The Fiscal Resilience of American Cities

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(GENERAL ABSTRACT)

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This paper brings together the concepts of fiscal health and resilience as they are understood in a contemporary context while seeking to establish whether a quantitative model of analysis can be meaningfully derived and applied to major American cities. Using major recessions from 1977 to 2015 as an exogenous shock, the values for fiscal health are assessed temporally to arrive at an assessment for whether a certain group of cities is inherently more resilient than others. Given subjective nature of the concepts used, this paper also grapples with the fact that any results must be analyzed within a local context. The end result is aimed to produce a tool for cities to compare how they performed in the wake of a recession and eventually work towards an understanding of what policy actions can be done to make a city more resilient.

(ACADEMIC ABSTRACT)

Expanding upon exiting ratio-analysis models of assessing fiscal condition, this paper provides constructs a new model based on those created by Brown (1993) and Maher and Nollenberger (2009) to encompass the four key types of solvency that may be considered in assessing a city's fiscal condition. The scores are grouped by population and indexed relative to 1977 and plotted through 2015. During this period, changes in fiscal health index recessionary shocks are observed within each population group. A quantitative analysis for resilience is applied using the framework largely from Martin (2012) and applied using the differences between defined intervals surrounding a period of economic recession. The end results suggests that with appropriate parameters it is possible to quantify resilience which invites further experimentation to eventually identify quantitative means on which future local government policies can be derived from.

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Chapter 1

Introduction

Across the United States exist thousands of local governments with the authority to raise revenue in exchange for the provision of demanded public services ranging from sewage treatment to street cleaning. These services are not only a part of everyday life, but essential in providing for the health, safety, and public welfare of residents. Of course, some services are more important in this regard than others. The role of a city's fire department has an obvious role in providing for public health, but that is not to say argue that some services are a waste of tax-payer money. Public services exist because the community voices a demand and a willingness to pay. Funding these services is a dynamic issue that is reevaluated each fiscal year and subject to unpredictable changes in the capacity to raise revenue or the final cost in service provision. A break down in the ability to provide services is unusual, but it does happen.

Major economic events present a significant challenge to the finances of local government as some methods of revenue collection are inherently tied to exogenous factors. Property taxes, for example, typically constitute the largest portion of revenue collection structures at the local level and can be influenced by macroeconomic conditions. The Global Financial Crisis of 2007-8 restricted individual access to loans causing a significant crash in the housing market which led to a significant decrease in property values across the country. The lower property values then have the potential to harm the capacity to raise revenue at the local level if there is a significant difference between expected revenue and actual revenue collected. A major recession can affect other means of revenue collection similarly: A decrease in consumer spending can impact municipal revenues from various sales taxes for example. Furthermore, any decrease in household income will likely increase resistance to tax hikes aimed at compensating for a decline in revenue. A major economic downturn can therefore have very real and measurable effects on municipal finances and the ability to provide expected services.

When Detroit filed for Chapter 9 bankruptcy in 2013 it was the largest American city to ever do so. It was not alone in its struggle to meet financial obligations. After the 2008 recession,

property values decreased dramatically across the country reducing one of the largest sources of revenue for local governments. Other streams of municipal revenue dried up as consumer spending decreased and the economy as a whole constricted. Every municipality facing budget shortfalls from the decrease in revenue must make a series of decisions as to how it will meet its fiduciary obligations–bankruptcy being the failure to do so. Even if cities did not file for bankruptcy, their capacity to meet public service expectations was most likely compromised as a result of the 2007-8 Global Financial Crisis as it can be by any major economic recession. The extreme cases where cities are unable to provide basic services are the ones that stand out: Flint's inability to adequately treat its water [1] or Detroit's severely underfunded fire department[2]. These examples–although not the direct product of any immediate change–serve as warning for what could happen should the fiscal capacities of a city deteriorate.

It would be unfair to say that any city in a weaker state of fiscal health is completely comparable to the most drastic examples who's misfortunes have been largely tied to a declining manufacturing industry. The reality is that all cities will be affected differently by economic shocks depending on the methods of revenue collection. Some might not notice a significant difference, while others might be stressed to the breaking point. In many cases, it is likely that the shock will be noticed more by city finance officers than ordinary citizens as the impact is diluted and resolved through minor budget cuts or tax increases. Given the inherent differences in revenue collection, some cities will be better equipped to respond to economic shocks better than others, minimizing the effect felt at the individual level.A failure to return to pre-shock conditions or reverse growing debt only increases the likely hood of bankruptcy or the failure to provide for the public health, safety, and welfare can usually be attributed to . The capacity to bounce back–a city's 'Resilience'–is a new aspect to the discussion about fiscal health, but an important one.

The concept of resilience has become an increasingly popular subject in the social sciences–partially due to the the lasting impacts of the Global Financial Crisis. What it takes to be resilience depends on the context. An ecosystem that returns to prior conditions after a wildfire could be seen as resilient. The is no ironclad definition, but resilience is typically defined as "...". This definition allows for a range of interpretations, but the term is still able to adequately express an observed reaction. One of the most important part of these definitions is noting the presence of an exogenous shock. The shock can be anything that significantly disrupts the status quo: A fire, disease outbreak, or–as is a more common threat to any fiscal landscapes–a recession. The relatively recent emergence of resilience studies presents an incredibly useful tool to evaluate cities after a major shock.

It is broad and potentially misleading to claim that a city is resilient. Resilience can be used in a number of different ways to address how various components of our society react to shocks, but it is difficult to claim that a city is resilient based on a few selected attributes. To better understand municipal bankruptcies or failures to provide a level of service, resilience can be studied in the context of a city's finances or other measures of fiscal health to assess a city's capacity to return to pre-shock conditions. However, to do so requires coming up

with an acceptable means for evaluating the fiscal health–an equally subjective term.

Because the resilience of a city's fiscal health plays a significant role in its long-term capacity to provide for the public health, safety, and welfare of its citizens, it is necessary to understand what attributes of a city make it resilient. Papers published in the wake of the Global Financial Crisis of 2008 have provided insight on what attributes can be used to assess resilience as the subject received increased interest. It is possible to produce a means of assessing and interpreting the fiscal resilience in municipal fiscal health by combining elements of the established methods of interpreting both fiscal health and resilience.

Given the subjective nature of the terms 'resilience' and 'fiscal health', it becomes impossible to rely on any assessment dogmatically. One could argue that the methods used to assess financial health by one author are stronger than those of another and a similar debate can be had about calling something resilient. At a time when large quantities of data are increasingly more accessible, it is imperative that the parameters and definitions used in any study are fully understood and presented in a reasonable context. Given the significant amount of work contributed in the studies of fiscal health and resilience, it is necessary to identify select methods after a discussion of contemporary works. The results of this study may hold merit on their own accord, but should also be brought into the discussion about what it takes to be 'resilient' or what is really meant by 'fiscal health'.

Chapter 2

Survey of Existing Methods

Because this study aims to examine the intersection of fiscal health and resilience it is necessary to survey the defining components of each subject and relevant elements of the greater discipline. It is not an illogical combination of two different areas of study. Although the study of urban fiscal health is a relatively focused and precise topic, the the term resilience can be applied as an evaluating criteria. As resilience became an increasingly important aspect of the urban environment after the Global Financial Crisis a number of studies have demonstrated the ability to assess the resilience of similar subjects through a temporal analysis.

A wealth of different methods to identify and track the fiscal health of municipalities have developed organically since the 1970's as the period of strong economic growth began to fade and an exodus from the city center began. The most common methods rely on an agglomeration of various indicators or constructed ratios. From these measures, it is possible to obtain a general sense of fiscal health of a municipality. Each method is likely to use different indicators and definitions to evaluate a group of cities which makes it difficult to directly scrutinize and assess different methods–there is a limited degree of subjectivity in identifying criteria to define fiscal health given the significant differences between each locality. Contemporary applications of resilience also come with their own degree of variance. Even though definitions differ only slightly, different interpretations can wildly affect outcomes. Therefore, this paper seeks to individually examine the various components necessary to evaluate fiscal health and resilience as they have evolved over time.

2.1   The Use of Fiscal Ratios

Measures of fiscal health have become a popular method of assessing economic resilience because of their relative simplicity and ease to construct throughout the simple use of ratios. Ratios, by their very nature immediately present themselves as a means to grapple with com-

plex situations Horrigan [3]. It is Horrigan who catalogues early uses of financial ratios and suggests their increasing importance in business and economic applications, but it is Minsky [4] and Barnes [5] who make the case for financial ratios and their role in understanding risk. Minsky [4] argues the importance of assessing risk by considering the ratio of assets to book values and promoted means to visualize and constrain risky behavior while Barnes [5] gives a far more complete recommendation for the types of ratios to use and their significance. These ratio-based risk assessments are by no means limited to business or macro-economic analysis; With the proper context, these ratios are easily transferred to the realm of local government to assess fiscal health. In the same way that ratios have historically been used to identify risky or unsustainable practices in business and finance, they can be applied within the realm of municipal finance.

2.2   Towards a Definition of Fiscal Health

Early interpretations of fiscal health within cities focused on stressing factors. The role fiscal 'stress' or 'strain' can be seen as auxiliary to fiscal health which is a more comprehensive assessment about a city's financial capacity. Attention to fiscal stress arose during the economic stagnation of the 1970's coupled with the mass abandonment of the inner city and movement towards the suburbs [6]. The extreme fiscal stress seen during this time, particular in the case of New York City, introduced further literature defining fiscal stress so that it could be understood and avoided. In their 1982 book "Fiscal Stress in Cities", Rose and Page assert that "fiscal stress is not simply a dispute about cutting public expenditure or need to maintain local service, but rather achieving a balance between the costs and benefits of government [7]." This suggests that good fiscal health is dependant on being able to strike this delicate balance. Clark and Ferguson come to a similar conclusion in their 1983 book "City Money" where they produce the following argument[8]:

$$UrbanFiscalStress = \frac{CityGovernmentSpendingandDebt}{PrivateSectorResources}$$

Given the nature of this definition, they also note that "stress can increase from either a growing government or a declining tax base [8]." Both the arguments presented by Rose and Page (1982) and Clark and Ferguson (1983) firmly establish the notion that preventing fiscal stress–and therefore improving fiscal health–is indeed a balancing act to keep public services in proportion to the capacity and needs of the private sector[8][7].

The concept of fiscal health can be boiled down to a fairly ubiquitous definition: "a city government would be in strong fiscal health if it has the capacity to provide its residents with an adequate (standard) level of a set of public service for which it is responsible, while not burdening its residents and businesses with unreasonable tax burdens." (Chernick Reschovsky 2013)[9]. Other definitions of fiscal health might place a greater emphasis on the absence of debt or the sustainability of practices, but this serves as a strong definition

for examining a city at a given point in time. While Chernick and Reschovsky's outline is a simple snapshot of the fiscal conditions in a certain place or time, it provides a means for comparison over time[9]. Surely one fiscal year might depict an elevated capacity to provide a certain level of service while another may depict a depreciated capacity.

Fiscal health refers to an agglomeration of financial conditions within a local government rather than a single indicator. Most of the literature refers to four key solvency categories that help define the larger picture of fiscal health. These solvency categories include: 1. Cash–the ability to pay for immediate obligations, 2. Budgetary–the ability to balance the budget on an annual basis, 3. Service level–the ability to meet service expectations, and 4. Long-run–whether the locality can met all service and budgetary obligations for years to come[10]. Ignoring any single category of solvency would be the equivalent of only looking one way while crossing a street–it demonstrates a failure to recognize risk from all avenues. To be quantified and measured accurately, the metrics used must adequately reflect the different types of solvency.

Though the financial crisis of 2008 received a great deal of analysis and attention in later research, its effects at the local levels have been less obvious as the subsequent recession impacted localities differently across the country. The most obvious consequence came in the wake of two high profile city bankruptcy filings from the cities of Stockton, CA and Detroit, MI in 2012 and 2013 respectively. Though these examples may not be the norm, this highlights the importance of what has come to be known as the 'Accounting Theory' of money and credit and its application in local fiscal policy. After the financial crisis of 2008, Bezemer [11] responded to the notion that such a crisis was impossible to predict by advocating for more emphasis on the accounting model of analysis which would have highlighted greater risks within the financial system and highlights many of the key aspects on what it means to be resilient and maintain a healthy municipal ledger. Ormerod [12] also concedes that while forecasting recession is next to impossible, he backs up the accounting theory with empirical evidence that suggests that recessions are simply inventory cycles which ever so slightly hints at the eventual feasibility of foreseeing a recession or at least the risk by understanding the basic flow and demand of money. In Bezemer's later work, he makes a bolder assertion that "An accounting view approach to the analysis of financial-development effects enables policymakers to distinguish between productive and unproductive uses of credit, and the results for private debt growth" Bezemer [13]. While Bezemer does not reject previous paradigm surrounding the use and importance of credit, he strongly advocates for a plurality which engages in further research regarding the analysis of accounts. The accounting view of money in the macro economic system has promise to provide a better sense of risk among economic systems even at a local level.

A 2011 study by Maher and Deller attempted to identify the relationship between "objective" measures of fiscal health and self-reported perceptions of fiscal health in various municipalities in Wisconsin [14]. Their results failed to demonstrate a strong relationship between "objective" measures like revenue to expenditure ratios and perceptions of fiscal health to which they offer three possible explanations: Perhaps "objective" measures do not

accurately represent fiscal health, public officials may be strategically answering for their own benefit, or that the officials in question simply do not know the exact fiscal condition. This study suggests that while it might be possible to develop and refine an "objective" evaluation of fiscal health, it will likely be difficult to permanently link this to "subjective" measures.

2.3   Indicators of Fiscal Health

One of the earliest well-structured methods for evaluating and monitoring indicators of fiscal health is described in the aforementioned 1981 piece by Groves, Godsey, and Schulman that uses 36 ratios to paint an overall picture of fiscal health [15]. This method was designed primarily for local governments to monitor trends in fiscal health and identify potential problems. It found success in its ability to communicate financial data to a wider audience, but was limited in it's ability to make greater inferences about municipal health. In other words, this was a useful tool largely limited to those within the sphere of municipal finance. Brown [16] applies fiscal ratios in a meaningful way that could be easily communicate information to government finance officers. By entering information then available from the Financial Indicators Database–produced by the Government Finance Officers Association–and making comparison between 'grades' of selected financial ratios between different cities, he shows it is possible to produce a quick assessment of a city's financial condition that can benefit smaller cities without the resources to produce a more localized analysis Brown [16]. Bohn and Inman (1996) supplement Brown's work by assessing state balanced budget limitations which shows a positive effect on a state's general fund surplus, producing a way to soften the blow of fiscal shocks outside of local control[17]. While Bohn and Inman engage less with classic literature surrounding financial ratios, their methods indirectly build on what others have argued.

A few years after the 2008 Recession, a number of studies were produced that aimed to better understand the fiscal health of cities during time immediately prior to and after the Recession. The "10-Point Test" used by Brown [16] was re-examined by Maher and Nollenberger [18] who noted the trend that localities are less dependent on state and federal funds and therefore more dependant "on a variety of more elastic revenue sources (income and sales in particular)." Luby and Whysel [19] builds on this post-recession analysis and suggests that Chicago in particular could have been better prepared for the economic downturn for similar reasons (namely lower tax revenues and increased expenses). In an analysis of 30 cities from 2003-2009, Sacco and Busheé [20] note that because cities tended to initially continue pre-recession spending patterns, revenue diversification may be an important path towards resilience, which goes somewhat further than Chernick and Reschovsky [9] (2011) who also highlights many important changes in municipal revenues around the same time period. A survey of fiscal stress in Michigan cities by [21] strays from the use of fiscal ratios and creates a relatively simple measure for stress. Their method defines fiscal stress as the result of their

government services cost index (GCI) minus the Government Revenues Index (GRI) which focuses on the "changing costs of public service provision and actual revenue growth." They note that the 15% increase of the government cost index (GCI) played a significant role in the growth of state-wide fiscal stress from 2005-2009 which disproportionately affected cities with low or negative revenue growth.

Stone et al (2015) builds on some of the most recent post recession financial analyses including (Wang et al, 2007; Rivenbark et al, 2010; Johnson et al, 2012; and Singla et al, 2014) who use financial ratios to give an understanding of risk using comparisons available after the recession[22][23][24][25][26]. What separates Stone et al (2015) is the focus on Detroit as a case study to differentiate between fiscal stress and bankruptcy[22]. While others have highlighted their concern about meeting fiscal obligations, the case study on Detroit–a city that actually did fail to meet these obligation–assesses fiscal resilience in a new way and attempts to further our understanding of what it looks like when a city's financial stress puts it over the brink. The changing composition of government accounts is an added element of complexity that requires researchers to frequently re-calibrate their methods. Regardless, this still provides valuable insight into the fiscal policy with respect to resilience–an interest that increased since the late financial crisis. In an analysis of 30 cities from 2003-2009, Sacco and Bushee (2013) note that because cities tended to initially continue pre-recession spending patterns, revenue diversification may be an important path towards resilience, which goes somewhat further than Chernick and Reschovsky (2013) who also highlights many important changes in municipal revenues around the same time period[9][20]. These rather comparable works both give renewed attention to the concerns of local governments during the recession and provide a very complete analysis of the institutional forces at play to give the reader an understanding of what can be changed and why. By incorporating a discussion on the institutional factors, these authors promote resilience studies as achievable and even a priority (which is certainly a topic worthy of debate). Similar to Sacco and Bushee (2013), Pew Charitable Trusts (2013) created a similar fiscal analysis using the same data from the Comprehensive Annual Financial Report (CAFR), but extended the study to 2011 and observed that most cities had still failed to recover from the recession[27]. While they note that in order to maintain financial solvency many cities were forced to cut costs and raise taxes, neither Pew or Sacco Bushee fully explored the relationship between municipal finances and other economic considerations. Though the exact metrics vary by author, the tools used to assess fiscal health have remained relatively consistent over time. Given that many cities have only just recovered from the recession in the past few years, there has been little time to analyze the entire recovery period. The capacity to explore and understand local response to this recession and others will only increase as more information becomes available and methods become standardized after extensive critique and improvement. Even when data is available, a consistent problem is the lack of standardization among municipalities can potentially skew findings and lead to incorrect assertions. In most studies it has been necessary for the author to construct their own model of local finances which led to the risk of error not in the procedure but in constructing the data. For example, the overlap between special use districts, counties, cities, townships, etc.

makes it difficult to see where the money is going. The Lincoln Land Institute produced a resource that counters these problems by standardizing the fiscal records of 149 major cities across the country from 1977 to 2015 ("Lincoln Institute" 2013)[28]. This isn't the only large database of readily usable municipal financial data; Pierson et al (2015) introduces a similar collection from Willamette University entitled the "Government Finance Database" which is equally promising as the one produced by the Lincoln Land Institute[29]. There is a notable absence of literature pertaining to future developments in data collection and availability as the two aforementioned databases are so new there has been little time for experimentation with the provided data and insight on future directions. It is likely that in order to move beyond current analysis of fiscal resilience it may be necessary to develop new methods that are capable of making the most of the available data. Given the widespread availability of good, ready to use data and an increasing interest in fiscal resilience following the recession and several high-profile bankruptcies, it is likely that increased attention will help further expand upon the methods already tested.

2.4   Assessing Resilience

The concept of resilience has existed long before it has grown in popularity among the social sciences. Traditionally, resilience can be understood as the capacity to return to an undisturbed state. This of course can refer to a wide variety of subjects ranging from ecology to economics. In discussing ways to assess the resilience of region, Foster (2007) notes that it is more multifaceted than it would appear and suggests some of the factors that are important to consider like leadership, governing styles, and economic structures to list a few [30]. Foster (2007) defines "regional resilience as the ability of a region to anticipate, prepare for, respond to, and recover from a disturbance"[30]. Hill et al (2008) says similar, defining it as the ability to recover successfully from shocks that alter the current pattern of growth[31]. This is of course taking a very holistic sense of what it requires to be considered resilient, looking at how significant differences in cities could eventually lead to very different outcomes. In the context of fiscal health, contemporary understanding of resilience is largely shaped by exposures to economic recessions or other large exogenous or endogenous shocks and the ability to return to conditions before the shock. Ormerod performed a study of resilience in capitalist countries from 1871 to 2007 which looked at the change in real GDP through numerous recessions[12]. The study remarks on the historical resilience in broad terms, remarking that "the bigger the recession, the more likely it is to continue." While not going into detail about each recession, Ormerod identifies a generalized qualification for what it takes to be resilient.

Martin and Simmie (2010) break from earlier literature in that they believe resilience should not be limited to assessing whether conditions are able to return to an equilibrium[32]. They offer an 'evolutionary' perspective that gives increased importance to how a systems responds to a shock in the years afterwards rather than whether or not a system has returned

to an equilibrium[32]. Continuing with their 'evolutionary approach', Martin (2012) suggests that resilience is not a single attribute, but a combination of other attributes observed after a shock including: Resistance, Recovery, Renewal, and Re-orientation[33]. This provides four separate ways to assess the response to a given shock that contribute to a greater sense of what it means to be 'resilient'. While Martin writes this in the context of regions, this multifaceted approach can apply to any geopolitical entity where the data is available. Martin applies this strategy in examining the contraction and expansion of employment figures across the United Kingdom to identify different patterns of resilience and recovery after major recessions[33]. Dube and Polese (2015) perform a similar study on 83 Canadian regions and their response to the 2007-2009 recession[34]. Their study similarly breaks down the concept of resilience through a temporal analysis that measures changes in employment rates through three sequences: Resistance, Rebound, and Recuperation. Dube and Polese also note that while there is a range of reactions than can occur, one of the greatest challenges in determining whether a region is resilient or not ultimately comes down to the metric used. It is worth mentioning that Dube and Polese (2015) engaged with Simmie and Martin's evolutionary definition of resilience in looking at the evolution of trends over time; However, their study was focused on a shorter period of time after the shock[34][33].

Other literature running parallel to regional economic studies shows the importance of resilience in municipal finance. In studying different revenue streams for cities Chernik (2011) suggests that a diversified revenue portfolio generates an overall greater quantity of wealth[35]. While Chernik's (2011) work does not directly use the term 'fiscal resilience' his work clearly steers the audience in that direction by suggesting that fiscal policy can be changed in different ways to be more 'resilient' as defined by Martin's (2012) parameters[33]. While most of these approaches have been largely economic in query, Bieri (2017) bridges the important work by Simmie Martin (2010) and Martin (2012) with the importance of financial commitments and their relationship to the economy as underscored by Minsky (2008)[36][32][33][37]. The result reinforces the importance of fiscal resilience, suggesting it may be worthwhile to further examine. Marcuse (2014) hints at a similar relationship between local governments and their relationship to the global economy, but doesn't base his argument within resilience studies[38]. Boschma (2014) makes a similar incorporation of political elements to Bieri (2017), but keeps it well defined and in context to the shocks test resilience[39][36]. The 'evolutionary perspective' of resilience explores how regions "re-configure their socio economic and institutional structures to develop new growth patterns". Zolli and Healy (2012) along with Martin (2014) acknowledge that even after extensive popularity (or perhaps because of its popularity) the notion of resilience remains open to interpretation and must be used critically and well defined lest 'resilience' simply be another buzzword[40][41]. The literature surveyed has demonstrated that there is a scientific and effective means to studying the emerging field of resilience–in both the fiscal and traditional economic sense–when analyzing urban economies.

2.5   Understanding Risk

Despite the influx of post-recession resilience literature, financial shocks have always been an ever present concern to municipalities. To understand and analysis municipal finances, a firm foundation in basic accounting theory is essential. Burchell et al (1980) describes accounting as "a means for enabling the more general economic management policies of the state to grow in significant and impact"[42]. Bohn (1992) adds that certain debts can be defaulted on and others cannot; important to identify the differences between assets and liabilities and clearly define governmental debt and suggests "one can model the government as an economic agent acting subject to a budget constraint"[43]. This sets the stage for further analysis of municipal accounts, beginning to describe their relevance in the macro-economy by focusing in on individual accounts rather than simply the net flow. After the financial crisis of 2008, Bezemer (2010) responded to the notion that such a crisis was impossible to predict by advocating for more emphasis on the accounting model of analysis which would have highlighted greater risks within the financial system[11]. This ties in with existing fiscal resilience literature (Brown, 1993; Maher and Nollenberger, 2009; Sacco and Bushee, 2013; Chernick and Reschovsky (2013) even if it is not entirely obvious, but Bezemer (2010) highlights many of the key aspects on what it means to be resilient and maintain a healthy municipal ledger[16][18][20][9][11]. Ormerod (2010) also concedes that while forecasting recession is next to impossible, he backs up the accounting theory with empirical evidence that suggests that recessions are simply inventory cycles which ever so slightly hints at the eventual feasibility of foreseeing a recession or at least the risk by understanding the basic flow and demand of money[12]. In Bezemer's later work, (2016) he makes a bolder assertion that "An accounting view approach to the analysis of financial-development effects enables policymakers to distinguish between productive and unproductive uses of credit, and the results for private debt growth"[13]. While Bezemer does not reject previous paradigm surrounding the use and importance of credit, he strongly advocates for a plurality which engages in further research regarding the analysis of accounts[13]. The accounting view of money in the macro economic system has incredible promise to provide a better sense of risk among economic systems. While producing an analysis that comes anywhere close to mapping out all the quirks of the global economy is still largely unrealistic, this theory has the potential to build on current fiscal resilience studies to identify not only the risks involved, but contextualize local fiscal policy with the greater macro economy. Therefore the importance of macroeconomic principles–namely the accounting theory–has manifested its importance within the role of municipal fiscal policy and makes an excellent candidate for future research that further explores this area.

The 2008 global financial crisis was perhaps the most universally experienced shock for American cities in the 21st century. Most cities saw a dramatic decrease in revenue which contributed to growing fiscal stress as local governments struggled to meet expectations in service provision. In the years immediately proceeding, it became apparent that the fiscal health some cities were better positioned to recover than others. Several local governments

were forced into bankruptcy while others were forced to make significant cuts to service expenditures. These represent some of the more extreme cases of cities with poor resilience. Because fiscal health can be quantified by various measures and ratios, it is therefore possible to assess a city's fiscal resilience in a similar manner through a temporal analysis. The most obvious comparison is the comparison of pre and post-shock measures of an aggregate fiscal health 'score', but examining the individual ratios presents a more holistic means of understanding what it means to be 'resilient'.

All of these studies bring together the relatively new field of fiscal resilience and can make a significant case for its importance in municipal fiscal policy. A significant portion of Brown's original "10-Point Test" that will be used in this paper for its relative simplicity and ease of construction from the sources available. Using Lincoln Land Institute's Fisc Database, there is little confusion or interpretation about how the ratios are defined, while Maher and Nollenberger's revised test contains variables that are less intuitive to extract from the Fisc Database. Either way, the two tests are very comparable in what they aim to achieve: An easy to understand metric indicating rough fiscal health at any given time. In this paper, Brown's test is used as the starting point for further analysis on the relationship between fiscal health and overall general economic health to identify any possible relationships.

2.6   Looking Forward

While economics dominates as a large discipline entirely on its own, the subsets of urban economics, resilience, and fiscal policy are largely on their own to make connections between established economic theory and recent findings within these newer fields. It may be tempting to assert that future research within the realm of urban economics will lead to a breakthrough in the way cities are organized and run or how other government entities interact with them. Unfortunately, the literature available today suggests that quantitative assessments to produce hard evidence are either lacking in scale or detail, or non-existent. The best studies at the intersection of these fields tend to neglect the local level (usually focusing on the state level) or focus more on one element (e.g. fiscal policy) and are unable to extend their analysis further. Chirinko Wilson (2010), building on Holmes (1998) provide a very good understanding of the use of state incentives and their impact, but to the urban economist this is only helpful in studying differences between states–not necessarily between cities[44][45]. Chinitz (1961) lays down an important step in urban economics, but his assessment is still relatively incomplete by comparison to a study in the same vein as Peltzman (2016)[46][47]. Obviously the incorporation of better data, paired with more consistent means of standardization will enable a more detailed analysis at a local level, but it is not entirely true that academic studies will be conducted on as wide a platform as is possible. The reason for this is the fact that as researchers narrow in on localities, it becomes increasingly difficult to remove inconsistencies between localities. This goes beyond what the Lincoln Land Institute attempts to do and manifests itself within less obvious differences

that are equally difficult for the researcher to sort accurately. Each locality is governed differently with a unique population and socio economic considerations that make it difficult to apply a broad trend to each area. In light of this, the research may not be immediately be of wider significance other than to the area it immediately concerns. For example, the research of Luby and Whysel (2013) and Stone et al (2015), which focus on Chicago and Detroit respectively, are able to contribute to the literature because they represent either an extreme case or a major metropolitan area[19][22]. Focusing at a smaller level doesn't attract the same amount of enthusiasm or attention. What the research has contributed to at this point is an empowerment of smaller communities to better understand their own situation based on their own information, but using methods like those of Brown (1993) and Maher Nollenberger (2009). These authors have provided new methods that make it relatively easy for localities to produce an independent analysis and understanding of their own fiscal policy in the context of resilience. What is lacking, at least for now, is a greater level of literature surrounding the intersection of local fiscal policies and their local economic impacts. While it is possible for data savvy localities to produce this information independently, it is less likely to be widespread. It may be unlikely to expect significant quantities of research beyond specific areas or regions, but the methods used to analyze fiscal policies within these areas may be sufficient to condense the working knowledge into a more rudimentary technique that can be tailored to give smaller localities a better understanding of outcomes. While there are significant opportunities to expand existing literature, there is real possibility that some of this knowledge will be scattered across various localities more so than with other issues that affect a greater audience. The advancement of resilience studies at the local level is likely to emerge on a case-by-case basis with cities seeking to further their understanding of resilience from outside agencies or the planning resources at their immediate disposal. This would suggest that the intersection of these fields would yield a less academic approach than what has been typically illustrated through economics or urban economics. The upside is that rather than ideas and methods trickling down from academia, the opposite may be true where researchers seek to expand on the independently derived findings of individual cities. By doing so, it may be possible to supplement existing financial models with empirical findings and help standardize these studies at the local level. Although it is likely that we will see this multidisciplinary intersection become an increasingly popular subject of study, it will also require the deviation from previous research trends in the past as it engages with an new setting and different actors.

Chapter 3

Methodology

Selected ratios from previous literature are re-combined to establish a quantitative measure of fiscal health. Some of this re-arranging is to select the strong-points from previous methods and create a well-balanced measure that examines many aspects of fiscal health. Many of the original ratios used in Brown 1993[16] are retained for their persistent ability to communicate sustainable fiscal policy. A few ratios have been taken from Maher and Nollenberger[18] and their post-recession analysis of Brown's original work where the data is available. Together, these ratios will be able to paint a comprehensive assessment of fiscal health at a given moment. The selected ratios can then be constructed using Lincoln Institute of Land Policy's FiSC database which covers 150 cities across the United States from 1977 to 2015. The FiSC database is unique in that it has been standardized to account for anomalies in revenue collection and distribution which facilitates comparison between localities without the need for additional data manipulation. These fiscal ratios can be organized by defining characteristics (e.g. Short Term Solvency) and later analyzed to assess their importance to resilience through a temporal analysis.

To produce a meaningful analysis of the ratios over time, each ratio is transformed into an indexed value that tracks the change in the individual ratio over time. The first year begins at a value of '100' and subsequent values are based on the rate of change from the previous year. By indexing the ratios, it becomes possible to make relevant comparisons between other cities. The indexed ratios are then aggregated by assigning a weight to each ratio so that the sum of the weights is equal to 1. The weighted indexes are combined to produce a cumulative index of fiscal health over time projecting relative levels of a city's fiscal health with the lowest scores indicating cities with severe fiscal stress.

In order to isolate a manageable quantity of data, the cities will be grouped by population so that comparisons can be made between relatively similar sized cities for greater context. This will make it easier to assess the overall capacity for resilience and the relationship between groups of ratios over time.

3.1 Selecting the Ratios

The literature surveyed presents a wide assortment of fiscal ratios that can be used to assess municipal fiscal health, but often these ratios overlap. For the sake of simplicity, ten ratios have been selected which provide a survey of different aspects of fiscal health. The use of around ten ratios has been demonstrated by previous literature as a manageable amount of ratios. A survey of fewer ratios may limit or skew the analysis of resilience, while too many ratios would make the analysis more complex than necessary. Fiscal ratios are designed to be concise representations rather than complete models–therefore this paper will focus on ten which provide a similarly concise yet comprehensive assessment of fiscal health. The ratios selected fall into four categories: Long-term Solvency, Budgetary Solvency, Cash Solvency, and Service Level Solvency which reflects an initial classification by Maher and Nollenberger [18]. Long-term solvency is the broadest sense of debt considerations as this reflects the capacity to pay long-term obligations with retirement funds being a major consideration. Budgetary solvency is focused on the immediate budget and the ability to produce enough revenue for current expenses without incurring debt. Cash solvency focuses on the ability to make immediate payments when necessary; focused on short-term demands. Finally, service-level solvency reflects the city's ability to provide for the expected level of services demanded by the population and ensure the welfare of the city. Some categories like budgetary solvency are better represented in both Brown 1993 and Maher and Nollenberger 2009[16][18]. This lack of representation is continued in this paper partially due to the limitations of the FiSC data base, but largely the fact that often a single ratio is capable of capturing the most important aspects of the category. The 10-point tests devised by Maher and Nollenberger [18] and Brown [16] similarly use only one ratio for a category (Cash Solvency). The four categories of solvency reflects a complete sense of what it takes to maintain fiscal health. Looking at only select categories invites the possibility of glossing over a weak link in a city's finances. It is entirely possible that a city ignores long term obligations in order to balance a budget or other strategy of allocating funds to address priorities. A greater diversity of ratios reveals a greater sense of the fiscal health of the city. The ratios selected in this paper aim to concisely address the full picture of fiscal health.

3.1.1 Ratio 1: Total Revenue / Population

This ratio is used to assess the capacity for raising additional revenue. A high ratio, or one that has steadily increased over time, suggests a limited ability to raise revenues as residents are already burdened by high taxes and would be unlikely to accept further increases.
Original Source: Brown, 1993

3.1.2   Ratio 2: Total Revenue / Total Expenditures

General measure of budgetary solvency–perhaps the simplest ratio used, this provides valuable insight to whether the municipality's expenditures are sustainable. A high ratio indicates a greater capacity of the city to respond to exogenous shocks. **Original Source: Brown, 1993**

3.1.3   Ratio 3: Property Tax / Total Revenue

This ratio illustrates the dependence on property tax revenues for operations; A high ratio indicates a particularly risky dependence on a single stream of revenue. **Original Source: Maher and Nollenberger, 2009**

3.1.4   Ratio 4: Intergovernmental Revenues/Gross Revenues

Most municipalities depend primarily on self-created revenue (from a variety of taxes, though predominantly property-based) because revenue from state, national, or other governmental bodies is less predictable. Intergovernmental revenue tends to increase during times of relative prosperity, but can disappear quickly during a recession or other shock with little input from the receiving municipality. **Original Source: Maher & Nollenberger, 2009**

3.1.5   Ratio 5: Total General Fund Cash and Investments/Total General Fund Liabilities

This ratio reflects how much cash is on hand each year which can be used to respond to a variety of short-term obligations. A limited amount of cash held in reserve is useful in mitigating the effect of mild shocks. A low ratio can be indicative of a persistent need to acquire short-term debt which can be a drain on a city's recovery. **Original Source: Brown, 1993**

3.1.6   Ratio 6: Total General Fund Liabilities/Total General Fund Revenues

This is a relatively simple assessment of the long-term solvency of the general fund by identifying the relationship of liabilities with revenues. The lower the ratio, the easier it is to meet short-term obligations. **Original Source: Brown, 1993**

3.1.7   Ratio 7: Debt Service/Total Revenue

This measures proportion of debt service expenditures to total revenue to assess the city's capacity to meet payment deadlines and provide a rough sense of overall credit. A low ratio would indicate a greater long-term budget solvency. **Original Source: Brown, 1993**

3.1.8   Ratio 8: Current Operations / Total Expenditures

This reflects how much of expenditures are regular operations and how much are for capital projects. A low ratio suggests that sufficient investments are being made to maintain and improve infrastructure and a high ratio suggests that fiscal stress is preventing improvements. **Original Source: Brown, 1993**

3.1.9   Ratio 9: Service Expenditures/Population

Rather than examine the per capita rate of all expenditures, this ratio looks exclusively at service expenditures. This is important in understanding whether a city is able to cut service expenditures in an attempt to balance a budget without seriously compromising its ability to meet public service expectations. **Original Source: Maher & Nollenberger, 2009**

3.1.10   Ratio 10: Direct Long-term Debt/Population

This ratio refers to long-term general obligation debt and is used as a general indicator for a city's capacity to pay off long-term debt. A high ratio would indicate an unsustainable trend of debt accumulation that would be difficult to repay without drastic changes or property tax increases. **Original Source: Brown, 1993**

3.2   Constructing the Ratios

The original data in this paper is exclusively from the Lincoln Land Institute's FiSC database. The original fiscal ratio calculations used by Brown and Nollenberger were constructed from the Financial Indicators Database published by the Government Finance Officers Association (GFOA). One of the key differences between the two databases is that the FiSC database is standardized to reflect the presence of special districts or overlapping jurisdictions. While the previous 10-point tests were designed to use the GFOA database, no part of the tests are dependant on a single database. The FiSC database provides sufficient categories for the ratios to be reconstructed without major discrepancies. However, directly comparing or combining the ratios as they are described requires minor modifications. Currently some

ratios, like Cash to Liabilities ratio increase simultaneously with the overall fiscal health of a city. The increase of other ratios, like Long-term debt per capita, indicate a decrease in fiscal health. This can be changed by simply reversing the numerator and the denominator for all the ratios except #2 and #5. With this adjustment made, all ratios now indicate the same trend; An increase in the ratio represents an increase in fiscal health.

The next problem with these modified ratios is that it is still difficult to combine or compare them due to significant differences in size. Because there is no 'correct' way to manage municipal funds, these decisions are made at the discretion of those in elected or appointed positions and therefore based on the demands of the general public. It would be meaningless to compare the ratios directly between cities given the potential differences. Brown's original article suggested the use of quartiles to evaluate ratios relative to those of similar sized cities [16]. The weakness in this approach is that it is difficult to identify outliers as they would simply be grouped in either the first or fourth quartile and the severity of the ratio would not be adequately expressed. A solution to this would be to create an index that reflects the rate of change over time relative to the initial ratio at the earliest point in the data–which in this instance would be 1977. The use of an index for these ratios represents a new approach to what Brown and Maher and Nollenberger initially designed, but the use of an index to compare fiscal ratios over time is by no means anything new[18].

3.3   Creating an Index

An index is simply a means of tracking change over time relative to an initial value. Indexes are used to better understand the frequent changes in values with context so that one value can be compared to a previous point in time. It is in the manner that indexes like the S&P 500 or the Consumer Price Index allow us to see the cumulative effect of changes over time. The initial value in this instance will be set at '0' and begins in 1977 where the data first becomes available. A value of '0' is chosen to represent the fact that there were no previous data points for which a rate of change could be constructed. Each successive year is based on the previous year beginning with the first value. The index for each ratio is constructed using the following formula:

$$(R1_b - R1_a)/R1_a = S_b \tag{3.1}$$

$$I1_b = I1_a * (1 + S1_b) \tag{3.2}$$

Where: $_a = 1977$ $_b = 1978$ $I = Indexed Value of Ratio 1$ $S = Series Value of Ratio 1 1$

3.4   Assigning Weights

The completed indexes for each of the fiscal ratios may be directly compared with each other; However, doing so implies that each ratio is of equal importance. In any instance, the

weights must equal '1', but can be arranged to give increased emphasis to individual ratios, certain types or ratios, or kept perfectly equal. With equal weights an equation looks like this:

$$FI = I_1 W_1 + I_2 W_2 + I_3 W_3 ... \qquad (3.3)$$

Where: $FI = Combined Fiscal Index$ $I_1 = Fiscal Index of Ratio 1$ $W = Assigned Weight$ $W_1 = 0.1$ Finally, the index is normalized using the 'Scale' function in the R Studio software.

3.5 Comparisons by Population

While it is possible to examine each city in the FiSC database individually, this paper seeks instead to perform a more holistic analysis to identify larger trends in the data set. In his original paper Brown, 1993 uses a scoring method that relied on assigning scores relative to other cities[16]. This is done because the fiscal environment of different sized cities can vary; What strategies may work in a small town might not be relevant to a major metropolitan area. However, that is not to say that grouping cities by population size is a perfectly accurate measure–the municipal fiscal environment can still vary significantly between major cities. Five groups were selected which includes all cities in the data set. This method of grouping was done as a compromise between having enough groups for comparison and enough cities within each group to prevent the data of any one city from controlling the group average.

Group 1: Population < 100,000
Group 2: Population > 100,000 & < 200,000
Group 3: Population > 200,000 & < 350,000
Group 4: Population > 350,000 & < 750,000
Group 5: Population > 750,000

3.6 Calculating Resilience

Because resilience implies the presence of a disturbance–or shock–to an existing trend, it is necessary to isolate significant exogenous shocks. In this instance, years that the United States experienced a major economic recession will be used. Because the impact of recessions are so widespread, their occurrence is often a cornerstone of resilience studies in macroeconomic entities[33]. There were five economic recessions from 1977-2015, however, because of the proximity between the 1980 recession and the 1981-82 recession it is unrealistic to assume that economic conditions improved significantly to allow for a period of normalization in municipal finances. Therefore, these two recessions will be treated as a single event. Because every recession can impact local governments differently, it is worth examining multiple recessions to avoid making generalized assertions.

Martin's 2012 examination of the four aspects of resilience is used to provide a clear and well-rounded means of evaluating the impact of economic recessions on the five groups of cities. There are three time periods of importance: 1. Pre-Shock 2. Shock 3. Recovery. This follows a similar method to the one used by Dube and Polese (2015) where elements of a shock were broken up into different periods[?]. Their assessment differs slightly in that they used four periods; However, three are used in this instance by consolidating Dube and Polese's 'Shock' period and 'Post-Shock' period into just a 'Shock' period. For this paper, sequential increments of 3 years each are used to delineate each period. The index values are averaged within each period to produce a single figure to make a comparison between periods. The use of a three year period reflects an attempt to smooth the data and ensure a consistent measure for each recession while not extending into the time-line of another.

The difference in period averages from the Pre-Shock period to the Shock period indicates a population group's resistance to the recession. A large negative change would suggest that the fiscal health of cities within a particular population group are especially vulnerable to exogenous shocks. The difference between the Pre-Shock period and the Recovery period is aimed at assessing whether the fiscal health index fully returns to what could be considered 'normal' . Lower values in this comparison would indicate that the fiscal health of a group of cities is slower to return to Pre-Shock levels. Therefore, for a group of cities to be considered 'Resilient', they must demonstrate both a high degree of resistance and recovery.

The differences are calculated through a simple equation based on the three time periods:

$$\Delta 1 = P_2 - P_1 \tag{3.4}$$

$$\Delta 2 = P_3 - P_1 \tag{3.5}$$

Where:
Delta1 = Change from Pre-Shock to Shock
Delta2 = Change from Pre-Shock to Recovery
P1 = Pre-Shock Period
P2 = Shock Period
P3 = Recovery Period

These differences, Delta 1 and Delta 2, provide a simple metric for evaluating resilience quantitatively. From these figures it is possible to evaluate four key components initially described by Martin (2012)[33].The resistance to the initial shock is demonstrated by Delta 1 as it is the change from the average pre-shock period to the period during and immediately after the shock. The recovery from the shock is demonstrated by Delta 2–the difference between the average pre-shock period and the recovery period. The other two aspects of Martin's assessment of resilience (renewal and re-orientation) are more difficult to assess because the Fiscal Health Index is stationary–unlike other economic indicators that increase with time. Renewal–whether conditions have returned to a pre-shock trend–cannot be fully addressed because the trend is planar. This can still be partially assessed by Delta 2 where

a positive value would indicate that conditions have returned or exceeded previous levels. The closer the value is to '0', the closer the trend is to demonstrating a renewal. Should the values of Delta 2 be negative, this would loosely indicate a failure to re-orient. The ability to make assertions about renewal and re-orientation may be limited, but it is still very much possible to make interpretations about resilience based on the available measures.

Chapter 4

Analysis

4.1   Observations

By simply plotting the average and median indexes of all cities in the data set, it is possible to achieve a very general sense of fiscal health (as measured by a 10 point ratio) across the country as a whole from 1977-2015. Both the average and median indexes demonstrate a stationary data set which suggests that cities are maintaining a relatively consistent level of fiscal health despite occasional fluctuations in specific years. The average index appears slightly smoother than the median index which has several deep drops in values in the years 1987, 2002, and 2010. The trough at 2002 and 2010 are indicative of the recessions that occurred in 2001 and 2010 respectively while the trough seen around 1987 is likely the combined result of the two recessions seen in the early 1980's. It is not necessarily implicit that a recessionary shock will correlate perfectly with the fiscal health index that has been constructed. A shock one year will–in all likely-hood–not indicate a shock to the fiscal health index in the same year; there will be some inherent delay before the impacts–if any–are felt by a city's finance officers. The impact will be seen in decreases in municipal revenues which are dependant on a variety of taxes. Because many of the ratios in the Fiscal Health Index are constructed using revenue figures, the changes in the ratios will partially reflect revenue differences each year.

The impacts from each recession are varied. After the 2008 Global Financial Crisis, both the median and average indexes see the most significant decline for two years, then make an equally aggressive increase that appears to return the fiscal health index to pre-recession levels. The fiscal health index after the 2001 recession moves in a similar fashion, but did not decrease or increase as dramatically. Reactions to the recessions around 1980 and 1990 are different in the fact that they suggest a longer period of recovery from a peak around 1980 and 1989. However, the existence of a peak before these years might not be a realistic recovery expectation. A brief period of heightened fiscal health relative to 1977 might not

be sustainable for a significant period of time without placing an increased tax burden on a population.

In the Index representing the average of cities, the period after the Global Financial Crisis of 2008 sees a rapid correction in Fiscal Health scores largely due to an improvement in Ratios 2,3, and 4. An improvement in Ratio 2 suggests that a city has been able to either cut expenditures, secure other means of revenue, or a combination of the two. An improvement in ratios 3 and 4 suggests a significant rate of improvement in the effective collection of a variety of taxes that was stunted by the recession. The sudden rise and fall of the Fiscal Health Index in the wake of the recession suggests a healthy correction back to normal patterns. A failure to improve ratio 3 would suggest that a city's ability to raise money from a diversity of sources is limited, perhaps made worse by the recession. A dependence on intergovernmental revenue is denoted by a low value for ratio 4 and can be equally indicative of internal struggles to raise revenue. Because ratio 2 can be addressed in two ways (reducing expenditures or raising revenue), it will likely be one of the most volatile for cities more sensitive to a recession.

Not all ratios within the 'average of cities' index demonstrated movement in unison; Many ratios showed changes at different times than other and at smaller rates. The majority of ratios saw a significant decrease after the 2008 recession. Ratio 8 consistently sees the smallest variation each year and even the 2008 recession was no different and the ratio did not budge. This might suggest that this ratio is not ideal for being averaged out for multiple cities as the infrastructure needs may vary considerably. Ratio 9 decreased during the recession, but not as dramatically as other ratios. This measure of service expenditures per capita suggests that the city allowed more money to go to public services for a period before the financial crisis, but was able to cut back on these expenses to balance obligations. High deviation from normal values might indicate a decreasing ability to provide for public health and safety. Because the ratios attempt to address a range of issues regarding the fiscal environment of a major city, seeing the full picture requires a careful examination of individual ratios to identify what is driving significant fluctuations. The combined index can only provide a rough sense of the overall fiscal health.

Figure 4.1: Average Index of Cities

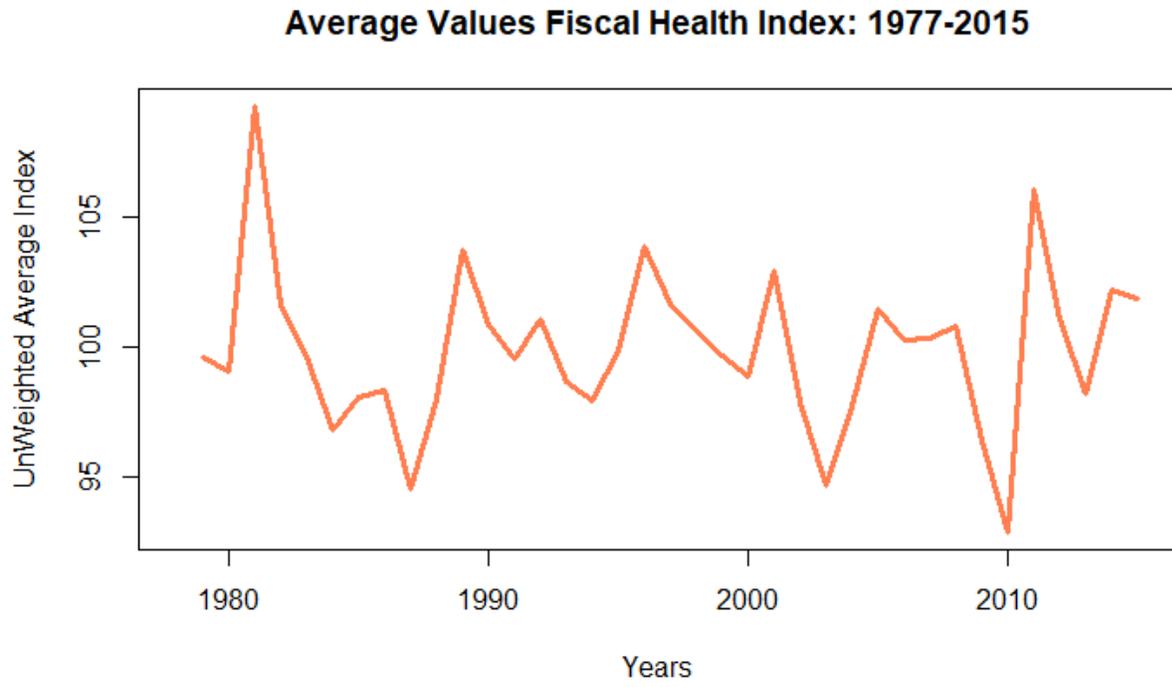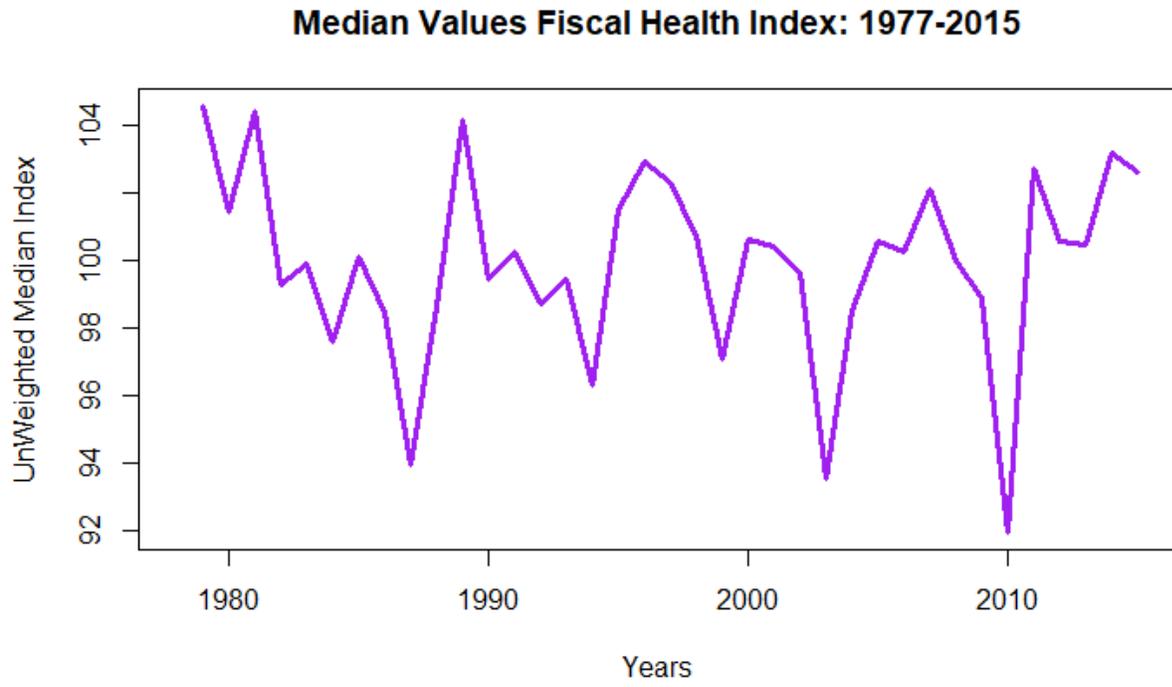Average Values Fiscal Health Index: 1977-2015

Figure 4.2: Median Index of Cities

Using the population groupings described earlier enables a closer look at the impact of each recessionary shock on different types of cities. In Figure 4.3 all five groups have been plotted with dotted red lines which indicate years that the United States experienced a recession. The general trajectories are still fairly similar with few significant anomalies; However, it is very apparent that there is a significant difference between groups especially when examining periods of relatively low and high fiscal health. At these extremes, the groups tend to follow in a pattern dictated by their size: Larger cities tend to face the largest declines and increases in the fiscal health index while smaller cities generally don't see as much variance. This has mixed meanings in the context of resilience: The ability to recover quickly becomes less important if a city is not as resistant to the initial shock. If both factors are given equal consideration, it becomes difficult to assert a significant difference in the overall capacity for resilience between large and small cities.

Furthermore, there appear to be clear areas outside the wake of recessions where all city groups gravitate towards a roughly stationary level which is typically at or just above 0. This means that it will be possible to use the average of a three year period to define a pre-recession without major distortions in the data. These periods of relatively 'normal' fiscal health also suggest that the recovery from a recessionary shock often brings the fiscal health index to levels above 'normal' for a year, then return to values closer to 0. This correction is largely the result of direct municipal policies aimed at improving the fiscal health (i.e. raising taxes, making budget cuts, etc.) at the expense of the capacity to provide a greater range of services and the individual tax payer.

Table 4.1: Descriptive Statistics: Normalized Index

Descriptive Statistics: Normalized Index					
	Group #1	Group #2	Group #3	Group #4	Group #5
Min.	-0.2788996	-0.404381	-0.4017554	-0.485583	-0.637121
1st Qu.	-0.0516222	-0.044246	-0.0716986	-0.077025	-0.160344
Median	-0.0063288	0.013264	-0.0014478	-0.029504	-0.002409
Mean	-0.0003744	0.003922	0.0008302	0.004187	0.002125
3rd Qu.	0.0572370	0.081258	0.0703557	0.113929	0.108236
Max.	0.2372434	0.272359	0.4065199	0.659565	0.815528

Figure 4.3: Cities Grouped by Size

Fiscal Health Index by Population Size: 1977-2015
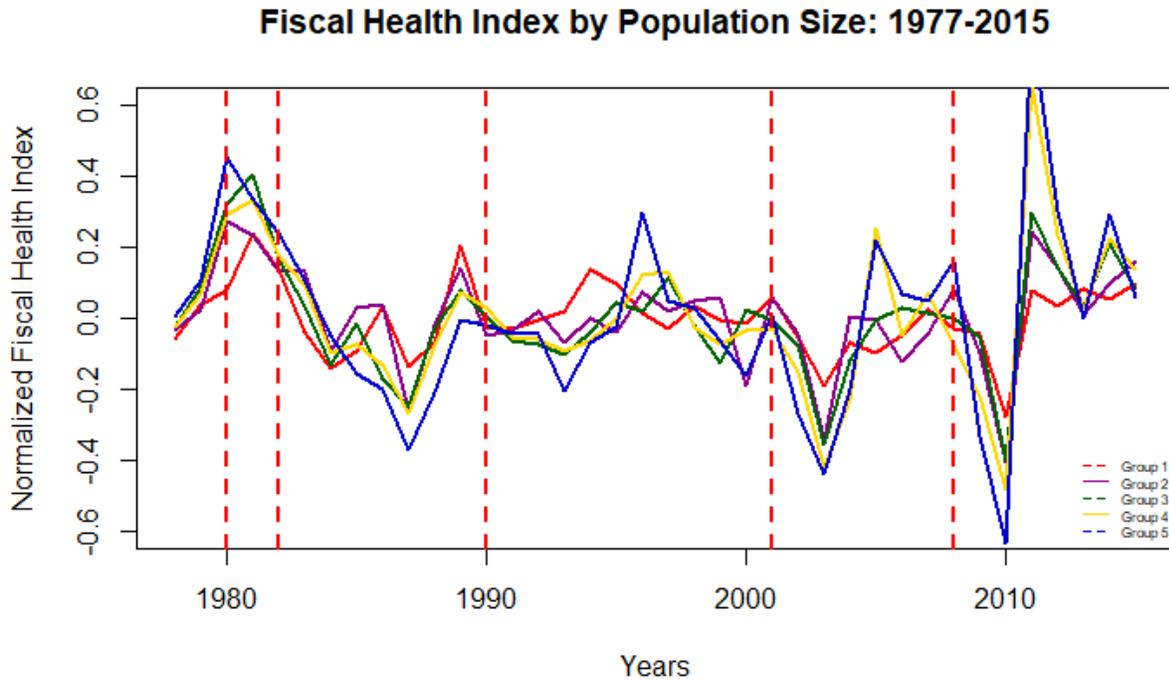
It remains difficult to fully answer how perilous these recessions are to the stability of a local government and its ability to meet financial obligations. If the groups were broken down to individual cities to see which fared poorly after the recession it would be possible to see where the recession has hit hardest. But how much can a city take? A decrease of 20 points in the Fiscal Health Index might indicate bankruptcy for one city but not another.

Similarly, the observations noted in Figure 4.3 might not apply to all cities within each group. Individual index values for Group 1 in 2008 ranged from a low of -0.55 to a high of 0.44 (though it should be mentioned that cities with a high Fiscal Health Index in 2008 tended to see a decline in later years). Cities in Group 5 actually saw far less variation than this with a high value of 0.38 and a low of -0.47. This suggests to a limited degree that as cities increase in size they are impacted similarly in the event of a recession. Additionally, this raises questions about the degree to which certain cities are impacted by a recession and why larger cities appear to consistently face greater degrees of impact from recessions and the growth in the years to follow.

While this paper was not intended to answer this question, it remains a challenge in being able to label a city as empirically resilient or not. The purely economic impact of a recession and a city's ability to recover afterwards are not dependant on size, but a correlation is likely. Economic impacts like decreased consumer spending or increased unemployment are going to be more deeply related to the composition and quantity of firms within each city. Our understanding of Fiscal Resilience has an inherent linkage to local economic indicators as they pertain to a city's ability to raise revenue. Therefore, because the impacts of a recession are impossible predict, it is impossible to accurately claim that because the fiscal health of one city was resilient in the wake of the 2008 recession that it would perform similarly in the wake of another yet-to-come recession. The trends observed here are therefore not intended on making definitive assertions about what will happen, but evaluate positive municipal responses in a variety of cities and bring this into a greater conversation about fiscal resilience.

With the averages for the Pre-Shock, Shock, and Recovery periods calculated, it is possible to make clearer claims about the changes in calculated fiscal health of each group of cities over time. The differences (Delta 1 and Delta 2) are included so that the whole scope of impact can be assessed quickly between each group during each recession. The changes of the Fiscal Health Index during these time periods allow us to make claims about the resilience of this Index. In the same way that it is possible to evaluate changes in the index, it is also possible to evaluate the change within individual ratios to explain movements within the groupings. Based on calculated Delta 1 values, the previously noted relationship between city size and impact of the recession holds true in the 2008 recession and to a lesser degree the 2001 recession. In the 1990 recession and the early 80's recession this relationship is not evident. The same trend is similarly apparent in the Delta 2 calculations: Usually smaller cities will experience a lower value than larger cities which suggests a slower rate of recovery or if the value is negative, a more significant failure to return to pre-recession conditions. An important anomaly to this observation is Group 3 during the 2008 recession which experienced a size-able drop in Fiscal Health Index values, but the average recovery period value remained slightly lower than the pre-recession period. This could suggest a slower return to normal levels of fiscal health. A closer look at the mean Fiscal Health Score shows fairly high levels of Fiscal health in both the pre-shock and recovery periods so it is possible that the years used before the recession were abnormally high and not the best

Table 4.2: Resilience Calculations: 2008 Recession

2008 Recession					
Group #	Pre-Shock	Shock	Recovery	$\Delta 1$	$\Delta 2$
1	-0.04173275	-0.1168555	0.06407201	-0.07512279	0.1058048
2	-0.05637567	-0.1396397	0.12977218	-0.08326408	0.1861479
3	0.01238583	-0.1511280	0.15576972	-0.16351383	0.1433839
4	0.08962472	-0.2610679	0.30692306	-0.35069265	0.2172983
5	0.11242500	-0.2706980	0.37242063	-0.38312297	0.2599956

Table 4.3: Resilience Calculations: 2001 Recession

2001 Recession					
Group #	Pre-Shock	Shock	Recovery	$\Delta 1$	$\Delta 2$
1	0.01267654	-0.1048093	-0.04173275	-0.1174859	-0.05440929
2	-0.02488141	-0.1280865	-0.05637567	-0.1032051	-0.03149427
3	-0.03709384	-0.1834471	0.01238583	-0.1463533	0.04947967
4	-0.04686341	-0.2668177	0.08962472	-0.2199543	0.13648813
5	-0.07310387	-0.3036475	0.11242500	-0.2305436	0.18552887

Table 4.4: Resilience Calculations: 1990 Recession

1990 Recession					
Group #	Pre-Shock	Shock	Recovery	$\Delta 1$	$\Delta 2$
1	0.037963256	-0.006376105	0.08247777	-0.04433936	0.04451451
2	0.023760762	-0.028745626	-0.03694902	-0.05250639	-0.06070978
3	0.018133530	-0.080184965	-0.03178952	-0.09831849	-0.04992305
4	0.008285323	-0.069433322	-0.05358496	-0.07771864	-0.06187029
5	-0.078792332	-0.098508346	-0.10071944	-0.01971601	-0.02192711

Table 4.5: Resilience Calculations: Early 80's Recession

	Early 80's Recession				
Group #	Pre-Shock	Shock	Recovery	$\Delta 1$	$\Delta 2$
1	0.01966756	0.1108916	-0.067192734	0.09122402	-0.08686029
2	0.08677045	0.1664166	-0.008982954	0.07964619	-0.09575340
3	0.12833992	0.2023529	-0.107703190	0.07401299	-0.23604311
4	0.11219564	0.1987414	-0.100737361	0.08654572	-0.21293300
5	0.18840318	0.2282187	-0.135608736	0.03981550	-0.32401191

indication of 'normal' fiscal health. Any greater of a difference between pre and post shock periods would be greater evidence for difficulty in recovery.

It is also worth noting that Group 1 was alone in its ability to more or less fully resist the fiscal stresses of the recession; Both Delta scores were higher than the pre-shock period suggesting that whatever shock occurred in the 'Shock' period was cancelled out by higher averages in the years that followed. There are two possible explanations: The first is that the pre-shock figures might have been lower than usual due to a slower recovery from the 2001 recession and the second would suggest that smaller cities are inherently less prone to the effects of a recession. An examination of the $\Delta 1$ values for Groups 1 & 2 cannot confirm that a positive $\Delta 1$ is any more common than for Groups 3,4,&5 suggesting that this is likely an isolated occurrence. As was noted previously, the range of Fiscal Health Index values within Group 1 was considerable, suggesting the difficulty in asserting trends for smaller cities. A further consideration is whether the periods used to measure times before, during, and after a recession might not fit as well as with other groups who feel the effects of the recession more immediately. Within Group 1 (and to a limited degree within the other groups) there are some cities that do not follow the patterns of others and have a delayed response to shocks. For example: Charleston, WV went from a score of 0.057 in 2008 to 0.383 in 2009 before dipping down to -0.41 in 2010 while Huntington, WV demonstrated a more typical response to the recession going from 0.078 in 2008 to -0.194 in 2009 before jumping to 0.075 in 2010. Significant differences in when a city feels a response make this analysis difficult to perform, however, making corrections based on these differences isn't ideal as it introduces a bias in the results if assumptions are made about when a shock should be felt or not.

From the evidence seen so far, the most recent recessions appear to affect cities different than the 1990 and early 80's recessions. The relationships between size and resistance, as well as size and recovery, become less linear. In the 1990 recession, the recovery from the initial shock was mixed. Groups 1 &2 saw a modest improvement in Fiscal Health Index values from the 'Shock' to 'Recovery' period, although still slightly below the 'Pre-Shock' period. Groups 3,4,&5 however, saw either stagnation, or an even further decrease in in Fiscal Health Index values. This reflects a larger failure to re-orient and adjust to the recession

while making the modest improvements of Groups 1 &2 even more impressive. This evidence suggests two possible explanations: that lessons were learned and practices were improved before more recent recessions, or that the types of recessions were inherently different in how the affected local governments. Although the length of the 1990 recession was just as short or shorter than more recent recessions, it is possible that there were other macroeconomic factors at play which caused the negative economic effects to linger longer than usual. One specific ratio within the average index that keeps recovery levels significantly lower after the 1990 recession is ratio 7 which suggests an increased debt burden more significant than seen in later recessions. The 'Pre-Shock' values are also slightly higher than in other recessions which indicates an adjustment of fiscal policies after the recessions of the early 80's that led to a briefly heightened period of fiscal health.

Given the brief interval between the recessions that occurred in 1980 and 1981-1982 and the attempt to identify the beginning of the recession, the table for the early 1980's recessions fails accurately capture the shock of the recession. This suggests that the model used for other recessions will likely need to be tweaked to ensure that it fits with the actual shock observed. This could be done by simply advancing the three periods by a year or two. However, this does raise an important question about how much manipulation should be allowed. If a city does not observe a shock immediately following a recession, the metrics for evaluating a recession should not be adjusted to fit a single outlier. Observing that some cities see a delayed response to a recession may skew the evaluation of resilience, but this could lead to a re-evaluation of our understanding of an exogenous shock. What remains uncertain is whether a delay in the observed effects is the result a city's natural resistance to the initial impact of a recession or if the delay is the result of human intervention with this specific aim. The latter is not entirely unrealistic and actually quite plausible; Suppose a municipal finance office anticipated a decrease in revenue and had the capacity to balance expenditures or build up a size-able cash reserves. Preventative actions like this could potentially delay or mitigate the impact of an exogenous shock where municipal finances are flexible enough to do so. A combination of intentional and natural factors is possible as well, but to identify the precise reason for a delay in effects would require a study aimed at specific cities and their reactions to a shock. Regardless, this study does suggest that some localities experienced delayed or severely reduced effect of some recessions; However, by and large the effects observed appeared to have a considerable negative impact on fiscal health.

While the absence of recessions at regular intervals is an excellent thing for the fiscal health of American cities, having only four recessions to observe is a smaller sample size that would be ideal to make inferences on a large scale. However,even if a greater sample were available, it is possible that the fiscal landscape could be entirely different in the span of a few decades. Laws change; Some states cede more power to local authorities to respond to shocks, while others reel it back. A city's municipal bond rating might decline; Given the breadth of factors that play into how a city responds to exogenous shocks, there is a high propensity for change. This suggests that observations about how cities respond to shocks is time sensitive and could become irrelevant in a short period of time.

4.2 Solvency Types

The combined, unweighted index leaves one blind to the workings of individual ratios and the different types of solvency identified by Brown (1993) and Maher Nollenberger (2009) which offer more insight as to what aspects of fiscal health are affected by recessions[18][16]. The four types of solvency are identified as: 1. Budgetary: How well a city can balance it's budget from one period to another; 2. Long-Term: The sustainability of municipal operations over a significant period of time; 3. Short-Term: Having sufficient cash and securities on hand to make immediate payments; 4. Service Level: Whether a city is adequately funding needed services and infrastructure [18] [16]. These solvency types can be constructed from the unweighted fiscal health ratio by adding weights to specific ratios to select which ratios are represented. Each level of solvency helps provide another piece to the larger picture of fiscal health. By examining these individual solvency types, it is possible to contextualize the observations noted in the unweighted fiscal health index and observe other trends endogenous to specific solvency types. The ability to make clear inferences about trends within solvency types is a step towards being able to produce implications for municipal fiscal policy.

Table 4.6: Descriptive Statistics: Budgetary Solvency

	Group #1	Group #2	Group #3	Group #4	Group #5
		Descriptive Statistics: Budgetary Solvency			
Min.	-0.373064	-0.519860	-0.464560	-0.547344	-0.616002
1st Qu.	-0.060834	-0.064218	-0.106965	-0.106925	-0.149517
Median	-0.007631	-0.012524	-0.028998	-0.031093	-0.002233
Mean	0.003380	0.004143	0.004136	0.005766	0.005045
3rd Qu.	0.080926	0.086340	0.084510	0.074629	0.085435
Max.	0.243534	0.433022	0.663671	0.987860	1.239740

4.2.1   Budgetary Solvency

Figure 4.4: Budgetary Solvency
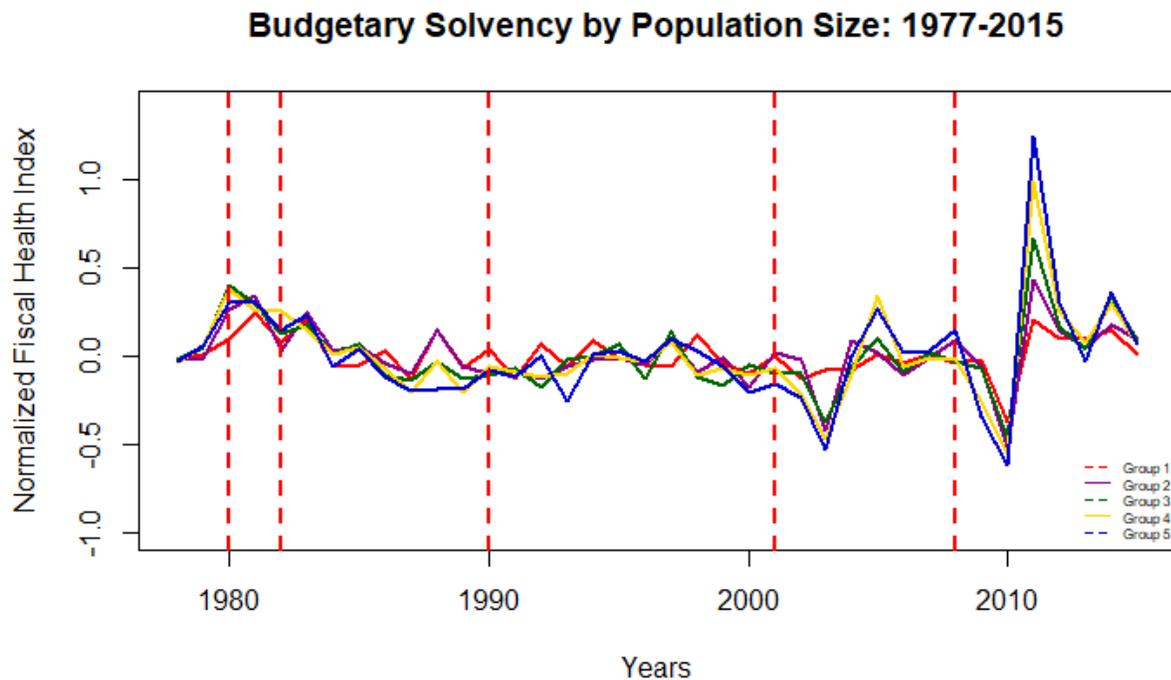
The movement of the fiscal health index for budgetary solvency is fairly static from 1977-2000. It is only after the 2001 and 2008 recessions that budgetary solvency along all levels

begin to sharply decrease, then correct. This suggests that either the two most recent recessions differ from earlier recessions in how the affect budgetary solvency, or management practices have changed since then. Group 1 cities appear to see even more consistently static behavior during the 2001 recession–the only group not to experience a significant decrease. The most significant decrease–after the 2008 recession–affected all groups similarly; However, the sequential response varied by population even as all groups returned to pre-shock values.

4.2.2 Long-Term Solvency

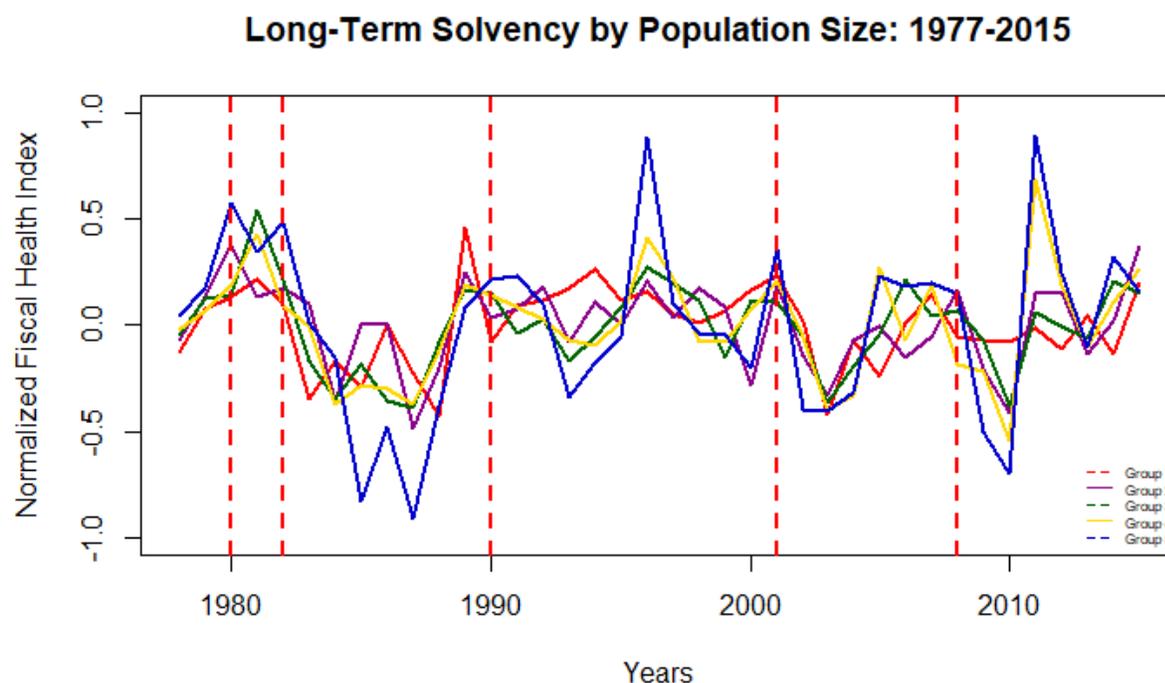Figure 4.5: Long-Term Solvency

Figure 4.6: Long-Term Solvency

Long-term solvency fluctuates a significant amount from 1977-2015 which most of the movements suggest a relationship to a recent recession. The effect of the early 80's recessions appears to be far more considerable than the 2008 recession, but the recovery from a prolonged period of low values is limited. While groups 4 and 5 usually see the greatest recovery from a shock, it is group 1 that sees the most significant recovery after the early 80's recession. Furthermore, group 1 doesn't appear to see a significant decrease in values after the 1990 recession or the 2008 recession, but it does respond to the other recessions.

Table 4.7: Descriptive Statistics: Budgetary Solvency

Descriptive Statistics: Long-Term Solvency					
	Group #1	Group #2	Group #3	Group #4	Group #5
Min.	-0.4268792	-0.483758	-0.386936	-0.541999	-0.9103418
1st Qu.	-0.1062556	-0.123961	-0.135168	-0.112935	-0.2871881
Median	0.0177483	0.024830	0.010650	0.007788	0.0637396
Mean	-0.0001466	0.004263	-0.003595	0.005536	-0.0005568
3rd Qu.	0.1293413	0.156580	0.139732	0.188270	0.2289084
Max.	0.4579891	0.376339	0.541443	0.689712	0.8969648

4.2.3 Short-Term Solvency

Figure 4.7: Short-Term Solvency
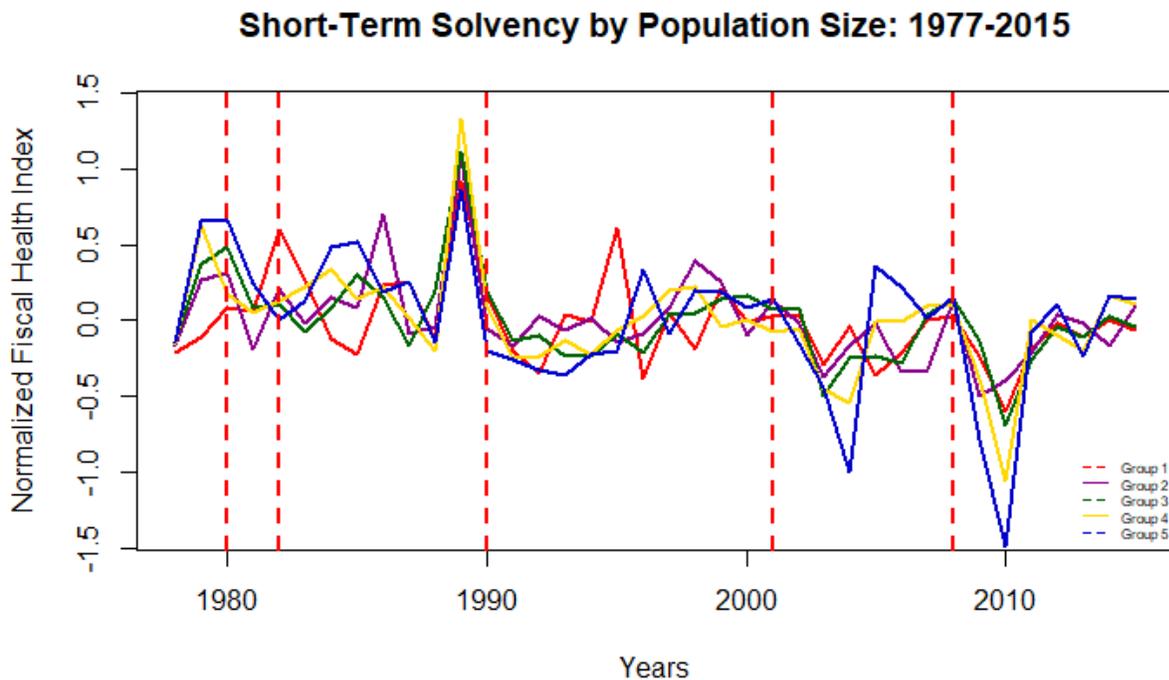
The Y-axis for this level of solvency is slightly larger than others which suggests more dramatic changes in this level of solvency over time. There is a peak around 1989 where all

Table 4.8: Descriptive Statistics: Short-Term Solvency

| Descriptive Statistics: Short-Term Solvency					
	Group #1	Group #2	Group #3	Group #4	Group #5
Min.	-0.598364	-0.494715	-0.69113	-1.059501	-1.4932619
1st Qu.	-0.19607	-0.161745	-0.15983	-0.147686	-0.2014107
Median	-0.01497	-0.022364	-0.01018	0.002474	0.0923775
Mean	-0.01186	0.008298	-0.00261	0.001889	-0.0009792
3rd Qu.	0.06073	0.125455	0.12903	0.141109	0.2165159
Max.	0.92217	1.079467	1.11594	1.326762	0.8592555

groups see significantly elevated values for one year before returning to a relatively static period. Again, in this level of solvency the effect of the early 80's recession and the 1990 recession is not as immediately obvious as the impact from the two more recent recessions. In the 2001 and 2008 recessions, the impact appears to depend on population.

Table 4.9: Descriptive Statistics: Service-Level Solvency

	Group #1	Group #2	Group #3	Group #4	Group #5
Descriptive Statistics: Service-Level Solvency					
Min.	-0.26722	-0.3490894	-0.314141	-0.3723334	-0.32254
1st Qu.	-0.11732	-0.0882979	-0.093693	-0.1038095	-0.16323
Median	0.00289	-0.0228640	-0.040403	-0.0053206	-0.02938
Mean	-0.00248	0.0007952	0.002566	0.0001699	0.00186
3rd Qu.	0.10265	0.0696851	0.055108	0.0907890	0.15098
Max.	0.34611	0.3987205	0.591317	0.4740712	0.47432

4.2.4 Service-Level Solvency

Figure 4.8: Service-Level Solvency
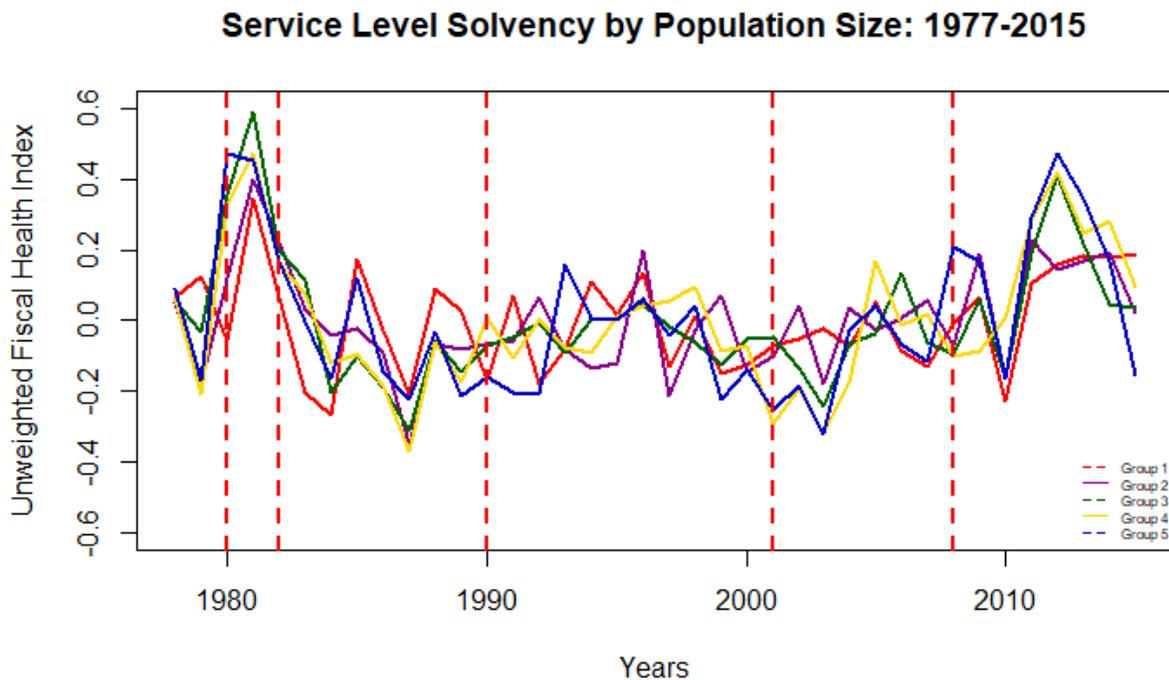
For the vast majority of the period studied, the service level solvency values tend to flatten out–relatively speaking–with the exception of two major increases and subsequent decreases

in 1981 and 2012. It is difficult to assess the first peak in 1981 given the lack of data preceding it, but it is possible that this was the result of changing policies of widespread fiscal stress during the 1970's, the correction possibly then undermined by the following decline of the economy. The decline following the 2008 recession is most likely the result of expenditure cuts to maintain a balanced budget and an improved level of solvency a few years later. The cyclical nature of this level of solvency makes it difficult to read, but the positive interpretation is that in no grouping is service level solvency facing decline for extended periods of time.

4.3   Discussion of Results

One of the most difficult aspects of this analysis is establishing parameters for both fiscal health and resilience. These are largely subjective measures intended to provide guidance on policy, not claim absolute truths. The ratios used in the construction of the fiscal health index are based heavily within established literature and previous methods, but given the wide breadth of variables at the municipal level there is bound to some amount of cities where one list of ratios simply cannot accurately convey a city's fiscal health. The strength of using 10 ratios is that it looked at an array of indicators–a city facing significant fiscal stress would face problems in all or aspects of solvency. The weakness of this method is knowing how to assign the weights and which ratios to include as there is no steadfast rule as to what defines good fiscal health for each city. Some cities may be in a better position to take on debt and use it to their advantage, others might be facing endogenous problems that cast them as outliers to more common trends. By looking at larger trends through averaged Fiscal Health Index scores it was possible to mitigate the impact of any outliers and achieve a better sense of how cities of different sizes respond to exogenous shocks. Constructing a measure of fiscal health based on selected ratios has its merits; It is a simple way to visualize and understand complex issues that might otherwise prove elusive. A greater quantity of ratios might possibly aid the tool's capacity to paint a clearer picture of fiscal health, but with a larger amount of ratios it is important that they are adequately managed and assigned relevant weights to avoid an over-emphasis on certain areas. It is also possible to examine particular municipal failures to recover after a recession to identify specific ratios that weigh down the overall Fiscal Health Index. However, this risks giving increased attention to areas facing endogenous economic issues that may not be representative of a larger trend. Despite a limited degree of subjectivity in establishing a metric for fiscal health, the use of selected financial ratios still presents a reliable means of comparing generalized trends within certain population samples.

By breaking down the Fiscal Health Index down into four levels of solvency, it is possible to ascertain a greater level of understanding of what is really at play behind the larger index. Each level of solvency reacts differently to recessions–several of which fail to respond to some recessions at all. Given the severity of the 2008 recession, there is a great deal of similarity in

the ways that the levels of solvency reacted, but reactions to other recessions prove that it is impossible to extrapolate these trends into generalizations. However, given the structure of the weights used, it is possible for any locality to establish which levels of solvency it deems important to combine or examine individually. The variation that occurs within individual cities is again important in being able to understand the full picture and eventually make decisions about policy regarding fiscal health.

The subjectivity of resilience also presents an issue when drawing conclusions about the patterns of each tested population group. The results showed evidence of a relationship between size and $\Delta 1$ values as well as size and $\Delta 2$ values. Whether a group of cities can be deemed more resilient than another will largely come down to the semantics: If resilience is defined as independent of any consideration of resistance to the initial shock, then the results of this study would suggest that larger cities are more resilient in that they are able to rapidly improve their fiscal health despite a significant shock. However, if one considers resistance to the shock and resilience as combined, then this study suggests a greater recovery is balanced by a weaker initial resistance to the shock. Martin's (2012) approach includes the broad definition of resilience including resistance while Dube and Polese (2015) and Hill (2011) stick to a more restricted definition with less focus on resistance[33][34][31]. Without the focus on resistance it becomes difficult to directly compare the recovery of recessions as each group is recovering from a different degree of impact, however, the $\Delta 2$ values fill this gap to a significant degree by asking whether a group had recovered at a set period after the recession. By providing by the $\Delta 1$ and $\Delta 2$ values, this study allows itself to stray from the larger discussion about how resilience should be defined and simply demonstrate the results as they apply to two major interpretations of the concept. Producing an aggregate measure for resilience–similar to what was constructed for the Fiscal Health Index–would require taking a firm stance on what attributes define resilience and possibly deliver misleading results.

The difficulty in applying the concept of resistance to a shock is that it shifts the conversation away from what a subject does in the wake of a shock to recover to pre-shock properties of the subject. Martin (2012) assumes that the regions he compares will be affected by macroeconomic activity in some way or another; However, it is worth asking at what point subjects become so fundamentally different from each other that this criteria for resilience simply does not apply[33]. While it is unlikely that any major local government will be immune to the effects of a major recession, perhaps this means that an evaluation of resilience would be more valuable if done within similar types of cities. A more realistic assessment of resilience might not be purely based on individual results, but a comparison to peer scores in the same vane as the 10 Point Tests constructed initially by Brown (1993) and Maher and Nollenberger (2009). However, the added benefit of this study is that cities are no longer grouped in quartiles and it is easier to observe extremes which can indicate problems or solutions.

Perhaps the appeal of the term 'Resilience' is somewhat embedded in its own ambiguity. Because there are multiple interpretations on what it means to be resilient, a city could

brand itself as resilient or declare its intent to become resilient without tangible goals. Based on the results of this study, there is evidence to suggest that all cities have some degree of resilience, especially when one factors in resistance. While this is designed to explore how different cities respond to major exogenous shocks, results like these could provide a false sense of confidence in their own capacity for resilience. An interpretation of this study could be that every group of cities is resilient and there no major problems that extend to an entire grouping of cities. The same inferences made about groups of cities should not be extended to individual cities. This indicates a general trend, but it is only an average, suggesting that there is another subset of cities that could be far less resilient.

Furthermore, a manipulation of the fiscal health index could completely alter the results–intentionally or not–to give struggling cities the perception of resilience while masking important factors. Coming up with a well balanced assessment of fiscal health could prove to be as elusive as a unanimous definition for resilience. The fiscal health index used in this study was designed to give equal importance to a variety of factors to prevent a narrow assessment of a city's fiscal health. Trying to reverse engineer a fiscal health index from the ratios of cities with severe service provision failures or bankruptcies is not a perfect solution; There are simply too few examples to make inferences about a wide range of fiscal environments. Further studies of fiscal ratios and their role in assessing local governments is needed to provide greater basis for assigning weights and incorporating more ratios without adding confusion. Even so, it is not possible to create a perfect metric for evaluation, but the model can be useful in noting important trends and addressing issues before they boil over. At the very least, the use of fiscal ratios in this context helps ask questions about erratic or volatile behavior.

To those working within the field of any social science, there is a draw towards quantitative methods as a means to empirically prove or disprove our perceptions and beliefs. In a time where large quantities of good quality data are increasingly available it would appear that answers are immanent. The reality is that data isn't everything. The methodologies used in interpreting and manipulating this data has an increased importance in conveying the results. An attraction to the idea of resilience or fiscal health may be in part to their ability to be loosely quantified, that somehow it is possible to escape the realm of qualitative analysis altogether to produce indisputable results. Both the concepts of fiscal health and resilience have the potential to be applied scientifically; An established definition and fixed criteria for evaluation could be implemented and established to prevent municipalities from drawing their own rosy conclusions. The problem with declaring a city financially 'healthy' is that the parameters for what is healthy and unhealthy are not concrete. What might work for one city might not be applicable to another. Further research can help deliver a greater sense of where these boundaries might be for different types of cities, but even so, in using these models a city will have to make an assessment for itself.

4.4 Further Research

Despite the subjectivity that lingers around these concepts, there are ways to improve the accessibility and scope of study so that further research can benefit decision makers in city finance offices. The relationship between available municipal tools for dealing with a recession outcomes in fiscal health could be an avenue for addressing what works best. This could be done by assessing specific strategies of increasing revenues–is there a revenue stream that is easy to tap into in times of need? Is a dependence on intergovernmental transfers bad for a short period of time? Going a step further, it could be possible to assess the differences in resilience based on statutory balanced budget obligations in different states, or differences between Dillon's Rule states and Home Rule states to assess how state policy affects city resilience. One could also go further and examine the resilience of states to examine whether there is a relationship between a state's fiscal health and the cities within it.

Building off the observations in this study, it would be worthwhile to examine how and why certain cities were affected by recessions and what local economic considerations are at play. Larger cities appeared significantly impacted by the recessions, but is because of different management practices or the concentration of significant economic activity that affects revenue collection differently? Better understanding the linkage between municipal fiscal health and local economic activity is important in grounding policy decision to economic realities. Furthermore, there is room to establish a stronger nexus between fiscal health and municipal failures to provide public health, safety, and welfare. While fiscal stress is obviously the driving factor in these failures, there are possibly significant managerial and political factors that complicated fiscal health. Looking at these human inputs would be challenging to say the least, but could provide valuable insight about what when wrong in the worst examples or how average cities can incorporate smarter practices to do more with less.

Chapter 5

Conclusion

The degree to which this study can adequately make definitive claims about the nature of resilience in major American cities through a series of major recessions is inherently limited by the subjective definitions at play. Despite this, the methods used allow for a clear visualization of general fiscal health trends experienced by five groups of cities. The data from the 2001 and 2008 recessions suggests two relationships: between size and the resistance and size and recovery to pre-recession averages. Possibly because of limitations of the recessional analysis used, this trend could not be observed in the 1990 and early 1980's recession. It is possible that slight improvements to the study could enable a better sense of whether these trends hold true in earlier years or if the landscape of municipal fiscal policies has significantly changed over time. Because each recession presents its own set of unique impacts, it is difficult to make specific assertions about how a city will respond to a recession in general. Upon closer investigation, some cities demonstrated a delayed response to recessions which raises questions about whether finance officers in smaller cities have more room to react to a shock or simply that recessions impact some cities differently than others. The general reaction of these averaged values across the groups is an important understanding to establish before moving forward. Given the degree of variation seen within Group 1, this might be an indication that cities need to be evaluated relative to their peers in order to make any inferences about policy.

The results of this study suggests a deeper analysis is possible at the level of individual ratios to achieve a clearer sense of the degree to which recessions affect parts of the Fiscal Health Index differently based on size. At such a level however, it is not immediately possible to accurately apply trends to any specific recession, but establishing a relationship between specific impacts of a recession and individual ratios would be an important step towards informing policy decisions.

Furthermore, the results also provide new context for the discussion about what qualifies as resilient. The relationships between size and the differences between periods suggest very different interpretations of resilience depending on the definition used. Martin (2012) is

right to give significant consideration to the idea of resistance as it raises the question of whether it is more important to be able to avoid shocks altogether or to simply be good at recovering quickly[33]? To answer this discussion beyond a subjective interpretation, it would be necessary to evaluate quantitatively evaluate this trade-off. A quantitative analysis is likely to be similarly elusive as it would have to demonstrate a real benefit by perhaps seeing if one ratio is more engaged than another and more significant to a city. Even so, these differences highlight the difficulty in trying to pin down the concept of resilience to something can be meaningfully applied at the municipal level. The introduction of weights to the model used could provide a solution by allowing individual cities to set priorities. This reinforces the role of local actors in producing their own conclusions. The further use of this model of analysis presents opportunity, but should proceed cautiously. A city keen to address previous mistakes has an opportunity to learn by applying their own context to quantitative assessments; However, the results could also be used politically to justify risky behavior.

There is a wealth of information waiting to be discovered within the Lincoln Land Use Institute's FiSC database of standardized cities. This study on the intersection of fiscal health and resilience relies on this database for its calculations, but it barely begins to scratch the surface on what can be accomplished with the standardized financial data of 150 American cities. Such a database enables and encourages the further research on a topic as elusive as the fiscal resilience of American cities. We have hinted at ways to improve upon this model that produce a more holistic assessment of this. Moving forward, it is possible to produce a clear sense of what it takes to be resilient and the importance of being so.

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