financial condition. To be specific, the coefficient of TELs (one-year lag) for cash solvency is -0.008 at 1 percent significant level, indicating that a one-unit increase in TELs stringency score leads to a 0.008 decrease in the cash solvency index. This result supports the first hypothesis that due to the restrictiveness of state-imposed TELs, local government officials have less incentive to hold a higher level of cash reserves.

Regarding budget solvency, TELs restrictiveness shows a significant and positive impact on the general fund budget solvency, which is opposite to the second research hypothesis. Contrary to the recent research indicating that TELs may limit the budget policies and restrict government's ability to meet budget balance (Jimenez, 2018), the result tends to be in line with the traditional proposition argued by Brennan and Buchanan (1980) that TELs, as fiscal institutional constraints, may ensure fiscal discipline and help officials avoid budgetary imbalance or build cash reserves for future need.

In terms of long-term solvency, the coefficient of the TELs index is found to be significantly negative. Consistent with the third research hypothesis, the empirical finding supports the arguments proposed by Jimenez (2018) and Mullins et al. (2014). Due to difficulty of increasing property taxes, state-imposed TELs may force municipal governments to seek alternative financial resources to meet demands for services, and debt financing is one of the

alternatives. A more reliance on long-term debt leads to a lower level of long-term solvency. Overall, the degree of TELs stringency is negatively associated with municipal financial condition index that is constructed from the government-wide financial statement data. The coefficient of TELs on the overall municipal financial condition is -.008 at 1 percent significant level, showing that one-unit increase in TELs stringency score results in a 0.008 decrease in the overall index of municipal financial condition.

In summary, the expected negative signs for cash and long-term solvency imply that the strict state-imposed TELs on municipalities substantially decrease local governments' ability to maintain enough cash and increase their burdens of long-term liabilities. In contrast to the expectation, state-imposed TELs have a positive effect on budget solvency. It could be the case that TELs force city governments to more effectively manage their revenues and expenditures, therefore decreasing budget deficits.

4.3.2 Effects of Revenue and Expenditure Decentralization on Municipal Financial Condition

Next, I investigate the effects of revenue and expenditure decentralization on each financial condition dimension and the overall financial condition index. As stated in 3.2.2, fiscal decentralization is measured as the percentages of revenues or expenditures at the local level relative to the combined state and local revenues and expenditures. Based on the estimation results for all sample cities, revenue decentralization has a negative effect on general fund budget solvency but a positive impact on long-term solvency. The coefficient of revenue decentralization for budget solvency is -0.73 ($p<0.01$), which is in contrast with the fifth hypothesis. Based on the literature, under a higher level of revenue decentralization, multiple

revenue sources may enhance local revenue capacity (Dabla-Norris, 2005), therefore improving budget solvency. However, the empirical finding casts doubt on this argument. The negative sign of revenue decentralization variable indicates the level of budget solvency decreases with the growing revenue allocated at the local governments.

As expected, revenue decentralization has a positive and significant effect on the long-term solvency (0.25 at $p<0.1$). This result provides weak evidence to support the sixth hypothesis. When revenue capacity is decentralized from the state governments to local governments, many differentiated and specialized local governments may avoid behaving as a revenue-maximizer, as citizens will leave jurisdictions with excessive taxation. The competitive pressure resulted from fiscal decentralization will force local officials to reduce debt burdens and be fiscally responsible over the long run, as citizens may take future obligations into account of their mobility decisions.

Concerning the cash solvency, the coefficient of revenue decentralization is expected to be negative, although it is not significant. At least, this result to some extent supports Gore's (2009) contention that revenue decentralization makes it easier for cities to obtain a variety of revenue sources while decreasing the need for cash reserves. Finally, the negative sign of revenue decentralization on the overall fiscal health index infers that the higher level of revenue at the local governments leads to a lower level of overall municipal financial condition.

Turning to expenditure decentralization, it shows a significant influence on cash and long-term solvency, but not on budget solvency or the overall municipal financial condition. Specifically, a one percentage point increase in the degree of expenditure decentralization is associated with an increase of 0.060 in the cash solvency index. This result supports the fourth hypothesis, suggesting that local governments attempt to save more cash under a higher degree

of expenditure decentralization, as they are assumed to undertake more spending responsibilities (Wang, 2012). However, the direction of this variable's coefficient was unexpected for long-term solvency. It implies that as more expenditure responsibilities are assigned to local governments, they may expand revenue sources and consider the long-term financing alternatives to maintain the current level of public goods and service provisions, thus decreasing the level of long-term solvency.

4.3.3 Effects of Intergovernmental Aid on Municipal Financial Condition

Examining the intergovernmental aid variable that is measured by the intergovernmental revenue per capita, it shows expected significant effects across all models. First, its coefficient on the cash solvency is positive and significant (0.065 at $p<0.01$). This result is in line with the argument raised by Kioko (2015) that municipalities receiving federal and state grants attempt to maintain higher cash reserves in order to prepare for possible aid cuts. Therefore, this empirical finding implies that local governments are more likely to take into account future financial risks.

Second, regarding the budget solvency, the intergovernmental aid variable demonstrates an expected sign as predicted by the eighth hypothesis. Its significant and negative coefficient (-0.13, $p< 0.01$) is consistent with the theoretical assumption that external financial aid may induce recipient municipalities to spend more than they could, potentially resulting in municipal budget deficits, especially when they are facing aid cuts.

Lastly, the empirical results show that intergovernmental aid may significantly decrease the long-term solvency (-0.16, $p<0.01$). Based on the previous justification, federal and state grants generally encourage local governments to spend more on grant-subsidized programs, as

well as capital projects. This not only leads to increased spending responsibility in the future (Douglas & Hartley, 2011) but also results in local demands for long-term debt (Martell & Smith, 2004). Therefore, my empirical evidence provides support to the theoretical arguments. Given the negative impact of intergovernmental aid on budget and long-term solvency and the positive effect on cash solvency, intergovernmental revenue per capita lagged unsurprisingly exerts a significantly negative influence on the overall fiscal health index.

4.3.4 Effect of Controls on Municipal Financial Condition

Among all control variables, the findings show that the coefficients of per capita income, percentage of white population and homeownership rates demonstrate significant effects across all models. The municipal per capita income variable is found to be positively associated with cash, budget solvency, and the overall fiscal health index. As per capita income is regarded as an important indicator of local revenue wealth, the higher per capita income, the wealthier the local governments, the better the municipal financial condition. The negative signs of the percentage of white population on cash, budget, long-term solvency and the overall municipal financial condition indicate that they may have more service demands with growing economies and improved living standards, and their local governments have to respond to this increased service demands by expanding expenditures or even resorting to long-term debt. Home ownership rate also has a negative impact on cash, long-term and the overall municipal fiscal condition. This indicates that homeowners may have a higher income level and can afford expensive public goods and services. It is expected that they may have greater demands for government expenditures. The growing spending needs could limit local governments' ability to save cash and increase their reliance on debt issuance to finance ongoing public programs. Therefore, the

overall municipal financial condition will deteriorate. The coefficient of the unemployment rate has a negative but insignificant impact on each financial condition dimension and the overall municipal financial condition. Citizens' liberal ideology is found to have no significant effects on cash, long-term solvency and the overall fiscal health index, but is positively associated with general fund budget solvency. Population density, and population aged 18 years and below have mixed results in predicting the three types of solvencies.

4.3.5 Robustness Check

Table 16 presents the results of equation 1 using the PCA indices of cash, budget, long-term solvency and the overall municipal financial condition as the dependent variables in Model 1 to Model 6. Equation 1 is estimated by using different methods to construct indices of dependent variables, but the regression results do not vary significantly as shown in Table 16. The primary consequences of using different indices are some magnitude changes in the coefficients of the variables, but very few changes occur at the significance levels of the variables.

First, the model 1 shows that more restrictive TELs lead to a lower level of municipal cash solvency, and this effect is highly significant. A one-unit increase in the TELs index leads to a 0.013 decrease in the cash solvency PCA index. The direction and significant level of this effect are consistent with those, using standardized z score of cash solvency index. Regarding the budget solvency, TELs stringency score shows a significant and positive effect on budget solvency, only when it is measured by the general fund data. This is in the opposite of the hypothesized direction, as well as recent empirical findings (Jimenez, 2018). In the model 4, the estimate for TELs is negative and highly statistically significant. Specifically, a one-unit increase

in the TEL index reduces the long-term solvency by 0.015 ($p < 0.000$). Given TELs' negative effects on cash and long-term solvency, TELs are found to be significantly and negatively correlated with the overall financial condition that is measured by the government-wide financial data.

Second, the effects of revenue and expenditure decentralization on three solvency dimensions are slightly different when the solvency indices are constructed using standardized scores or PCA. Specifically, revenue decentralization is only significant in the model 3. The negative sign indicates that when revenues are more decentralized at the local level, municipal budget solvency decreases. This negative direction and significant level are consistent with the results using the standardized index scores, but the magnitude of the coefficient is larger (-0.73 in Table 15, -1.05 in Table 16). Another difference is that the significant effect of revenue decentralization on long-term solvency disappears when it is measured by the PCA index, although the direction of this effect remains the same. The effects of expenditure decentralization are highly statistically significant on cash and long-term solvency, and this estimate is larger when using the PCA to construct solvency indices. To be specific, a one percentage point increase in the shares of local expenditures relative to the combined state and local expenditures results in an increase in municipal cash solvency index by 1.04. This expected result indicates that more spending responsibilities may lead to larger need to hold cash in hand. Similar to the result in Table 15, expenditure decentralization is found to have a negative and significant impact on long-term solvency, which is contrary to the sixth hypothesis.

Turning to the intergovernmental aid variable, the results in Table 16 show predicted significant estimates across all models. Intergovernmental aid per capita is found to have negative impacts on budget and long-term solvency but have a positive effect on cash solvency.

Compared with the results in Table 15, all the coefficients of intergovernmental aid per capita are larger in Table 16, suggesting that the effect of intergovernmental aid variable is found to be stronger for each solvency when measured by the PCA index.

Overall, the estimates in Table 16 confirm that the findings are consistent when constructing all the indices using the standardized score or PCA. This suggests that the results are robust. More importantly, the directions of these variables do not change when using the PCA indices compared with using the average z-score indices as dependent variables.

Table 16. Fixed Effect Regression Results (PCA)

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Cash-PCA	Budget-GW-PCA	Budget-GF-PCA	Long-Term Solvency-PCA	Fiscal Health-GW-PCA	Fiscal Health-GF-PCA
Key Independent Variables						
TELs Index (t-1)	-0.0133***	-0.00671	0.0210***	-0.0153**	-0.0118***	-0.00265
	(0.00376)	(0.00936)	(0.00713)	(0.00719)	(0.00187)	(0.00287)
Revenue Decentralization (t-1)	-0.204	0.540	-1.053*	0.422	0.232	-0.303*
	(0.170)	(0.342)	(0.556)	(0.272)	(0.175)	(0.164)
Expenditure Decentralization (t-1)	1.038***	-0.0199	0.0366	-1.793***	-0.231	-0.175
	(0.378)	(1.007)	(1.047)	(0.541)	(0.313)	(0.280)
Ln Intergovtpc (t-1)	0.113***	-0.180***	-0.185*	-0.345***	-0.137***	-0.135***
	(0.0342)	(0.0507)	(0.0971)	(0.0275)	(0.0199)	(0.0297)
Control Variables						
unemployment (%)	-0.00789	-0.0110	0.00486*	-0.00220	-0.00679	-0.00132
	(0.00504)	(0.00736)	(0.00250)	(0.00219)	(0.00452)	(0.00194)
Ln Per Capita Income	2.542*	6.821**	2.059	1.134	3.614***	2.042***
	(1.437)	(3.135)	(1.279)	(1.021)	(1.160)	(0.629)
Ln PopDensity	-0.528	-0.903	3.099*	0.691	-0.201	1.175
	(1.320)	(3.063)	(1.681)	(2.692)	(0.786)	(1.342)
WhitePop (%)	-5.157***	-5.804***	-1.073	-2.327***	-4.419***	-2.793***
	(0.528)	(0.819)	(0.907)	(0.734)	(0.507)	(0.402)
Homeowner (%)	-12.73***	2.457	-1.973	-2.881***	-4.399***	-5.797***
	(1.318)	(2.528)	(1.222)	(0.380)	(1.154)	(0.628)
Bachelor's Degree (%)	-3.206	-4.440	5.612**	7.258***	-0.166	2.960**
	(3.586)	(3.721)	(2.512)	(0.537)	(1.618)	(1.247)
YoungPop (%)	15.70**	-7.329	-6.199	0.126	3.102	3.437
	(7.182)	(7.612)	(4.558)	(1.615)	(3.179)	(3.242)
ElderlyPoP (%)	-5.902	1.381	-5.921**	15.02**	3.175	-0.244
	(6.893)	(4.044)	(2.942)	(6.534)	(3.517)	(2.895)
Democratic Voter (%)	0.00435	-0.00690	0.00565*	-0.000771	-0.00228	0.00200

	(0.00286)	(0.00878)	(0.00313)	(0.00300)	(0.00326)	(0.00182)
City Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-Square	0.0685	0.0464	0.0403	0.0948	0.0815	0.0865
Observations	790	790	787	786	786	783
Number of groups	88	88	88	87	87	87

Note:

Budget-GW refers to the budget solvency measured by revenues and expenses data in government-wide financial statements.

Budget-GF refers to the budget solvency measured by revenues and expenditures data in governmental fund financial statements (I use general fund data).

Robust clustered standard errors are shown in parentheses.

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

Chapter 5 Conclusion and Future Research

5.1 Summary of the Research

This dissertation uses government-wide statement data to comprehensively measure municipal financial condition in three dimensions (cash, budget, and long-term solvencies). The relevant indicators within each dimension, indices of each dimension, and the overall financial condition index are constructed using standardized z scores and principal component analysis. Based on Hendrick's (2011) financial condition process model, this dissertation systematically investigates the institutional and intergovernmental factors affecting municipal financial condition that is measured by the government-wide financial data. Specifically, the research questions in this dissertation are the following: whether state-imposed tax and expenditure limitations (TELs), revenue or expenditure decentralization between states and local governments, and federal and state intergovernmental revenues have significant impacts on municipal financial condition. These questions have been explored by using panel data of 100 large cities in the U.S. for ten years from 2007 to 2016.

First of all, this dissertation contributes to a better theoretical understanding of the complexities of financial condition process. The dissertation adopts Hendrick's (2011) financial condition process framework as the basis to conceptualize financial condition in current and long-term dimensions, as well as to investigate the impacts of fiscal environment on each financial condition dimension. Under this framework (Hendrick, 2011), fiscal environments create a set of exogenous threats and opportunities for governments, which may affect government financial condition in the short run and long run. As state statues, intergovernmental revenue, revenue base, and spending needs are key elements of fiscal environment; this dissertation specifically examines the roles of state-imposed TELs, revenue or expenditure

decentralization, and intergovernmental aid on each disaggregated dimension of municipal financial condition.

Second, this dissertation uses data from government-wide financial statements in Comprehensive Annual Financial Reports to measure cash, budget, and long-term solvency, while little research has measured municipal financial condition using government-wide financial data. Government-wide statements prescribed by GASB Statement No. 34 use full accrual accounting that addresses the issues with fund statements. Government-wide full accrual accounting requires governments to report long-term debt, capital assets and unpaid city contributions to pension (Finkler et al., 2016), which can better evaluate the overall fiscal health of the government and compare, analyze, and explain the financial condition in a more accurate and comprehensive manner.

Finally, the indices of three solvency dimensions and the overall financial condition index are constructed in two different ways, using standardized z scores and principal component analysis (PCA). The panel two-way fixed-effects regression is used to find out the impacts of three institutional and intergovernmental factors on each of the solvency dimensions and the overall municipal financial condition. Although the dependent variables are created by different indices, the direction and significant levels of the key independent variables are consistent across all models. This confirms that the overall regression results are robust.

5.2 Research Findings and Policy Implications

Financial condition is a broad and multidimensional concept, and multiple indicators are used to measure each dimension. To assess whether different indicators can be grouped to

measure the same dimension and whether different dimensions have internal consistency to measure the same construct, a set of correlation tests have been applied to ensure measurement reliability. The results show that the ratios within each dimension of financial condition are significantly associated with each other. Bivariate analysis of the three solvency indices of financial condition shows that any two solvencies are significantly and positively associated with one another, indicating that cities with higher cash solvency tend to have higher budget solvency and long-run solvency. This evidence also supports Hendrick's (2011) financial condition process framework in which financial condition in different time frames tends to be positively related. Governments with good cash and budget solvency are less likely to have higher future liabilities, resulting in good long-term solvency.

In terms of the effects of TELs, fiscal decentralization, and intergovernmental aid on each solvency of municipal financial condition, as shown in Table 17, the majority of the results presented in Chapter 4 are consistent with what are hypothesized earlier in this dissertation. Table 17 specifically compares regression results to hypotheses 1-9 presented in Section 2.2.

Table 17. Summary of Research Hypotheses Compared to Empirical Findings

IDVs	Cash Solvency (Expected)	Cash Solvency (Actual)	Budget Solvency (Expected)	Budget Solvency (Actual)	Long-term Solvency (Expected)	Long-term Solvency (Actual)
TELs	+/-	-	-	+	-	-
Revenue Decentralization	-	NS	+	-	+	+
Expenditure Decentralization	+	+	+/-	NS	+	-
Intergovernmental Aid	+/-	+	-	-	+/-	-

Notes: NS is not statistically significant

First, the results of FE regressions show that TELs stringency index has a negative and significant effect on cash and long-term solvency, but a positive impact on budget solvency. This implies that cities with stringent TELs tend to have small government-wide cash reserves in the short-term but are more likely to excessively rely on debt when short-term revenues decline, therefore facing difficulty in the payment of long-term liabilities. The restrictiveness of TELs is found to have an unexpected impact on budget solvency. Previous studies show that TELs reduce the flow of resources into cities (Ross, Yan, & Johnson, 2015; McCubbins & Moule, 2010). Restrictive TELs may limit local governments' ability to increase revenues, but citizens' service demands have not declined with the growing economy, so TELs are hypothesized to intensify budget deficit. The empirical evidence presents another possibility: Rather than threatening city budgets, stringent TELs may promote fiscal discipline and prudent financial management.

Second, an increased level of revenue decentralization is significantly associated with lower budget solvency and higher long-term solvency. Considering the effect of revenue decentralization on budget solvency, the finding is the opposite of what is hypothesized. It is possible that as more revenue sources become available at the local level, the spending needs increase, which could extend beyond local revenue capacity. In this case, local governments are required to expand their responsibilities for providing more services, which may not sustain the short-term balanced budget. As expected, long-term solvency is positively affected by revenue decentralization. Under the condition of fiscal decentralization, local governments compete with each other for wealthy residents (Tiebout, 1956). The competitive pressure may force local officials to improve their accountability over the long run, as well as to reduce debt issuance and long-term obligations since citizens will take future tax burdens into account in their mobility decision (Baskaran, 2010). Therefore, revenue decentralization is associated with higher long-term solvency.

Results for expenditure decentralization are somewhat as expected. The evidence of its effect on cash solvency is consistent with the notion that municipal managers have strong incentives to accumulate cash in anticipation of growing spending needs; since local governments assume greater service delivery responsibilities under the context of expenditure decentralization. On the other hand, expenditure decentralization is estimated to negatively affect long-term solvency, which is contrary to the hypothesis 6. This may partially reflect the conventional wisdom about the loss of economies of scale. More fiscally-decentralized states may not ensure allocative and productive efficiency in delivering services and goods (Brennan & Buchannan, 1980). Local governments in states with higher levels of expenditure

decentralization are given greater discretion and fiscal responsibility and are more likely to experience greater spending and higher debt burden.

All the results for intergovernmental aid show the predicted effects on cash, budget and long-term solvency. The positive relation between intergovernmental revenues and cash solvency confirms the argument that municipalities regard intergovernmental aid as a volatile revenue source, likely to increase cash holdings to prevent uncertainty and financial risks in the future. The result with respect to the effect of intergovernmental aid on the budget solvency is consistent with conventional theories. Intergovernmental aid may induce recipient municipalities to increase the use of their own resources, and the positive revenue-enhancing effect of federal and state intergovernmental aid may be overwhelmed by its negative effect on increasing local expenditures. Therefore, it may exacerbate the unbalanced budget. Regarding the long-term solvency, many federal and state grants are allocated to support grant-subsidized services and activities, leaving local governments with full financing responsibilities in the future. Intergovernmental aid, from this perspective, increases cities' spending responsibilities and stimulates local demands for long-term borrowings and debts. The higher debt levels lead to a lower level of long-term solvency.

5.3 Limitations and Future Research

Although this study improves understanding of the effects of institutional and intergovernmental factors on municipal financial condition along with the three solvency dimensions, some limitations exist as the research design and collected data limit the ability to offer definitive answers to the research questions.

The first limitation to this study is that I did not include the service-level solvency to conceptualize the financial condition. As an important component of financial condition, the service-level solvency is defined as the government's ability to provide adequate public services to meet the health, safety, and welfare needs of its citizens. However, it is largely determined by citizens' satisfaction of services; this concept is relatively subjective and related to their perspectives and basic needs, which cannot easily be captured by the numbers in government-wide financial statements. As such, I plan to conduct future research including interviewing residents and local officials in an effort to find out the extent to which service needs are satisfied, and whether service-level solvency varies by different types of services provided.

The measurement of intergovernmental aid also limits this study. Constrained by the availability of data, intergovernmental aid is measured by the amount of real per capita federal and state aid to a city. However, governments' reactions to different types of intergovernmental grants are different. Therefore, their impacts on each solvency dimension, as well as the overall financial condition may be different. Future research could examine if intergovernmental grants can affect municipal financial condition differently based on their types.

This dissertation focuses on the large cities in the U.S. The main findings may only apply to America's major cities. It raises the issue of external validity and generalizability of this study. Future research is encouraged to investigate factors affecting the local government's financial condition for mid-sized and small cities, as well as other types of governments such as county governments or rural communities. For example, whether the same measurement of financial solvencies is valid and applicable to smaller cities or county governments? Whether the institutional and intergovernmental factors exert similar effects on their financial condition along

with these solvencies? Through conducting research on a wider range of local jurisdictions, a more generalizable model of local governments financial condition process could be developed.

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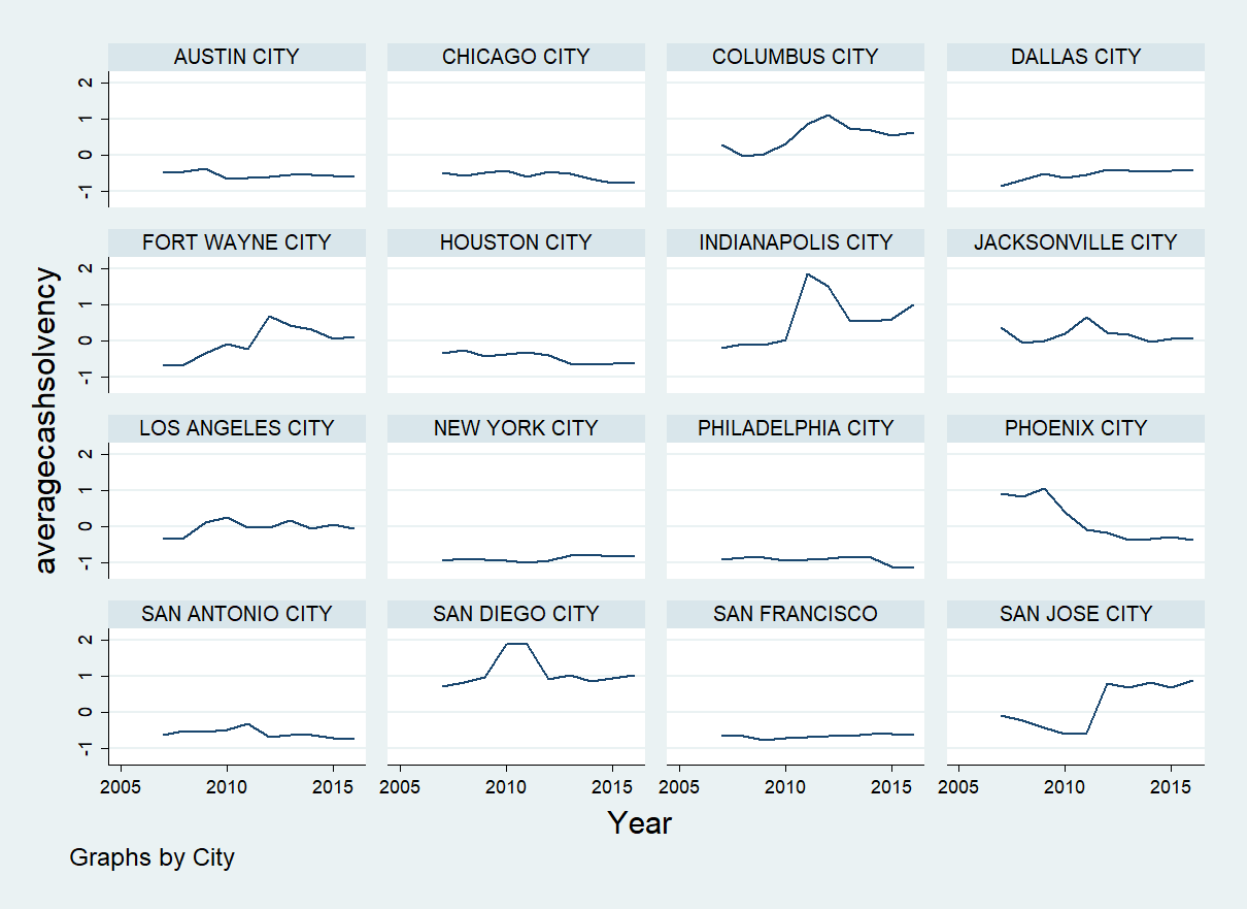
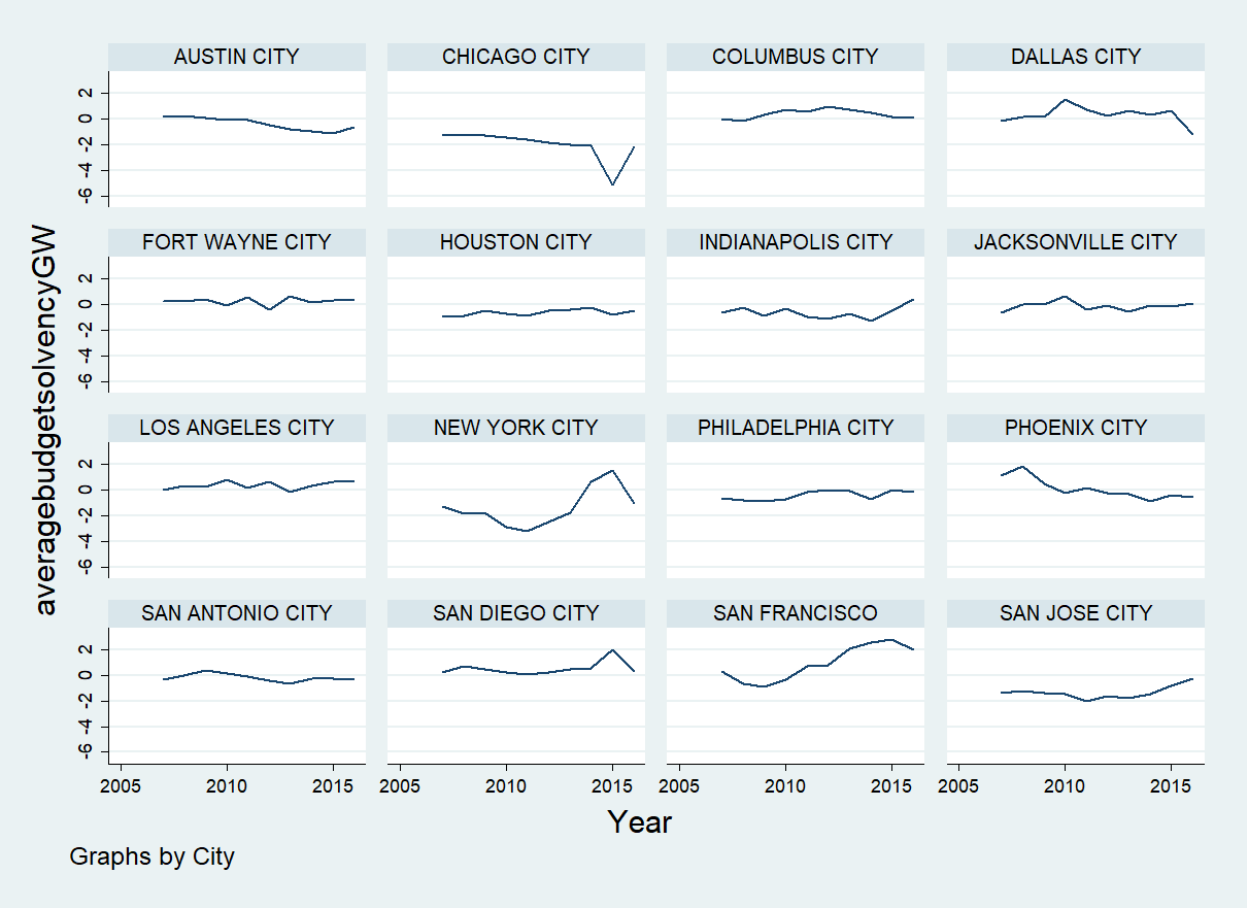
APPENDICES

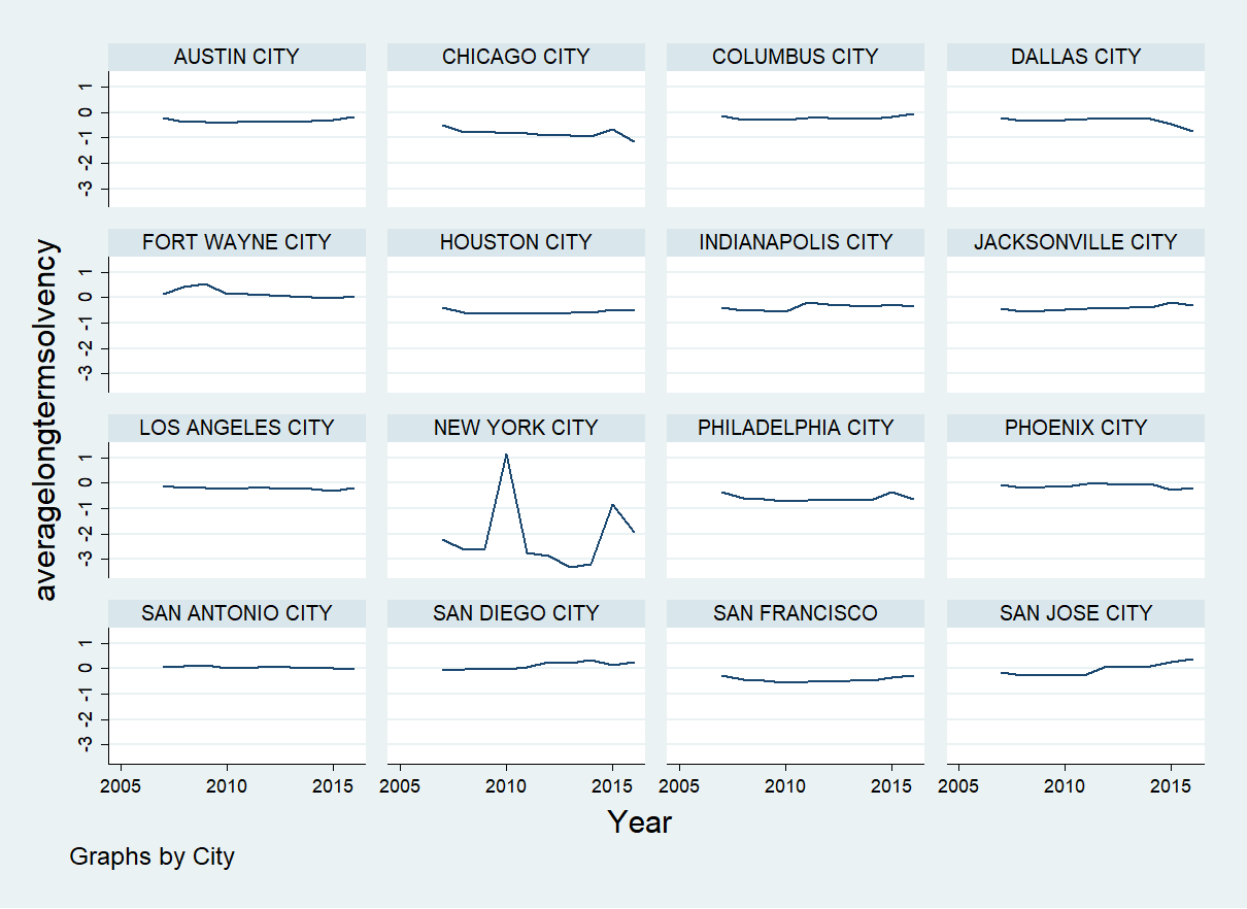
APPENDIX I: Variation of Cash Solvency of U.S. Largest Cities (2007-2016)



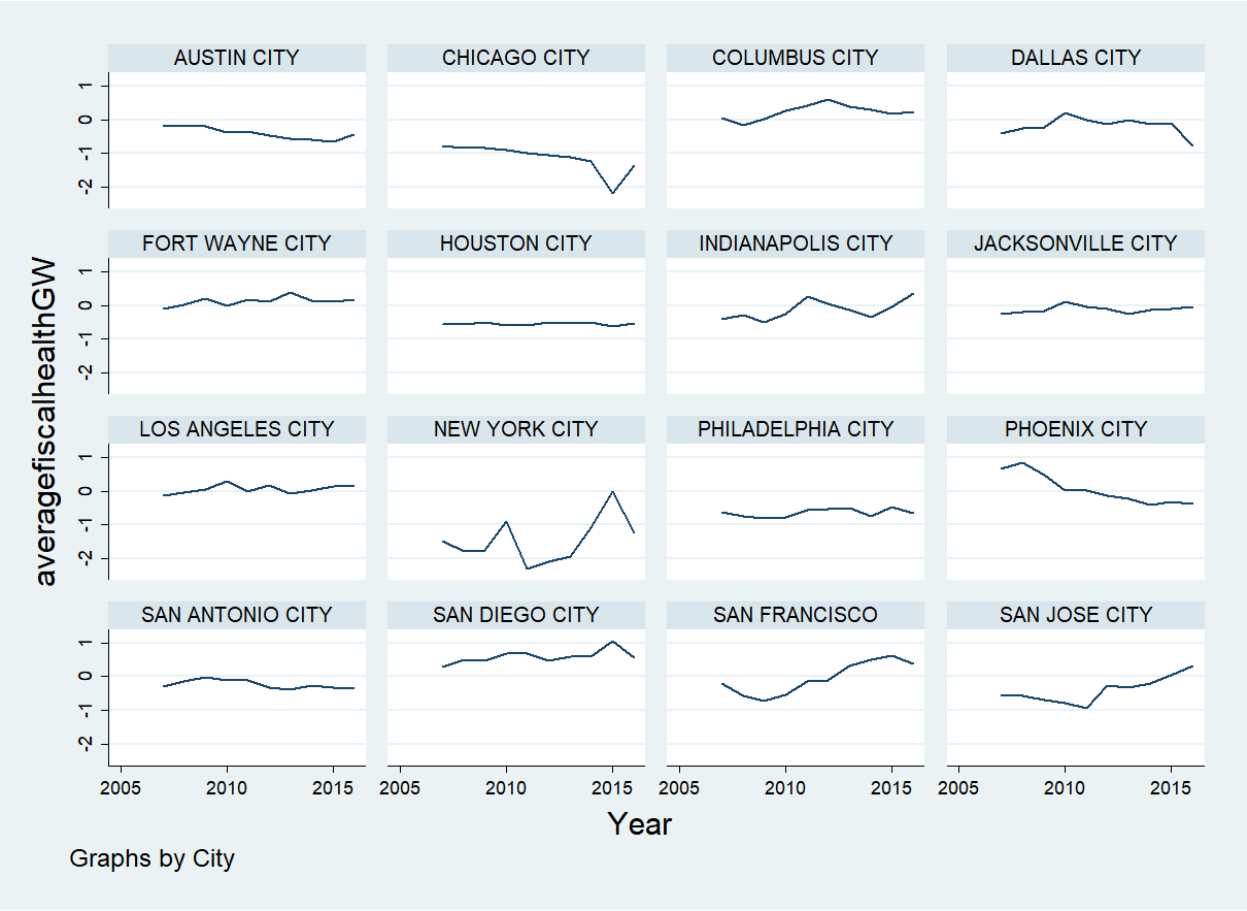
APPENDIX II: Variation of Budget Solvency of U.S. Largest Cities (2007-2016)



APPENDIX III: Variation of Long-Term Solvency of U.S. Largest Cities (2007-2016)



APPENDIX IV: Variation of Overall Financial Condition of U.S. Largest Cities (2007-2016)



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