STRATEGIC PATH TO FISCAL SUSTAINABILITY: REVENUE DIVERSIFICATION AND THE USE OF DEBT BY U.S. MUNICIPAL GOVERNMENTS

Vaida Maleckaite B.Sc., M.P.P.A.

Dissertation Prepared for the Degree of

DOCTOR OF PHILOSOPHY

UNIVERSITY OF NORTH TEXAS

August 2012

APPROVED:

Skip Krueger, Committee Chair
Brian Collins, Committee Member
Robert L. Bland, Committee Member and Chair of the Department of Public Administration
Lisa Dicke, PhD Program Coordinator
Thomas Evenson, Dean of the College of Public Affairs and Community Service
Mark Wardell, Dean of the Toulouse Graduate School

Maleckaite, Vaida. Strategic Path to Fiscal Sustainability: Revenue Diversification and the Use of Debt by U.S. Municipal Governments. Doctor of Philosophy (Public Administration), August 2012, 177 pp., 14 tables, 12 figures, references, 150 titles.

This work explores the relationship between municipal government debt and revenue diversification using a prism of institutional and fiscal interactions, concentrating on revenue fungibility effects over time and on the role of state-imposed constraints.

A diversified revenue structure tends to stabilize revenue levels by balancing income-elastic and inelastic revenue sources. The impact of such diversity has been the subject of much research on expenditure and service levels among state and local governments. Considerably less research has been conducted on its potential relationship with debt, although capital financing is a necessary and often-utilized mechanism for funding capital and operational spending for local governments.

Since it is well known that debt payments are fixed in the short run, they require sufficient revenue adequacy through economic highs and lows. It is thus argued that local governments with more diversified revenue structures are better able to utilize debt financing since revenue diversity mitigates the risk of borrowing by providing for greater fiscal predictability in the long run. This hypothesis is tested on two samples - a large sample of cities in Massachusetts from 2000 through 2009, as well as a cross-state sample, encompassing the cities from the majority of U.S. states.

The findings of both studies provide preliminary evidence on the influence of revenue diversification on the levels of municipal indebtedness. While the Massachusetts study reveals that revenue diversification is, indeed, a statistically significant determinant of debt per capita, which also has an indirect effect on property tax burdens, the cross-state study suggests that

revenue diversification has a mitigating impact on certain state-imposed fiscal rules, further adding to its weight as a strategic financial management tool. Both studies also reiterate the importance of such fiscal capacity factors as fund balances, intergovernmental revenue, and the size of government, while also revealing some new interaction patterns among various state-imposed debt limitations.

ACKNOWLEDGEMENTS

The completion of this work would not have been possible without all the kind and generous help I received from numerous sources. Firstly, I would like to thank Dr. Skip Krueger, Dr. Robert Bland, and Dr. Brian Collins for serving on my dissertation Committee. I am deeply grateful for Dr. Collins' and Dr. Bland's helpful suggestions on improving my research, as well as their mentorship and much-needed words of encouragement while I was working toward my degree and, in particular, toward the completion of my dissertation.

My gratitude is also extended to Dr. David McEntire who played an instrumental role in my decision to choose the graduate program at UNT, as well as to Dr. Lisa Dicke, Dr. Sudha Arlikatti, and, especially, Dr. Margie Tieslau, for serving not only as my professors but also as role models for female career achievement in academia. The inspiration I received from observing their work has continuously strengthened my determination to follow the path I've chosen, and helped me say focused on my goals.

A special word of acknowledgment is due to the Toulouse Graduate School at UNT for its financial support which made my dream of getting where I am today possible. I am also grateful to the Department of Public Administration for kindly providing research and teaching assistantship opportunities during my second and third year of studies.

Last but not least, I would like to sincerely thank my family: my husband Eugene, for his unwavering support during all these years, and my parents Elena and Algis, for all of their sacrifices in helping me pursue my dreams, and for their unconditional love. I dedicate this work to you and hope it makes you proud. Finally, a big thank-you to my two furry kids, Lucky and Bandit, for teaching me patience and persistence that helped me succeed in this and many other endeavors.

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF ILLUSTRATIONS

Page

CHAPTER I

INTRODUCTION

Government revenue structure and policy constitute a crucial element of the quality and long-term viability of governance. The practices of taxing property by localities in the United States go as far back as early 17th century, while the U.S. Constitution of 1787 first extended the power to tax to the federal government, introducing poll taxes, tariffs, and excise taxes, and paving the way for the country's financial independence (Brownlee 2004). In the modern institutional environment, the government revenue and spending patterns are much more diverse while still being subject to a never-ending debate about their adequacy and efficiency. Calls for taxation system reform and decrease of tax burdens have spared no level of governance from claims about unconstitutionality of the federal income tax, repeatedly rejected by courts, to the opposition toward highly visible local property taxes (Slemrod & Bakija 2008).

In this context, revenue diversification can be viewed as a tool to address the problem of limited appeal of taxation, as well as revenue adequacy concerns that arise due to natural movements of the economic cycle. Since diversification helps to spread negative impacts of different tax sources more broadly, it has the potential to reduce both economic and political consequences of over-reliance on one or two traditional revenue sources, of which the property tax is, and remains, the most popular one.

Since perpetual revenue constraint represents a problem for government agencies, saddled with the overreaching goal of serving their communities by providing services based on need rather than availability of funds, government debt is an often-used mechanism of providing financing for projects that cannot be financed by using current revenues. A strong credit position, backed by the taxing power, allows governments on all levels to enter capital markets and use

borrowed funds to address their outstanding needs. Revenue diversification, found to have significant positive impact in reducing revenue volatility in the long run (Suyderhoud 1994, Carroll 2009), can be expected to influence government's decision to use debt as more stable revenue structures provide better guarantee for repayment. Rooted in theoretical framework of complex fiscal relationships and embedded constraints, this research explores the relationship between revenue diversity and debt, ultimately addressing the issue of fiscal (un)sustainability related to strategic government borrowing and revenue decisions. Using municipal governments in the United States as units of analysis, the research presented in this work aims to shed light on the role of revenue diversification as a strategy to enable government borrowing and to enhance/maintain fiscal capacity in the long run.

While data availability issues often confine government finance research to the national or state level, the dynamics of fiscal relationships on the local level is important in several respects. First, due to the proximity of local governments to citizens, local taxation, debt, and spending patterns have an especially deep impact on the individual and on social welfare and equity. Second, in a federal system, the efficient distribution of benefits at the local level is largely determined by local taxation, spending and borrowing decisions that also have spillover effects on other jurisdictions. At the same time, the distribution of tax burdens, debt burdens, and merits of the activities and services financed by taxes, including larger distributive consequences of the tax system, also raise moral and ideological value questions for public administration scholars concerned with preferable actions/outcomes in fiscal policy.

Best practices of financial management for local governments, regularly promulgated by national professional associations and regulatory bodies, encompass a variety of areas, from accounting and financial reporting to budgeting, debt and benefits management, and economic

development. While most of these practices are based on ensuring solvency and financial propriety, the reality of local governance also reveals a strong strategic aspect of financial management, given numerous constraints embedded in the institutional environment. Unfunded mandates, changing tax policies, tax, expenditure, and debt limits, as well as intergovernmental competition are bound to affect local fiscal decisions in a profound way, causing governments to think strategically when dealing with these constraints while implementing their primary mission of serving communities.

The notion of strategic fiscal management is especially relevant in times of economic downturn when many revenue sources dry up and obligations increase as a result of both the elevated need for public services provoked by deteriorating socioeconomic landscape, and the need to maintain constant debt service levels. Recent widespread impacts of the Great Recession on local governments manifested themselves in different ways. Falling property home values, costly state mandates, as well as ongoing intergovernmental competition forced many municipalities to reconsider their financial management practices. While the extent of the economic damage varied among the states, most municipalities nationwide have experienced difficult times.

Among prominent examples of the recession-bound financial conundrum one can recall the spending cuts announced by the governor of the state of New York in February 2011, which coincided with the declaration of the state being functionally bankrupt (Confessore & Kaplan 2011). In the same year, the City of New York, the largest municipality in the state and the home of Wall Street, the mastermind behind financial crisis, saw a $2 billion decrease in its operational budget after continuously struggling with deficits and cost-cutting measures since late 2007 (Goldman 2011).

Although the initial fear for a chain reaction of municipal defaults (Gordon 2011) never materialized, a few high-profile cases have received national attention. First, Jefferson County in Alabama, home to the state's biggest city of Birmingham, filed bankruptcy in the fall of 2011 after being unable to meet its obligations on sewer bonds hedged by means of interest rate swaps and issued to pay for improvements required by the federal government (Edwards 2011, Church et al. 2011). Around the same time Harrisburg, the capital city of the state of Pennsylvania, filed for Chapter 9 protection seeking relief from demands of its creditors, holding debt issued as a result of an ill-conceived expansion of the city's incinerator (Shade 2011). Finally, the city of Central Falls in Rhode Island filed for a last-resort bankruptcy in the summer of 2011, after being unable to meet outstanding pension fund obligations (Niedowski 2011). Most of the defaults of municipal securities, however, so far have been based on revenue bonds issued for industrial developments and public debt for private purposes. A good example of the latter is the ongoing concern represented by the aptly named "dirt bonds," issued by community development districts nationwide. As housing prices collapsed all over the country, many projects connected to the "dirt bonds" went unfinished, producing billions of dollars in distressed assets and subsequent defaults on debt (Baribeau 2011).

Manipulations with collateralized debt instruments and mortgage securities by financial institutions precipitated the financial crisis of 2008-2009. Having ravaged housing markets nationwide and driven numerous financial and insurance companies to the brink of bankruptcy, the crisis did not leave public sector agencies unaffected. Numerous entities, from school districts in Wisconsin to public employee pension trust funds in Maryland and several Midwestern states suffered significant losses after investing their funds in risky securities in order to boost earnings (Gallu & Selway 2011, Amon 2011). The failure of prominent municipal

bond insurers such as AMBAC and MBIA subjected to technical defaults many municipalities that had previously chosen to use sophisticated debt instruments like auction rate securities or variable debt rate obligations (Gordon 2011). Finally, the U.S. federal debt downgrade in summer of 2011 by Standard & Poor's, one of the three global credit rating agencies, has left many local governments scrambling with the ripple effects while facing downgrades of their own debt including mortgage-backed bonds secured by the federal government or its agencies such as Fannie Mae and Freddie Mac (Frier & Kaske 2011).

On the revenue side, the burden on municipalities has increased even more after struggling states nationwide have been forced to cut their aid to local governments, thus passing on their own budget woes to the bottom of the fiscal chain. The responses to rapidly shrinking funding ranged from property tax increases to service and personnel cuts to alternative financing. In an effort to establish new sources of revenue, cities in different states have demonstrated certain levels of creativity. While mineral resource-rich municipalities in Texas agreed to a wider distribution of oil and gas leases (Toland 2011), the City of New York introduced a widely-opposed new "crash tax" on the use of its emergency services (Goldman & Marois 2011).

Other municipal coping strategies largely included drawing on rainy day funds, outsourcing and privatizing public services. The city of Maywood in California took perhaps the most radical approach to outsourcing, deciding to replace all of its workers with contractors from neighboring municipality so as to avoid dealing with bankrupt employee pension funds (Nichols 2010). Numerous other cities followed the same, albeit less drastic, route, inducing a wave of staff layoffs in search of greater efficiency and personnel expense savings.

Given all the above, it is safe to say that, in the aftermath of the Great Recession, the concerns about revenue stability and sustainable borrowing in the light of increasing demand for

resources will continue to grow. Moreover, revenue and debt decisions are of utmost importance not only to municipalities as service providers but also to the "municipal shareholders" (Fischel 2001), or residents that are motivated to protect their substantial and poorly diversified assets in the form of real property located in a specific jurisdiction. Finally, in addition to economic efficiency and financial sustainability, revenue and debt decisions made by governments need to answer the goals of social equity and fairness, tying the problem to the broader context of public administration. Consideration of social benefits of taxation and borrowing is especially important given often-present discrepancies between these decisions and the optimality of levels of public goods and services provided.

Despite growing academic interest in local fiscal capacity issues, no comprehensive theory evaluating all the aspects of strategic financial management has been suggested so far. Numerous attempts to study revenue diversity and its effects on revenue stability in local and state governments (e.g. Hendrick 2002, Shamsub & Akoto 2004, Carroll 2005, Carroll 2009) are largely limited to exploring individual aspects of the phenomenon and not the comprehensive picture of its relationships with other fiscal factors. In particular, there have not been attempts to relate revenue diversity and stability to the problem of municipal indebtedness.

The use of debt by governments has been extensively addressed in the literature, emphasizing its attractiveness as a financing source due to the transfer of the costs to future users and the political need to reduce volatility in tax rates (Barro 1979), to cover temporary cash shortfalls (Clingermayer & Wood 1995), and to act as a means of advancing political agendas (Salamon 1989, Stephens and Wikstrom 2007). However, rising levels of long-term debt mean a greater strain on government operating budgets, especially during periods of economic downturn. Greater levels of outstanding debt are also bound to negatively affect perceived

creditworthiness of a government entity, increasing its future borrowing costs. Finally, a large debt burden may undermine voter satisfaction with managerial and financial practices, especially when increases in debt are accompanied by growing tax burdens. Hence, local government debt represents an important aspect of local fiscal capacity, or the ability of a jurisdiction to provide and maintain long-term financing and efficient provision of its services (Hyman 2011).

Municipalities issue several types of debt securities, from short-term tax anticipation notes to long-term general obligation or revenue bonds. While repayment of revenue bonds is based on the proceeds of a revenue-generating project they were issued to finance, the general obligation bonds rely on the taxing power of the jurisdiction and often require tax increases to be levied to obtain funds for repayment[1]. Unlike private sector companies, government entities do not operate by the concepts of acceptable leverage of assets and risk-return ratios, instead basing their needs to borrow on the existing demand for services and capital infrastructure. Given the fact that, for the most part, municipal borrowing power and borrowing cost are based on taxing capacity, in many cases, political considerations and institutional constraints play a major part in municipal debt decisions.

Since repayment of obligations incurred today occurs in an uncertain future, borrowing is always subject to revenue risk. This risk, as shown by an extensive body of research, can be mitigated to a certain extent by reducing revenue volatility related to changing economic circumstances. One of the tools to achieve greater stability is revenue diversification, which, not unlike in the world of corporate entities, reduces the variation of levels of future funds, thus eliminating unsystematic risk that these funds are subject to.

[1] Given the notion that governments often tend to pledge non-tax revenues for repayment of revenue bonds, thus diverting those funds from operational spending purposes and potentially replacing them with *ad valorem* revenue, some argue that jurisdictional taxing power is being pledged indirectly whenever revenue bonds are issued (e.g. see Eddy-Nichols 1994).

Capital projects often help attract new residents and boost the jurisdiction's economic condition as well as its property tax base. Given an expanding revenue base, a community becomes more capable of supporting debt payments over time. Due to preferential tax treatment and perceived lower probability of default, municipal bonds become more attractive to potential investors, at the same time providing for lower borrowing costs for governments through higher credit ratings.

Given the fear of potential defaults in the aftermath of economic recession, some states have recently introduced new measures to tighten local debt restrictions. In the fall of 2010, a constitutional amendment in Colorado, aiming to completely eliminate non-voter-approved borrowing by local governments as well as to introduce lower maturity and quantitative debt limits, was overwhelmingly defeated by voters (State of Colorado 2010, Hanel 2010). In this respect, Rhode Island, the home of the bankrupt City of Central Falls, boasted greater legislative success, ultimately passing a law which put bondholders before other creditors in the case of municipal bankruptcies (Corkery 2011). Finally, as part of the requirements by the Frank-Dodd Wall Street Reform and Consumer Protection Act (2010), the municipal bond issuers and dealers nationwide are now subject to tighter regulations, raising fears of increased borrowing costs and unnecessary disruptions in capital markets (Preston 2012).

Since government budgets are revenue-driven, the viability and stability of revenue structures play an important role in determining the capacity for government spending as well as for debt financing. Government revenue diversification, or the ability to expand and spread out the sources of funding, has received a significant amount of scholarly attention in the last decade (Hendrick 2002, Hannarong & Akoto 2004, Carroll 2005, 2009) being praised as a tool of revenue stabilization and a measure of fiscal stress relief for often cash-strapped local

governments. While actual levels of diversification can potentially be influenced by a multitude of factors, including but not limited to land use, regional and local economic patterns, and institutional rules on tax structure, diversified revenue structures can be expected to affect other aspects of government fiscal policy, such as levels of public expenditures (Carroll 2005), fund balances (Pagano & Johnston 2000), and also, potentially, the debt issuance by the local governments.

Considering the complexity of local fiscal decisions, it is evident that the analysis of revenue structures and borrowing behavior merits a perspective that combines both traditional public finance and financial management research. In normative public finance, where the government is seen as a benevolent actor aiming to maximize social welfare, both revenue effort and borrowing behavior have a distinct goal to ensure and improve service delivery. The influence of political factors and strategic behavior, exemplified by budget maximizing tendencies and strategic behavior, require a broader frame of analysis, based on design and binding powers of fiscal institutions. Perhaps no other area can manifest the above in a more evident way than the analysis of property tax burdens and municipal borrowing. Since increases in property values are not necessarily directly related to actual tax burdens (though they indicate certain capacity to tax) but rather represent a reflection of political preferences, the relationship between property tax burdens and long-term indebtedness merits investigation.

As factors of fiscal capacity, both indebtedness and property tax burdens play crucial part in financing government operations. Both of them can also easily become instruments of political manipulation when a government chooses to saddle its citizens with long-term higher costs of services or projects while seeking short-term political gains. This notion is crucial in conceptualizing the reciprocity of causal relationship between property tax burdens and

government debt, as is further explained in chapter III describing the Commonwealth of Massachusetts panel study.

The necessity to design effective fiscal institutions that would be able to prevent excessive borrowing and taxation was first acknowledged by the proponents of Leviathan model of governance. Pioneered by Geoffrey Brennan and James Buchanan in 1980, the Leviathan model views the power to tax as being similar to that of a business monopoly, which the revenue-maximizing government entity uses at will, taking advantage of imperfect monitoring and rational ignorance of taxpayers. Constitutional and statutory provisions constraining such behavior represent one of the means to curb the appetite of the Leviathan. Such restrictions, first and foremost, include tax, expenditure, and debt limits, imposed on local governments at the discretion of the states in exercise of their sovereign powers.

While restrictions on state debt have been in place since mid-18th century, state provisions for municipal borrowing were first developed as an aftermath of the "railroad aid" bond crisis which occurred in 1870, resulting in numerous municipal defaults. Similarly, as early as in 1875, the first limitation on the growth of property tax rates was imposed in the state of Missouri (Mullins & Wallin 2004). Perhaps the most prominent attempt to constrain local fiscal powers in the 20th century became known as the wave of tax revolts of late 1970s, producing infamous Proposition 13 in California which capped property appraisals and was followed by initiatives of similar intent in other states, creating long-term fiscal implications for municipalities.

Though their intent is largely the same, actual rules defined by the limits on local taxation and spending vary from constraints specifically oriented to control property tax increases (limits on rate, levy, and assessment increases), to caps on overall revenues and expenditures (Joyce &

Mullins 1991). Arguably the strictest among state-imposed limitations is the Taxpayer Bill of Rights (TABOR) in Colorado, which applies to all taxing districts and requires that voters approve all tax rate increases, new taxes, and increases in property tax assessments. The law also limits general revenues to the previous year's revenues adjusted for population growth and inflation, mandating that all excess revenues must be distributed back to taxpayers either through reductions in taxes or through tax rebates (McGuire and Rueben 2006.)

Currently, all the existing local debt limitations can be classified broadly into three types: revenue-contingent, quantitative limits, routinely expressed as a percentage of the jurisdiction's property tax base (given substantial role of the property tax in local revenue structures), debt maturity (or repayment term) limits, and requirements for voter approval. All of these limitations vary significantly in their severity among different states. Local tax and debt limitations imposed by city charters, provide additional restraints to frivolous fiscal decisions – however, given their significant variation and data collection costs, they have received little scholarly attention so far.

According to Wallis and Weingast (2006), fiscal institutions, designed to constrain socially suboptimal borrowing behavior "do not eliminate borrowing but force governments to follow procedures that ensure that debt will be issued for positive purposes and ultimately repaid" (Wallis & Weingast 2006, 3). The same can likely be said about tax and expenditure limits (TELs), which have been found to have varying constraining intent as well as varying binding power (Joyce & Mullins 1991). Precisely because of debatable binding power related to individual restrictions, the interactions of these limits are of special importance and so is their potential connection to the revenue diversification-debt relationship, which represents the main goal of cross-state study, described in Chapter IV.

The research presented in subsequent chapters explores how the local fiscal policy outcomes are intertwined, examining the relationship between revenue diversification and municipal debt. While local fiscal capacity varies depending on the values of local tax bases and ability to export taxes, the stabilizing properties of well-diversified revenue structures (Suyderhoud 1994, Carroll 2009) contribute significantly to the stability of the revenue stream. The patterns of the use and financing of debt can be expected to differ among governments depending on their ability to design and maintain diversified revenue structures. Governments that have well-diversified revenue structures are expected to be more inclined to borrow in the capital markets, whereas those that are dependent mainly on a single-source revenue, such as property and/or sales taxes, would adopt more conservative borrowing strategies. This notion, while specifically unexplored in empirical studies, is consistent with earlier literature on revenue diversification and portfolio theory (e.g. Hendrick 2002, Carroll 2005, 2009, Misiolek & Perdue 1987, Gentry & Ladd 1994), strategic debt (Petersson-Lidbom 2001, Alessina & Tabelini 1990, Berry & Berry 1992) and tax capacity/burden considerations (e.g. Suyderhoud 1994, Pagano & Johnston 2000, Hendrick 2002, Hannarong & Akoto 2004).

Based on these assumptions, the empirical research design addresses revenue diversification and debt effects on U.S. municipal governments by using two distinct approaches as referenced above. This dissertation encompasses two quantitative studies directed at exploring fiscal sustainability issues on the local level, with the primary emphasis on developing and testing a theory of revenue diversification as a determinant for government debt. The rationale for using two studies is based on the goal to explore the dynamics of government debt both across the different institutional contexts defined by states, and as an autonomous influence on local fiscal behavior over time.

The first approach is based on a panel data study analyzing revenue fungibility over time (defined as potential substitutability of certain more volatile revenue sources with those that have lesser degree of volatility, in order to maintain the long-term stability of a revenue structure), based on the dynamic relationship between the levels of debt, revenue diversification, and tax burdens. Using Massachusetts Department of Revenue data on municipal governments, we construct a simultaneous equation model to examine potential "feedback loops" between debt and tax burdens. The second study employs a cross-sectional analysis of U.S. local governments with a focus on impacts of institutional constraints on debt. For the purposes of this study, these constraints are defined as tax, expenditure, or debt limits commonly imposed on municipalities. The main theoretical hypothesis stipulates that, while generally binding, their influence is mitigated by revenue diversification, which can be regarded as a strategic tool used by governments to partially overcome the effects of those constraints.

While presenting different institutional environments and exploring different aspects of revenue fungibility, both studies are united by the same notion of fiscal sustainability through prudent revenue and borrowing decisions. Both of them view municipalities as strategic actors, interested in maintaining appropriate levels of services and implementing their mission of serving communities effectively despite economic changes. While it is expected that the cities included in both studies would differ significantly in terms of their size, demographic composition, and monetary potential, the strategies they employ to achieve greater fiscal stability are not likely to vary as much, determining core theoretical expectations of this work and setting the stage for further exploration of the revenue effort-debt relationship.

While empirically confined to the local level of governance, the studies included in this work address the issues that are of relevance to all levels of analysis. As shown by the outcry

surrounding the recent U.S. federal debt downgrade (Walker 2012), the issues of strategic debt management and revenue adequacy extend far beyond the realm of local governance. Prudent and timely management of revenue and debt-related risk leads to fiscal sustainability which is an indispensable component of economic and social welfare. The implications of the empirical findings are, therefore, expected to be of use for further inquiry into government revenue structures and the use of debt at the local, state, and federal levels.

CHAPTER II

REVENUE DIVERSIFICATION AND GOVERNMENT DEBT: IN SEARCH OF FISCAL BALANCE

This work essentially bridges two literatures: that of research on local revenue structures and diversification with the existing knowledge on government debt. It seeks to establish a relationship between these two aspects of local fiscal capacity. The existing base of knowledge in both areas is rather extensive; however, the development of a theory that explains how a well-diversified revenue structure can be expected to act as an additional incentive for government borrowing is novel. At the same time, it is hardly inconceivable that solid financial management capacity can decrease the local government's borrowing costs and that greater revenue stability provides reassurance of ability to repay obligations incurred due to a larger future tax base or the ability to raise funds from a greater number of alternative sources.

The literature of relevance to this research includes numerous earlier contributions to the fields of fiscal federalism, public finance, and public financial management. In a sense, the goal of the overview as presented below is to illuminate linkages between these theories, synthesizing and extending their ideas to new frontiers. First, the review reflects two major approaches toward government debt – the one stemming from public finance theories (e.g. Musgravian finance, Leviathan hypothesis, Wagner's law, flypaper effect), and another one based on "best practices" financial management. By the same token, it draws on two generations of fiscal federalism studies, exploring the role of fiscal institutions on governmental decision-making. As the use of alternative revenue sources becomes more widespread, the discourse on government revenue effort is gradually being diverted from the property tax, with its well-known economic and political weaknesses, to other sources. The literature review also shows that the issue of revenue

diversity, praised as a tool for increasing revenue stability, potentially can be tied to motivations ranging from social welfare maximization to political victories and interjurisdictional competition. As such, it plays an important, if perhaps slightly overlooked, role in local fiscal behavior.

Sections 1 through 3 below provide a literature review on government revenue diversification including a discussion of the role and adequacy of the property tax, followed by a discussion of the use of and strategic considerations related to government debt, as well as the role and significance of state-imposed constraints on local spending and borrowing behavior. Section 4 addresses conceptual properties and operationalization of revenue diversification and debt, emphasizing their role in local fiscal capacity as well as long-term fiscal sustainability. Finally, section 5 proceeds to lay out the theoretical framework and assumptions for constructing empirical research design to address the revenue diversification-government debt relationship in different contexts and levels of analysis.

II. 1. Revenue Diversification and Stability

Existing theories of public finance imply that the means of financing of government-provided services can vary with local desires when government is decentralized. These strategies and means of financing public good provision have been studied extensively. For example, Tiebout's model (Tiebout 1956) implies that the level and mix of local expenditures and taxes are likely to show wide variations among local political jurisdictions (within a constrained geographic area). Citizens with mobility may choose to live where the mix of public services best satisfies their preferences. Thus, according to this model, government expenditure and revenue patterns tend to be set at the local level.

Traditionally, the main source of revenue for local general-purpose governments in the United States has been the property tax, levied on real property on the basis of its location. On the one hand, such a system of taxation assured an efficient linkage between property ownership and contribution to the local provision of public goods, while also possessing a reasonable level of administrative feasibility. Unrestrained property taxation, however, can also result in reduced economic development and reduced value of real property tax base. Local government-supplied goods and services financed with local taxes can have effect on property values (Tiebout 1956, Oates 1968) and thus low-tax-base communities are potentially more likely to encounter difficulties in supplying acceptable minimum levels and qualities of public services.

Hence, governments are likely to be motivated to seek revenue diversity as a means to help minimize the risk of decline in revenue streams, which also has implications on the stability of government budgets, as well as on their capacity to provide necessary public services. For local governments, diversification is especially important due to their limited ability to raise revenues and high vulnerability to the economic cycle, exacerbated by their position at the "bottom" of the fiscal chain (Pagano & Johnston 2000).

The idea of revenue diversification as a tool for increasing fiscal stability draws upon extensive body of literature in portfolio management and investment finance. The classical work by Markowitz (1959) stipulates that the problem of uncertain future returns on assets can be mitigated by diversifying the holdings of those assets so as to reduce dispersion of possible returns relative to their expected values. As variation of returns decreases, the risk of investments also becomes significantly lower. While not all the risk is subject to portfolio diversification, diversity does provide for greater stability of the asset return structure.

Seemingly, it is dubious that the government revenue structure could be fully equated to that of the investment portfolio given limited opportunities by governments to raise revenue beyond a certain capacity, as well as a pre-defined set of tax revenue options. Unlike private investors who can maximize the stability of a portfolio by calculating the desired rate of return and determining the share for each investment that minimizes variance of the said rate, government entities operate within strict institutional rules that govern their revenue capacity. Moreover, the problem of risk-related volatility, predominant in investment finance cannot be carried over into government finance due to the different nature of revenue-generating mechanisms that are employed in the public sector. However, different revenue sources possess different levels of income elasticity and thus respond differently to economic downturn. For example, local property taxes are usually affected to the lesser degree by economic recessions as compared to service charges, income or sales tax revenue. On the downside, property (unlike sales and/or income) taxes also do not tend to increase dramatically during the periods of economic growth.

Thus, the problem of future return-related unsystematic risk in government finance ultimately translates into an issue of revenue elasticity. In this respect, diversification of revenue sources to the extent possible echoes the notion of efficient diversification in investment finance, as, in both contexts, the structure comprised of units that have a tendency to "move" in opposite direction and/or where low positive correlation exists between the units that are likely to move in the same direction, such as in the case of sales tax collections and revenue received from licenses, fines and forfeitures. Given all the above, it is worthwhile to emphasize that the approach employed in this work does not aspire to determine the "optimal" revenue diversification strategy but rather concentrates on descriptive composition of sources as a

specific fiscal policy outcome and ultimately seeks to establish the significance of differences in such policy patterns among jurisdictions. This goal is consistent with the dominant approach in literature on government revenue diversification (e.g. see Carroll 2005, 2009, Pagano & Johnston 2000 and others).

Diversification, or the policy strategy aimed at ensuring greater revenue *diversity* as studied in public finance, on the local level usually pertains to increased reliance on alternative taxes instead of property tax (e.g. sales, income taxes), as well as the expansion of non-tax revenue sources. For example, Schoenfeld (1982) suggests imposing user charges on a wide range of government services that would increase government's cash flow while gaining the approval of citizens' groups that want fewer taxes. Bartle et al. (2003) indicate growing use and importance of local sales and income taxes, as well as excise taxes (motor fuel tax, tobacco and alcohol tax, hotel/motel taxes, etc.) for some cities[2]. Ladd & Yinger (1989) speak in favor of the use of exportable taxes, such as a commuter income tax, emphasizing its usefulness in mitigating fiscal problems faced by municipalities. Tasca & Murphy (2005) suggest a more widespread use of sponsorship agreements between municipalities and corporations as a potential alternative revenue source, provided that necessary internal controls and long-term planning efforts are in place.

The literature review below focuses on several different aspects of government revenue diversification, including the economic and political rationale for greater diversity, implications for fiscal stability and tax burdens, as well as current trends in local government revenue structures.

[2] Current structures of local sales and income taxes by state are presented in appendices 1 and 2.

II. 1.1. The Case for Diversification

The revenue decisions and revenue structure in government are influenced by numerous factors, from economic position to fundamental community values. According to Howe & Reeb (1997), the long-term tax base tends to be defined by the economic activity, economic crises, changing revenue needs in relation to service demands, political opportunities, and possibilities for tax exportation. Moreover, the use of specific tax structure is also subject to the institutional arrangements, such as limits and caps imposed by the state (e.g. see Misiolek & Harold 1988, Joyce & Mullins 1991), and is potentially influenced by the long-established specific industry and land development patterns in the locality.

In a review of revenue diversification practices among state governments, Carroll (2005) points out that, although political and demographic factors influence the level of state tax revenue diversification, economic factors and whether a state utilizes an income or sales tax to generate revenue represent the most important determinants of state tax structures. It is worthwhile to mention that not only diversification can be influenced by the availability and feasibility of revenue sources, but diversification can also be expected to affect other aspects of fiscal policy, such as levels of public expenditures (Carroll 2005), fund balances (Pagano & Johnston 2000), and also, potentially, the amount of debt issued by local governments. The latter notion ties in directly with the objectives of the research design presented in this dissertation and significantly contributes to the complexity of determining the "optimal" government revenue structure.

The reasons for revenue diversification as a means to increase fiscal stability are both economic and political. Economic reasons include gaining added protection over the course of the economic cycle, when lower property tax revenue yields can be supplemented by revenues

from the more elastic local income and sales taxes, while at the same providing a stable revenue stream when the income from other sources is reduced by sluggish economic activity. As indicated by Bartle et al. (2003), alternative sources of taxes also make possible more stability in cash management, more flexibility in budgetary planning, and can facilitate the issues of tax resistance.

Political reasons for tax and non-tax revenue diversification are often based on anti-tax rhetoric, which is justifiable, given the fact that no tax is perfect in terms of its implications on equity and/or efficiency. Both property and sales taxes are often perceived as regressive[3] and act as potential deterrent for business investments, while income taxes are vulnerable to inflation and visible to taxpayers, bringing about significant public resentment and potentially resulting in the taxpayer choices to move away from over-taxing jurisdictions (Bland 2005). Similarly, too heavy a reliance on user charges has implications for vertical equity, as it can impose greater burden on low-and moderate-income families. In the case of well-diversified revenue structure, however, all of these impacts are mitigated and spread around, creating a more favorable political as well as economic environment.

Finally, the extent to which local governments rely on the property tax for financing their activities differs significantly across the states. As can be seen from state-by-state comparison table presented in appendix B, in 2007 the levels of local property tax reliance with regard to overall revenue ("reliance" being expressed as aggregate numbers of local property tax revenue received by each state) range from above 50 percent for New Jersey and New Hampshire, to as low as 9.3 percent for Alaska and 8.5 percent for Arkansas. Similarly, the highest level of

[3] Since the property tax is proportional with respect to individual wealth (property value) and is not necessarily always inversely related to income, some controversy with regard to its regressivity exists (e.g. see Youngman & Malme 2005).

reliance on sales tax revenue among the local governments allowed to levy that tax, ranged from 20.5 percent for Louisiana to 0.01 percent for Connecticut, with as many as 14 states falling into below 1 percent category. Among the states allowing for local income taxes (corporate and individual), the highest reliance observed was for the District of Columbia (15.2 percent) and Maryland (16 percent), whereas, with regard to other taxes collected by local jurisdictions, all the states fell into the below 10 percent category. Finally, the reliance on user charges was found to be the highest (slightly above 30 percent) for South Carolina and Idaho and the lowest for Connecticut (8.9 percent). This shows that the patterns of revenue diversification vary greatly among the states, with different institutional rules, political tradition, and fiscal management practices being likely reasons for this variation.

II. 1.2. Debate about Property Tax as a Local Revenue Source

The use of property tax by local governments has been historically justified as a major revenue source due to relatively easy enforcement and rate adjustments, as well as its ability to tax unrealized capital gains. Youngman & Malme (2005) praise it as promoting visibility and accountability in public spending by tying the levies to costs and benefits of local government services, as well as its stability as a source of revenue. However, Bartle et al (2003) point to many deficiencies of this tax, such as the inequity that arises from it being imposed only on certain types of wealth, and on the basis of the gross rather than the net value. Moreover, the property tax can be expensive to administer, and can also be inconvenient and burdensome for many taxpayers, requiring a lump-sum payment and not being directly tied to levels of income.

Finally, being relatively income-inelastic, the property tax has both an advantage and a drawback: while it can be advantageous for local governments to be able to rely on property tax receipts in recession, when other sources of revenue significantly decrease, property tax receipts

also tend to only marginally increase during the periods of economic boom, rendering the governments over-reliant on this type of tax incapable of meeting new and increased spending demands.

Historically, the property tax has been viewed from two distinct angles. The first one, known as the ‘‘benefit view,” essentially represents an extension of a Tiebout public expenditures model (Tiebout 1956). Under this model, the property tax becomes the key source of revenue for local governments and is governed by strict zoning rules to protect the value of homeowners’ assets. Over time, the property tax also capitalizes into property values in line with the public service benefits received, thus it becomes a ‘‘benefit tax’’ (Fischel 2001). The alternative view, known as the “new view”, sees housing as one type of mobile capital stock within a larger capital market, where tax levied on real property becomes an excise tax on capital (Zodrow 2001). As such, it discourages development relative to other uses of capital and thus distorts local housing markets and local fiscal decisions (Oates 2001). As a result, the restrictions by state governments on the use of property taxes lead to low levels of public service (Bartle et al. 2004). Neither of the theories, however, has yet received solid empirical support (Bartle et al. 2004).

The share of the property tax as local government revenue has been declining since late 1940s, with property tax receipts accounting for only 27.2 percent of total local government revenue, as compared to 51.4 percent in 1948 (Bartle et al. 2003). As indicated by Stocker (1976), the opportunities for revenue diversity for local governments started significantly increasing after the Word War II, as sales taxes were enacted in many cities in New York and California, while Pennsylvania and Ohio cities went heavily in for earned income taxes. After the growing unpopularity of the property tax resulted in infamous tax revolts of 1970s, numerous

cities followed the trend of diversification and non-property taxes have gradually become a major component of municipal government revenues, especially among larger cities and urban county governments. According to Bartle et al. (2003), from 1948 to 1999, most local governments in the United States saw significant increases in intergovernmental revenue (from 30.8 percent of local general revenues to 39.0 percent), charges and miscellaneous revenues (from 11.2 percent to 23.3 percent), and growing share of taxes other than property tax. Nevertheless, the second largest local tax, the general sales tax, comprised only 4.3 percent of local general revenue, compared to 27.2 percent from the property tax.

II. 1.3. Empirical Research on Government Revenue Diversification

Most of the current research advocates for greater revenue diversification as a means of increasing fiscal stability and improved fiscal performance (Suyderhoud 1994, Carroll 2009). According to Carroll (2005), the underlying motivation of revenue diversification is to decrease the instability of individual revenue sources. Following the premises of the classical asset portfolio theory (Misiolek & Perdue 1987, Gentry & Ladd 1994), a well-diversified and less income-elastic revenue structure helps ensure revenue adequacy and stability during recessions, serving as a safety cushion by providing alternative sources of funding for programs and thus helping avoid such economically or politically detrimental measures as service cuts or tax rate increases. At the same time, some authors caution that that substantial commitment to fast growing but unstable revenues sources as a result of diversification tends to actually exacerbate, not reduce, fiscal stress (White & Chou 1980).

Some recent studies find that greater tax revenue diversification results in a decrease in per capita expenditures over time (Carroll 2005, Carroll 2009), despite earlier findings that insisted on the opposite relationship between the two (Wagner 1976, Breeden and Hunter 1985).

Intuitively, due to the lack of direct relationship between most government revenue and expenditures financed by that revenue (a "fee-for-service" approach does not apply in provision of public goods and services nor to redistributive spending), public expenditure budgets are largely revenue-driven.

Assuming that revenue diversification provides greater revenue stability, one might expect expenditure increases over time due to growing reliance on a diversified revenue structure. However, the results of empirical research remain mixed and provide some level of support for both the hypothesis that greater diversification will lead to increased expenditures, and for the view that the introduction of new revenue sources will reduce property tax burdens. Jung, Roh, and Kang (2009) point out that impact fees and special assessments as a means of private financing of public infrastructure increases both the level of local capital spending and the long-term debt. Sjoquist, Walker & Wallace (2005) introduce a differential response model to investigate whether local sales and income taxes are used to fund additional expenditures or to reduce property taxes and determine that an *a priori* conclusion cannot be made about the intent of each individual jurisdiction. Thus, the relationship between government revenue diversification, budgets, and the levels of government debt represents an especially compelling topic for research and merits further investigation.

Overall, revenue diversification has been found to significantly contribute to the reduction of fiscal stress (Hendrick 2002, Hannarong & Akoto 2004), while over-reliance on the property tax was found to negatively affect government fund balances (Pagano & Johnston 1995). However, some level of ambiguity remains as to the ultimate impacts of diversification, as well as with regard to the role of diversification in the policy-making process. For example, Ladd and Weist (1987) caution that a diversified revenue structure does not necessarily help to

achieve tax policy goals like efficiency, equity and adequacy and emphasize the importance of the policy objectives rather than diversified revenue patterns as an end goal. Based on this strand of literature, revenue diversification can be perceived as both a direct policy choice, directed at reduction of fiscal stress and increased revenue stability over time, and as an indirect policy outcome. This distinction is important when considering specific properties of revenue diversification to be included in the theoretical and empirical research design.

II. 2. Borrowing Behavior and the Use of Government Debt

Government debt as one of the aspects of the government fiscal behavior has been a popular topic of research in public finance, economics, and public administration. The main issues discussed in the literature, as revealed below, are those of determinants and capacity of government borrowing, political and economic implications of indebtedness, as well as strategic interactions between borrowing behavior and political and/or economic motivations[4]. Based on the goals and purposes of this study, the primary focus of the literature review is devoted to the discussions of government debt in the literature as either a strategic policy tool (Salamon 1989, Petersson-Lidbom 2001, Alessina & Tabelini 1990, Berry & Berry 1992), or as fiscal sustainability issue (Clingermeier & Wood 1995, Bahl & Duncombe 1993, Hildreth 1993, Hildreth & Miller 2002, Burnside 2005). It is also worthwhile mentioning that, although most of the literature on subnational government debt has focused on states, many theoretical insights produced by this research can be successfully applied to local governments.

As noted by Burnside (2005), the government's debt portfolio implies risk, in the sense that future government outlays for debt service depend on future realizations of uncertain

[4] For the purposes of this discussion and research focus, the review mainly concentrates on general obligation local debt, excluding any pension fund and unemployment compensation trust fund liabilities.

variables. The risk of insolvency and default is an important part of long-run fiscal sustainability, which can be defined as a steady-state version of a government's lifetime budget constraint. The necessity of maintaining targeted levels of fiscal surplus for a given level of indebtedness can therefore be related to the implicit need for greater revenue diversification as a means to ensure greater stability of revenue capacity in the long run.

II. 2.1. Determinants of Government Debt

Among the factors determining the use of debt by subnational governments, the literature has indicated influences ranging from institutional to political, to economic and demographic. Temple (1994) emphasizes the role of private incomes, existing debt burdens, and borrowing costs in determining the levels of debt. She also provides a literature review confirming that the jurisdiction's reliance on bond versus tax financing of its expenditures depends on the relative costs of bond and tax finance, further arguing that the cost of borrowing is a function of the level of borrowing (Temple 1994).

Throughout the literature, fiscal capacity and economic necessity are two the most common factors recognized to be influencing the levels of government debt (e.g. Clingermayer & Wood 1995, Bahl & Duncombe 1993), as are the prevailing interest rates and intergovernmental revenues (Clingermayer & Wood 1995). While the interest rates are generally negatively associated with the levels of borrowing, by private and public sector alike, the intergovernmental revenues can either increase or decrease borrowing, as they can be used to both cover the shortfalls in operating revenues by funding services and programs, as well as act as a capital investment source or a tool for further expansion of government (Clingermayer & Wood, 1995). While tax and expenditure limitations might also be perceived as influential in determining the levels of debt, their actual impact varies depending on whether these limitations

are actually binding. Moreover, as pointed out by Clingermayer & Wood (1995), said limitations tend to apply to the on-budget government activities and general obligation debt borrowing only, which does not eliminate spending by off-budget entities funded by nonguaranteed debt.

Among other studies, Cukierman & Meltzer (1989) emphasize the importance of intergenerational transfers as one of the main functions of government debt, while Clingermayer & Wood (1995) find that debt management is largely dependent on economic conditions and strategic political behavior, and point out to the patterns of government borrowing being not unlike those of private firms or individual consumers. Interestingly, the research also indicates that higher revenues, income levels, and perceived good credit standing lead to more borrowing in the short-term, while in the long term, as revenue flow increases, the need for incurring debt gradually diminishes (Clingermayer & Wood 1995), making the expectations for debt in the context of more stable revenue consistent with the fiscal conservativeness hypothesis (see above).

Sharp (1986) distinguishes between general obligation (GO) debt, backed by full faith and credit, and guaranteed municipal debt, implying greater importance of various fiscal factors on the non-guaranteed debt and significant influences of pure socioeconomic determinants (population, geographic location, etc.) on general obligation debt. Most of the research on debt tends to focus specifically on general obligation debt, which also represents an attractive subject of research given its political implications from the use of the taxing power of a jurisdiction as collateral.

Current literature on the use of debt by local governments reveals several interesting trends. Hildreth & Zorn (2005) point out that the overall levels of debt issued by municipalities have been steadily increasing during past few decades, despite the fact that, in the aftermath of the Tax

Reform Act of 1986, the borrowing costs for local governments have generally increased. Since local governments, as primary service providers to the communities, are subject to tight fiscal constraints that become especially apparent during the downturn of the economic cycle, they need to raise local resources, improve the efficiency of resource use and engage the private sector in local services and infrastructure. To finance these investments, they often choose to access capital debt markets. Thus, first and foremost, the use of debt by the local government obviously depends on the spending preferences and the needs for capital investment (Hildreth 1993, Temel 2001)[5].

II. 2.2. Affordability and Strategic Use of Debt

Hildreth (1993) indicates that, as financing of the projects with the use of debt provides the means to pay for projects upfront, it also helps governments to advance their political goals by creating a certain type of fiscal illusion to the extent that the benefits from the project accrue immediately and the repayment of debt can be stretched out for years. Moreover, since debt service costs are fixed, it may create incentives of advanced refunding or funding of the old debt with the proceeds from the new issue, placed in a designated escrow account (Hildreth 1993). Moreover, general obligation municipal bonds possess unique properties that make them competitive in the capital markets, including their tax-exempt treatment and low probability of default. The resulting attractiveness of these debt instruments to investors means lower comparative borrowing costs for government agencies, which translates into an additional incentive for governments to use debt financing. This notion of strategic behavior is largely consistent with the hypothesis of a positive relationship between revenue diversification and

[5] For graphical representation of the most recent available data from U.S. Census on local and state debt outstanding (Maguire 2011) please refer to appendix C.

government debt, based on increasing borrowing capacity as uncertainty related to future explicit liabilities is reduced.

The use of debt is also often related to fiscal illusion, which implies creation of a perception for current taxpayers that expenditures financed with debt are cheaper than using current taxes. Barro (1974) suggests that the problem of fiscal illusion could be overcome if the current generation provides enough savings by wealth transfer to the future one in order to retire the accrued debt, thus maintaining net levels of debt relatively constant in the long run. Alternatively, debt capitalization theory implies that future debt payments are "capitalized" into the value of properties and jurisdictions with higher net debt have lower property values (Eichenberger, Reiner, and Stadelman 2010). Inelastic land supply and increased mobility of other factors of production exacerbates this effect, thus creating the greatest menace for local governments.

Hildreth & Miller (2002) also find that debt affordability, or the ability of the government to handle debt, is tied to the economic condition of the locality and, especially, its economic diversity (the distribution of economic activity in the area), which helps distribute unsystematic risk. Given this relationship, one can expect that, ultimately, economic diversification of the tax base may lead to higher debt levels (Loviscek & Crowley 1990, Hildreth & Miller 2002). Another influencing factor in terms of debt issuance and repayment, however, is the "overlapping debt" which occurs as overlapping jurisdictions accumulate debt independently of each other, but which ultimately falls on the local property owners (Hildreth & Miller 2002).

Another factor of interest in government debt analysis is the size and growth of debt service expenditures. Since debt service expenditures represent a constant, long-term, obligation, higher levels of these expenditures can lead to crippling financial impacts on the government

operations. For example, Bland & Laosirirat (1997), in their study of effects of full disclosure tax limit on property tax, find that property tax burdens are significantly negatively related to the levels of debt service expenditures. It is worthwhile noting here that debt service expenditures, while being as common a measure of indebtedness as debt per capita, concentrate more on the cost of actual debt than on its amount and hence provide an insight into the long-term "expenditure burden" as a commitment consciously undertaken by the jurisdiction.

Finally, a significant amount of the literature is devoted to political influences on debt, exploring such aspects of it as the "political business cycle" (Nordhaus 1975, Berry & Berry 1992) and strategic use of debt, relating the debt decisions to specific electoral outcomes and party ideology. The main idea behind strategic use of debt lies in the assumption that an incumbent government that anticipates the possibility of defeat in the next election will try to use the debt strategically in order to influence the policy of its successor (Alesina & Tabellini 1990, Petterson-Lidbom 2001). At the same time, voter political orientation can also be a determining factor in issuing debt, with liberal jurisdictions having an inclination of issuing more debt (Nice 1991).

II. 3. The Role of Institutional Constraints

The state authority and limitations thereof in taking away citizens' incomes has been studied by numerous theorists of fiscal federalism. The classical "Musgravian" view of public finance emphasizes the benevolent role of government in providing public goods and seeking to raise a given amount of revenues subject to certain efficiency and equity constraints (Musgrave 1959). This notion is consistent with the median-voter model, which posits that local officials attempt to maximize the community-wide benefits of fiscal policy choices by making decisions that are consistent with the preferences of the median voter (McCabe & Feiock 2005). Agency

theory, on the other hand, suggests that local bureaucrats have jobs with high levels of discretion, making it difficult to supervise them, as well as a continuous motivation to increase the budgets (e.g. Niskanen 1975). Alternatively, the elected officials may become captured by special interests and/or union bargaining processes (Cutler et al. 1999).

One of the ways for the state to control local government growth and fiscal decisions is through binding constraints imposed by state statutes and constitutions. Perhaps the most thorough and compelling explanation of the role of these constraints is presented by a set of theoretical developments that became known as the Leviathan studies. Pioneered by Brennan & Buchanan (1979, 1980), this view argues that the power to tax is similar to that of a monopoly, and is used by a revenue-maximizing government, taking advantage of imperfect monitoring and the rational ignorance of taxpayers. The Leviathan must therefore be constrained by either constitutional provisions or by citizens adjusting their behavior so as to minimize the its gain. Popular forms of opposition include sheltering income and wealth, introduction of fiscal decentralization and tax competition mechanisms, as well as institutional arrangements of progressive taxes, horizontal equity, tying expenditure proposals to the source of income, and balanced budget provisions (Brennan & Buchanan 1980).

McCabe & Feiock (2005) define the institutional framework governing municipal governments in the United States as "nested institutions", where state and local constitutional and substantive rules form an intricate hierarchy. While the rules contained in state constitutions and municipal charters lay out the basic system of governance, substantive rules describe the limits and course of action in specific policy areas, and how they translate into local policy decisions. The tax, spending, and debt limits, imposed on municipalities by the state are therefore substantive-level rules that establish state preferences for city actions, replacing city preferences

(McCabe & Feiock 2005). In the light of these constraints, a number of empirical studies (Ladd and Yinger 1989, Burns 1994, Krane, Rigos, and Hill 2001) conclude that cities have a limited ability to achieve smooth financial performance because of numerous external factors that affect their fiscal capacity.

Generally, with respect to both local government debt and revenue diversity, the existing literature points to mixed impacts of state-imposed constraints. For example, in their analysis of post-Proposition 13 California localities, Saxton, Hoene, and Erie (2002) find that stricter state-imposed limits on revenue have led to cuts in non-essential services, as well as to greater diversification of revenue sources, such as expansion of sales tax-generating redevelopment efforts and implementation of new taxes and user service fees. Most of the authors emphasize that tax and expenditure limitations (TELs) significantly reduce local discretion and autonomy and increase centralization of state and local finances. Mullins (2010) argues that uniform statewide constraints in the form of TELs potentially produce intermediate- and long-term revenue difficulties for local governments, which became especially apparent in the light of the deflation of housing values brought on by the subprime mortgage and liquidity crisis and the general economic contraction.

On the other hand, some indication exists of both tax limits and debt limits being less powerful in practice than in appearance due to their non-binding nature. For example, overlapping jurisdictions can issue debt or impose taxes supported by the same base so that taxing/borrowing capacity as applied to any individual unit may easily exceed the limits imposed. Exemptions and exclusions, as well as special treatment of certain kinds of

revenue/indebtedness obligations[6], also undermine the restrictive power of these institutional constraints.

The literature review below provides a more thorough discussion on each of the state-imposed constraints and their significance in the context of local fiscal environment.

II. 3.1. Development and Significance of TELs

TELs are statutory or constitutional restrictions on the ability of a government to generate revenue or increase expenditures (Brooks & Phillips 2008). These limits are imposed upon cities either by the state legislature or by statewide voters through the use of the citizen initiative[7]. The legal restrictions embodied in a TEL are extremely difficult to circumvent and require extraordinary means, such as a supermajority popular vote, when allowed to do so (Brooks & Phillips 2008). Even though the beginning of TELs can be traced to nineteenth century (Mullins & Wallin 2004), it is the constraints introduced as a result of property tax revolts in 1970s, leading to significant changes in institutional structure governing local taxation, that have received the most attention in the literature. According to Mullins (2010), as many as forty-seven states currently possess a revenue and/or expenditure limitation of some kind, with significant implications on their fiscal behavior and operations:

> Limitations on local property taxes and general expenditures have stimulated shifts toward non- tax sources of revenues (fees and charges, state transfers and debt) and have encouraged vertical shifts of revenue and expenditure authority and responsibility to the state. They also inspire horizontal shifts of local functional responsibility (through increased roles of special service and finance districts)… Limitations have also had differential effects across governments within states. As would be expected, they are

[6] An illustration of this is provided by Weiss (1980), indicating the exclusion from tax limits allowed by the State of New York, which enables jurisdictions to levy taxes outside the limits in order to pay interest or principal on indebtedness.

[7] The types and state-by-state use patterns of TELs are presented in appendix D, based on classification and data provided by Mullins & Wallin (2004).

> likely to have the most serious implications for central cities and less prosperous communities. The overall outcome may be impaired responsiveness, as relationships between local governments and local populations are substantially altered and local government's capacity to provide for public needs and wants declines. (Mullins 2010, 203)

Assuming the absence of institutional constraints, local control over property tax rates provides governments with a means to compensate for cyclical drops in other revenue sources with income elastic tax bases. Long-term average universal assessments can further stabilize local budgets by shielding the property tax base from short-term volatility in market property values. In the constrained environment, however, the governments do not have this freedom.

Pagano and Johnston (2000) determine that tax and spending limits entail revenue constraints that are not fully mitigated by intergovernmental aid. The existing literature also demonstrates that, while widespread imposition of TELs reduced property tax reliance (Joyce & Mullins 1991, Shadbegian 1999, Sokolow 2000, McCabe & Feiock 2005), it possibly also led to greater levels of borrowing among local governments (Mullins and Joyce, 1996, Joyce and Mullins, 1991, Mullins, 2001, 2004, Danziger 1980, Downs and Figlio 1999, Bowler and Donovan, 2004, Carr, 2006). According to Stallmann & Deller (2010), TEL proposals, such as a freeze on property taxes, could also restrict investment, thus affecting economic development and the growth of per capita income in the short run. The same authors also argue that existence of TELs is bound to produce fiscal illusion by means of relegating funding of services to newly created special districts (see also Carr 2006) and/or using various means to promote economic development and interlocal cooperation.

The underlying intent of the TELs is to bring about reduction in the excessive growth of the size of government. Ladd (1978) analyzes the motivation of states to impose TELs, as well as the costs and benefits of their constraining powers, and finds a positive relationship between

imposition of constraints and the growth of property tax burdens, as well as the growth of expenditures per capita. Similar conclusion is also reached by Alm and Skidmore (1999).

It must be acknowledged that in addition to imposing limits on revenue, expenditures and debt, state governments have also been granting municipalities certain level of fiscal discretion, in the form of increased variety of revenue sources that municipal governments may use, such as local option sales taxes, franchise fees, municipal enterprises, rents and royalties and a wide array of excise taxes and fees (Krane 1999). Thus, the existing institutional environment can be expected to produce greater levels of non-tax diversification among local governments, motivated to act strategically in promoting growth and fiscal stability of the jurisdiction within the limits of existing constraints.

II. 3.2. Debt Limitations

Even though they have not received nearly as much attention in the research literature, debt limits similarly reduce local discretion in fiscal choices, potentially hampering their ability to provide demanded public services and increasing their reliance on the states. At the same time, while imposed by states to ensure local financial responsibility, debt limits are often argued to be inefficient by being either non-binding (Kiewiet & Szakaly 1996) or producing perverse incentives for local governments to circumvent them (McCabe 2000).

Previous studies about the binding nature of limits have concluded that they do not always constrain local fiscal behavior, as whenever the limits are too high to place any binding constraints on debt issuance, or whenever supermajority approval requirements are circumvented by means of legislative logrolls, they tend to lose their intended power (Kiewiet & Szakaly 1996). Similarly, the debt and expenditure decisions are seldom optimal when left in the hands of naïve voters (Buchanan 1958). Moreover, the governments can always choose to issue revenue

bonds when restrictions prevent them from issuing full-faith and credit ("guaranteed") debt (Bunch 1991, Kiewiet & Szakaly 1996).

At the same time, Kiewiet and Szakaly (1996) find that when state governments imposed debt limits, they are likely to delegate more power to lower level government to issue bonds. This is partially confirmed by some other studies (such as Kelly & Massey 1996), whereas, for example, Farnham (1985) find that state statutory debt limits tied to revenue base are actually capable to significantly lower the levels of debt (both general obligation and non-guaranteed) in local governments, whereas referendum requirements do not possess such capacity. Several studies (MacManus 1981, Foster 1997, McCabe 2000) find debt restrictions increase local governments' reliance on special districts. For example, McCabe (2000) indicates that that when a state government specified local governments' debt purpose and required debt referendum, the number of special districts in the state is higher than in the states without these debt limits. MacManus (1981) finds that an increase in the number of property tax-funded special districts is a consequence of restrictions placed both on tax levies and on borrowing capacities of local governments, while Foster (1997) argues that states with debt limits experienced an increase in the number of special districts while those with property tax limits had a reduced number of special districts. Similar notion appears in Krueger & Bernick (2010), where the authors reveal strategic cooperation patterns among local governments, based on the necessity to mitigate state-imposed resource constraints.

It is therefore rather difficult to disagree with the findings of the seminal report published by the Advisory Commission on Intergovernmental Affairs (ACIR, 1961), which suggests that state-imposed quantitative debt limits are far from optimal constraints on local borrowing as they tend to focus on present or past conditions, rather than those of the future (debt service period)

and only on one revenue source – *ad valorem* property tax, with locally varying assessment practices. Moreover, these limits take little notice of overlapping debt by concentrating on separate layers of government rather than the aggregate measures for a particular area. Overall, according to ACIR (1961), state-imposed debt restrictions have had a mixed impact on the growth of municipal borrowing; however, their effects have been mostly negative on a wide array of other areas of local governance: public accountability and responsiveness, creation of sound taxation and financial management policies, and even greater reliance on state and federal grants.

Based on all the above, debt limits, while theoretically expected to reduce debt burdens, can be strategically circumvented in actual debt issuance by local governments. This lends weight to the hypothesis of possible strategic interaction between local revenue diversification and debt issuance patterns. While stand-alone debt limits are bound to have less restraining power than combined with other institutional arrangements, their role in determining local fiscal behavior merits further investigation.

II. 4. Revenue Diversification, Debt and Fiscal Capacity: Empirical Definitions

The fundamental goal of this research is to refine the understanding of local fiscal capacity and its determinants. While the inquiry into the topic of fiscal capacity appears frequently in literature, there is no uniform, agreed-upon definition of the concept. There is also a significant lack of causal determination as to how exactly capacity-building measures should be implemented to achieve the greatest possible levels of success. Various aspects of capacity that are discussed in literature include topics ranging from organization performance to leadership and strategic planning. For the purposes of this research, capacity is defined along the lines of "an interplay of expectations, resources, and problems" concept, suggested by Gargan (1982,

652). Specifically, the notion of fiscal capacity as used in this work implies the ability of the government entity to finance its operations and meet its debt obligations. Being consistent with previous attempts to capture fiscal capacity (Ladd 1975, Lewis 2003), this definition encompasses the elements of both political/community preferences for particular levels of spending, and its ability to generate sufficient resources to meet these preferences.

The research in local government fiscal capacity plays an important part in providing linkages between the pursuit of stability/predictability in the revenue structure and the normative debate about revenue adequacy. The ability of a local government to rearrange its revenue portfolio in order to pursue increased stability provides for soundness and safety of the public services provision. At the same time, citizens considering such a change to the tax structure could use the implications of such research to be better informed about direct and indirect cost of services and the legitimacy of the swings in their levies. Overall, exploration of fiscal effects of revenue diversification and borrowing behavior is significant in improving the understanding of local revenue structure design and contributes to the goals of revenue adequacy and politically, as well as fiscally, sustainable governance.

For the purposes of this research, we define fiscal sustainability as long-term viability of government's fiscal activities. Burnside (2005) relates fiscal sustainability to such aspects of government's fiscal behavior as solvency, budget constraint, and government's ability to indefinitely maintain the same set of policies while remaining solvent. Hence, fiscal sustainability implies a specific, self-sufficient policy mix that increases stability of future cash flows and reduces risk and uncertainty related to unrealized gains/losses. While the terms "sustainability" and "stability" as pertaining to revenue structures imply a similar notion of long-term equilibrium, the former concept represents a more comprehensive dimension of long-term

maintenance of favorable financial position, with revenue stability incorporated into it as an indispensable component that contributes to achieving said equilibrium.

Fiscal sustainability has a direct relationship with debt and revenue diversification, as both of these elements of fiscal behavior play an important role in long-term fiscal equilibrium. Since balanced budget requirements and other fiscal constraints require local governments to be able to maintain certain level of predictability in their finances they need to have diverse revenue structures that would mitigate the risk for default and insolvency due to economic shocks when using debt financing. Lewis (2003) uses local government "operating surplus" as a measure of fiscal capacity, defining it as the difference between government routine revenues and routine expenditures. Sufficient and constant surplus allows government entities to maintain desired levels of services, as well as ensures availability of resources for debt repayment. Fluctuations inherent in the economic cycle, as well as uncertainty surrounding future political choices, however, can undermine the viability of constant surplus – and, at the same time, be mitigated by the presence of more diversified government revenue structures.

Since a fair share of public finance research takes interest in debt as a determinant of fiscal capacity/sustainability, the most common measures of government debt are often empirically based on variations of "debt burden" definition. To better capture the dynamics of debt in the long run, as well as to account for specific impacts it has on fiscal and social characteristics of jurisdictions, the following measures appear in pertinent literature:

1. The measure of *government debt per capita*, defined as the total debt outstanding divided by the total number of population in a given year, is perhaps the simplest and the most convenient measure of indebtedness, operationalized as the level of overall debt in relation to the total population. However, it involves some ambiguity when considering the levels of

indebtedness with respect to future financial commitment. Unlike measures of indebtedness tying the outstanding debt per capita to the existing revenue base (e.g. aggregate assessed property value) which can be only indirectly, tied to the population, debt per capita measure somewhat lacks "depth" in accounting for possible future implications of the current levels of debt but captures the "burden" aspect of government indebtedness on the ultimate stakeholders – the citizens.

Both studies presented in subsequent chapters employ this measure of debt as being the most consistent with the research goals and most convenient empirically, given the fact that the models make use of numerous other variables measured on "per capita" basis.

2. The measure of *debt service expenditures* as a percentage of total operating budget largely captures the same concept of indebtedness by a jurisdiction as debt per capita and is also often used for empirical inference. The main distinction between the two is that, while debt per capita is essentially concerned with the *amount* and impact of indebtedness on the population (taxpayers), the debt service expenditures focus on the actual *cost* (current and future, as long-term debt expenditures remain fixed over a period of time) of debt to the government. Hence, it provides a useful insight into the long-term expenditure burden, defined as a commitment consciously undertaken by the jurisdiction, while emphasizing the cost of actual debt subject to budget constraints.

3**.** *Debt burden on assets,* measured as a total outstanding debt as a percentage of equalized valuation (i.e. total assessed real property value divided by the equalization ratio), is employed as a proxy for capturing the ratio between the government debt and the yield of property tax revenue as one of the main assets held by the residents of the jurisdiction and one of the most stable sources of government revenue inflows. The variable can therefore be considered

a good proxy for measuring government's capacity to account for the "full faith and credit" debt which loosely implies using property tax revenue as collateral for debt obligations incurred[8]. The main weakness of this measure is the notion of "overlapping debt" where the same revenue (real property) base serves several jurisdictions possessing independent debt authority, (e.g. county governments, school districts).

Empirical measures of *revenue diversification* used in the literature vary in their operationalization, but usually are based on evaluation of the share of each of the revenue sources in the overall revenue structure. For example, Pagano & Johnston (2000) incorporate the measure of reliance on property tax (i.e. the share of property tax in the overall revenue structure). While property tax remains among the main revenue sources, this measure does not account for non-tax revenue diversity.

Some studies seeking alternative revenue diversification (diversity) measures attempt to borrow heavily from the portfolio optimization approach in investment finance. For example, Gentry & Ladd (1994), in their case study analysis, design an efficiency frontier for state taxes, seeking to determine the optimal mix of their distribution with regard to growth and stability of the overall revenue structure. Concentrating on minimization of risk for a given level of return (revenue), these authors test their theory using mean-variance models, employing the dimensions of growth and instability as the main criteria for evaluation.

Carroll & Johnson (2010) provide a good summary of studies that chose to use a Hirschman–Herfindahl Index (HHI) as a measure of diversification. A common measure of industry concentration, HHI is often used in economic and sociological research and, in this

[8] While the U.S. Bureau of the Census includes in full-faith and credit debt only those issues where the full taxing power of the general-purpose government is guaranteed for repayment, for our purposes and given limited availability of the data, we choose to treat all the outstanding debt the same, concentrating on the long-term debt as an indicator of fiscal health.

specific case, reflects the level of revenue diversity by considering the "weight" of each revenue source included in the calculations. Some studies (Carroll 2005) include only tax revenues, whereas others (Suyderhoud 1994, Hendrick 2002, Carroll et al. 2003) combine both tax and non-tax own-source revenues (Hendrick 2002, Carroll et al. 2003). Since the HHI does not take into consideration the elasticities of revenue sources, it has its limitations in capturing the "optimal" revenue diversity. For example, property and income taxes will differ greatly in their reaction to economic shocks, the latter being much more sensitive due to decreased consumer spending, and regulatory charges would be less sensitive than *quid-pro-quo* user fees. On the other hand, being standardized and comparable across the numerous studies already available, the HHI provides perhaps the most consistent quantitative approach to diversification.

Based on the above, the HHI index of all own-source revenues is constructed for both of the studies in the design, taking advantage of the relative simplicity of this measure, and the potential for comparability given the reliance on it by numerous previous revenue diversification studies.

The HHI for both studies was calculated for all the own-source revenue types by using the following formula:

(1.) $$HHI_{rev} = \frac{(1 - \sum_{i=1}^{N} SOURCE_i^2)}{1 - 1/N}$$, where SOURCE represents a "weight" for each type of revenue (obtained by calculating the value for each revenue source as a percentage of total own-source revenue), and N equals the total number of revenue sources used. Then the sum of squared weights, subtracted from 1, is standardized as a percentage of the total. Hence, for a perfectly diversified revenue structure, the HHI would approximate 1, whereas reliance on a single source of revenue would lead to HHI being equal to 0.

To address two different aspects of the relationship between revenue diversification and debt – the revenue fungibility effect over time and the role of institutional environment, this work includes two separate quantitative studies, directed at exploring fiscal sustainability issues on the local level. While both studies have the primary emphasis on developing and testing a theory of revenue diversification as a determinant for government debt, they also represent two distinct arenas of inquiry that allow for addressing interactions between the two. The first study concentrates on strategic interplay between debt, tax burdens and revenue diversification as a policy choice and is based on the Commonwealth of Massachusetts Department of Revenue data for the period 2000-2009. The uniformity of institutional rules governing municipal revenue structures, spending and borrowing behavior, and availability of a complete data panel for the whole population of cities provide a lucrative opportunity to study revenue fungibility effects and their impact on the levels of municipal debt.

The second study employs 2007 U.S. Census data for American cities and is primarily concerned with the influences of institutional constraints (tax, expenditure and debt limits that vary by state) on government debt, also including revenue diversification measure as one of the main variables of interest. Subsequent chapters provide a more thorough discussion of theoretical assumptions and empirical models as they pertain to each study conducted.

II. 5. Revenue Diversification and Debt: Generalized Theoretical Model of Interactions

Similarly to portfolio optimization strategies in investment finance (Misiolek & Perdue 1987, Gentry a& Ladd 1994), government revenue diversification provides stabilizing influence on variability of future returns/revenues, albeit not necessarily enhancing those returns in the long run (Hendrick 2002, Hannarong & Akoto 2004). The stability of revenue structures allows government entities, despite their tight budget constraint, to enter into service agreements and

future financial obligations, such as debt financing due to the expected constant operational surplus (Peterson 1998, Lewis 2003). This notion serves as a core of the suggested theoretical framework, viewing government entities as rational actors, driven by the environment of continuous service demands, intergovernmental competition (Tiebout 1956, Fischel 2001) and budget and institutional constraints.

As shown in figure II-1, the operating budget (as a proxy for available resources) of a government entity is both revenue-driven and preference-driven, and is also dependent on various political as well as economic factors. The debt service budget is dependent on operational surplus and revenue stability in the long run. The operational budget, on the other hand, is also influenced by the total debt service obligations, given fixed amount of overall resources available for spending in a particular fiscal year. As debt service obligations for paying back both interest and principal remain fixed over a period of time, any disturbances in revenue-generating patterns are bound to reflect negatively on operating activities, which, in turn, would have significant political and economic costs.

Adding to the resource constraints, tax and expenditure limits (TELs) as well as debt limits, imposed by either state law or local governments themselves (e.g. by establishing appropriate provisions in the City Charter), can be expected to significantly influence both budgetary and debt service capacity of the jurisdiction. As shown in the figure II-1, assuming their binding nature, tax and expenditure limits, imposed to prevent frivolous spending and excessive taxation, have direct influences on both property tax burdens and budget (and also potentially have impact on the levels of debt through these constraining effects). At the same time, debt limits, apart from influencing the levels of debt and thus impacting debt service budget, can be expected to have indirect influence on tax burdens. The extent to which all these

relationships are mitigated by revenue diversification is one of the questions addressed by this work.

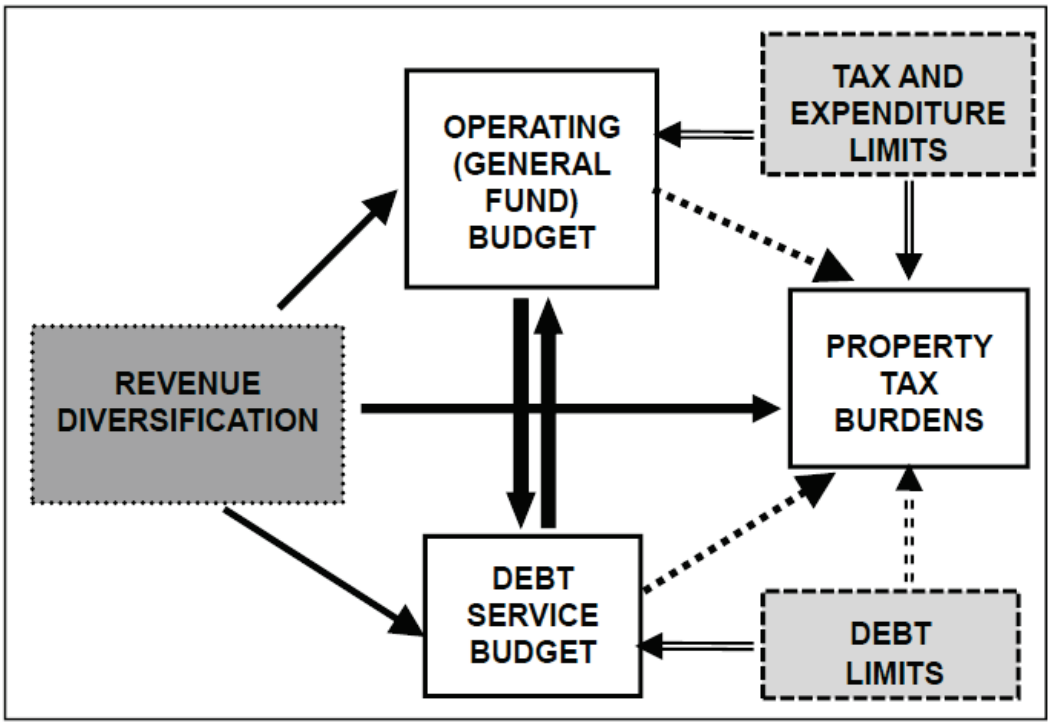


Figure II-1. Generalized Model for Studying the Relationship between Revenue Diversification and Debt

When revenue structure is diversified, the volatility related to aggregate revenue stream decreases, leading to greater capacity for debt repayment. Hence, the governments that have diversified revenue structures may be inclined to borrow more, which then leads to increase in overall debt levels and debt burdens. At the same time, the property tax burdens are likely to remain unchanged over time due to revenue fungibility effect, whereas growing service and debt repayment demands can be financed without relying solely on the property tax revenue. The fungibility effect also contributes to stability of the revenue structure as less income elastic revenue streams (e.g. property tax) get substituted by the more elastic ones (e.g. fees and charges, sales tax) during the periods of economic growth; by the same token, eventual decreases

of revenue from more elastic sources then can also be offset by receipts from less sensitive sources.

Assuming that revenue diversification has a potential to reduce the volatility of operational surpluses over extended periods of time, the patterns of the use and financing of debt can be expected to differ among the governments. Such differences would be determined by their ability to design and maintain diversified revenue structures, greater levels of revenue diversification potentially leading to higher levels of debt due to stronger prospects of repayment.

At the same time, given its stabilizing properties revenue diversification increases revenue predictability, which can be defined as real and perceived revenue (tax) burdens imposed by a jurisdiction on its residents. Given large unpopularity of the property tax, and negative political value of taxation in general, the issue of revenue predictability, the relationship between government operational and capital budgets, and the issue of tax burdens imposed remain among the central issues in modern public finance, as an extension of the classical arguments postulated by Wagner's Law and Leviathan models (Brennan & Buchanan 1980). It is also a concern for public administration scholars, concerned with efficiency of governance and social equity.

If theoretical expectations with respect to the relationship between debt and revenue diversification at the local level hold, and the financial burden related to debt obligations incurred is indeed offset by more stable revenue structure, one can also expect that the tax burdens would not increase as steeply over time, even though the overall debt burdens may (fungibility effect). In this context, revenue diversification becomes a strategic tool that allows

local governments to pursue their service and investment goals by increasing their debt obligations with lesser political and economic consequences.

Local governments, however, do not possess unlimited powers in levying taxes or even determining their overall revenue and spending patterns. Different institutional arrangements, contained in municipal charters, as well as in state statutes and Constitutions, constrain local fiscal behavior by imposing specific limitations. The dynamics of strategic interactions between debt and revenue diversification variables can therefore be expected to be different based on the rules that govern the behavior of municipalities in different states. Institutions matter on the cross-state level, even though some adjustments should be made for binding versus non-binding limits, as pointed out earlier by Joyce & Mullins (1991). Overall, theoretical expectations for the impacts of debt limits and TELs in this theoretical framework remain consistent with prior literature, indicating general constraining intentions of these institutional arrangements as well as their binding and non-binding nature under specific circumstances (Joyce & Mullins 1991).

To address two different aspects of the relationship between revenue diversification and debt – the revenue fungibility effect over time and in diverse institutional environment - the research design includes two separate quantitative studies, directed at exploring fiscal sustainability issues on local as well as state level. While both studies have the primary emphasis on developing and testing a theory of revenue diversification as a determinant for government debt, they also represent two distinct arenas of inquiry that allow for addressing interactions between the two. The first study concentrates on strategic interplay between debt, tax burdens and revenue diversification as a policy choice and is based on the Commonwealth of Massachusetts Department of Revenue data for the period 2000-2009. The uniformity of institutional rules governing municipal revenue structures, spending and borrowing behavior, and

availability of a complete data panel for the whole population of cities provide a lucrative opportunity to study revenue fungibility effects and their impact on the levels of municipal debt.

The second study employs 2007 U.S. Census data for American cities and is primarily concerned with the influences of institutional constraints (tax, expenditure and debt limits that vary by state) on government debt, also including revenue diversification measure as one of the main variables of interest. Subsequent chapters provide a more thorough discussion of theoretical assumptions and empirical models as they pertain to each study.

CHAPTER III

THE STUDY OF MASSACHUSETTS MUNICIPAL GOVERNMENTS (2000-2009)

III. 1. Background

Perhaps the main advantage of case studies in social sciences is to provide an in-depth analysis of phenomena of interest. The main goal of this study is to provide an insight into the mechanisms of the revenue diversification-debt interactions within the context of municipal governments in the Commonwealth of Massachusetts. Additionally, the study also tests the hypothesis of revenue fungibility, or the extent to which one source of revenue can substitute for another, and the implications of this on the overall municipal fiscal capacity.

The notion of fungibility implies that different streams of revenue can potentially be substitutable with regard to one another. Revenue fungibility has been previously studied in finance, economics, as well as in public administration literature. In investment finance, fungibility represents the extent to which assets can be interchangeable, which facilitates the asset trading process and has significant implications for risk, liquidity and transaction costs. With regard to government finance, the main emphasis lies on the substitutability of revenue sources in order to long-term fiscal stability.

Prior studies of revenue fungibility in public administration concentrate on exploring the extent of fungibility for different sources of government revenue. Many of these studies produce evidence of fungibility. For example, there is substantial evidence that earmarked revenues such as federal grants are, indeed, fungible in a sense that a portion of the grant money is used for publicly provided services or for providing tax relief to the private sector (McGuire 1975, Gold and Lowenstein 1996, Dye & McGuire 1992, Craig & Inman 1982). On the other hand, some

studies also produce contradictory findings. Namely, Spindler (2003), exploring revenue fungibility in the case of state lotteries, finds only limited evidence that that lottery revenues substitute for general revenue expenditures for education and emphasizes the importance of budgetary politics as a deciding factor for fiscal choices. Zhao & Jung (2008), examining the effects of a county local option tax instituted in the state of Georgia since 1976, find that, while the adoption of the tax brought short-term property tax relief, it fails to produce any significant long-term effects. Thus, further inquiry into the nature and impacts of revenue fungibility is well warranted.

One of the studies of special interest given its proximity to the objectives of this work, is the research carried out by Zampelli (1986) which uses panel data of U.S. municipal governments (1974-1978) and finds that a large part of federal aid targeted at specific programs (40 to 70 percent) is converted into fungible resources. The study presented in this chapter concentrates on own-source revenues generated by municipalities and constructs a measure of revenue diversification appropriately. While the issuance of local government debt is deeply intertwined with the issues of service demands, economic cycles, and political pressures, it inevitably imposes certain levels of risk and uncertainty, given the debt service commitment required when present consumption is financed through future revenues. Under these circumstances, the implicit purpose of revenue diversification becomes to reduce this risk and uncertainty related to the mix and overall levels of debt can be mitigated by ensuring greater revenue stability in the future.

Overall, it is reasonable to expect that higher levels of debt would also require higher tax/revenue burdens to be imposed as financial liabilities increase over time. Revenue diversification, expanding the number of sources including non-tax receipts, can be expected to

mitigate this relationship to a significant degree by producing a revenue fungibility effect as discussed above.

The research design and findings presented in subsequent sections of this chapter concentrate on addressing all the issues raised above. Given availability of data panel extending over an economically and socially eventful time period (encompassing the years 2000-2009), the study concentrates on evaluation of the impact of revenue diversification with respect to the theoretically assumed reciprocal dependence between debt and property tax burdens. Uniform institutional rules imposed at the state level (the most prominent being the Proposition 2 ½, limiting property tax increases) allow for focusing exclusively on local fiscal dynamics, which contributes to the attractiveness of the Massachusetts panel as material for the case study.

III. 2. Theory and Hypotheses

The theoretical framework presented in Chapter II regards municipal governments as utility maximizers, the utility in question being conceptualized as the local (median) voter support for higher levels of services which ultimately translates into higher housing values and thus are preferable to the "municipal shareholders" interested in protecting and augmenting their assets as a result of tax capitalization benefits (Fischel 2001, Tiebout 1956, Oates 1969). Therefore, the municipalities can be expected to possess a strong motivation for using debt as a means to finance greater variety and quality of public services, tying this type of strategic behavior to significant future political and monetary returns. This motivation is further strengthened by the stability of a more diversified revenue structure that allows for reasonable prospects of repayment. Therefore, one can expect that, ultimately, diversification of the revenue structures may lead to higher debt levels.

Revenue fungibility in empirical research is generally conceptualized as a phenomenon when an extra dollar of earmarked revenues, dedicated to a particular category of spending, lead to general fund revenues, previously allocated to this spending category, getting diverted to other purposes as necessary (see Zampelli 1986 and others). With regard to their designated purpose and relative size, sufficient extent of fungibility can be implied for most of municipal general-purpose tax revenue sources, interest earnings, as well as revenues from licenses and permits, fines and forfeitures, and other miscellaneous sources. By the same token, specially designated tax increments, as well as some dedicated tax revenue (hotel/motel taxes, local option sales tax), as well as intergovernmental grants earmarked for special purposes by the state government would have a much lesser degree of fungibility.

Assuming the absence of restrictions on use, the less income-elastic revenue sources that do not deplete as quickly due to economic shocks, can be used to "plug the holes" in distressed municipal budgets and provide greater assurance of constant future cash flows needed to repay outstanding debt obligations. Considered in the light of local fiscal sustainability, this notion leads to further implications with regard to potential impacts of revenue diversification on the levels of outstanding debt.

Since, theoretically, revenue fungibility would preclude budgetary deficits, it can also be expected that it would prevent an increase in the property tax burdens over time, regardless of growing financial liabilities incurred by debt financing. As more diversified revenue structures potentially can be related to greater fiscal stability (Suyderhoud 1994, Carroll 2009), the governments with more diversified revenue structures will experience decreased reliance on property tax revenue over time due to the revenue fungibility effect.

While revenue fungibility does not automatically guarantee or imply lower overall burden imposed by government, the substitution and diversification of revenue sources helps distribute negative effects related to each individual source among the wider variety of groups within the population. Keeping in mind that some revenue burdens can be easily exported by the jurisdiction to non-residents (e.g. tax on absentee landlords or sales taxes earned by retail centers), the idea of fungibility becomes especially attractive. Ultimately, only the unique needs and capacities of each jurisdiction can determine the "optimal" revenue structure, including its distributional and political consequences. This notion, though representing a compelling direction for future research, goes beyond the scope of this work. In the case of Massachusetts study, the primary concern with fungibility, as explained further, is the extent to which it prevents the growth of property tax burdens as municipal borrowing increases over time.

Prior studies of local tax/revenue burdens have produced conflicting results. For example, Suyderhoud (1994) theorizes that diversification should support higher tax effort because taxing jurisdictions are under pressure to utilize a wider variety of revenue sources. On the other hand, using a sample of Illinois cities, Hendrick (2002) finds that communities with more revenue diversification actually have lower tax burdens – a trend also confirmed by Hannarong and Akoto (2004). Finally, Pagano and Johnston (2000), using a measure of property tax reliance as a proxy for diversification, determine that higher property tax reliance, is associated with higher revenue burdens, while also stipulating that diversification via user fees (that can also be potentially exported to non-residents) may decrease tax burdens and increase revenue. While some of the aforementioned studies (Hannarong & Akoto 2004), Hendrick 2002) use panel analysis, they do not specifically employ the concept of revenue fungibility with respect to debt financing.

As shown in figure III-1 below, the size of overall government budget and fund balance is influenced by various external factors, including, among others, revenue base and economic potential of the jurisdiction, political preferences of the legislature, and specific fiscal institutions. Revenue diversification, which is both an outcome of the aforementioned processes and a necessary condition/policy tool for revenue stability, affects both tax and debt burdens, allowing the former ones to remain unchanged despite greater spending demands, and the latter ones to increase without the potential "penalty" of fiscal distress whenever certain revenue streams fall short and fund balances decrease. Over time, the effects of these interactions become especially pronounced.

When revenue streams dry up during the periods of economic downturn, increased service demands and debt obligations incurred in the past require the imposition of higher tax burdens to maintain required levels of spending. However, if the revenue structure is more diversified, it is reasonable to expect that at least some if not all of the "lost" revenue would be substituted by income from other sources, thus avoiding potential tax hikes. In other words, revenue structures, diversified away from reliance on property tax revenue, can also be expected to prevent increases in property tax burdens over time, due to potentially greater fungibility of these structures. Thus, revenue diversification essentially becomes a strategic tool that the governments use to mitigate fiscal stress (the notion that is consistent with extant literature), as well as to avoid negative political and economic costs of increasing tax burdens.

As shown by Hildreth and Zorn (2005), municipal borrowing has been steadily increasing during past few decades, and/given volatile, slowly recovering economy, one could predict these trends to extend into foreseeable future. Provided the assumption of utility-and-budget maximizing jurisdictions holds, it becomes apparent that (property) tax burdens and the levels of

municipal debt are interrelated. On the one hand, increased levels of indebtedness play instrumental role in demand for future revenue, thus potentially becoming positively associated with the increase in tax burdens. On the other hand, higher revenue effort, including increasing tax burdens, may serve as an indicator for jurisdictional budget-maximizing preferences in and of itself and as such be positively correlated with higher levels of debt. Therefore, the fundamental question to be asked in this context concerns the spending preferences each jurisdiction has, and how those preferences determine its taxing and borrowing behavior.

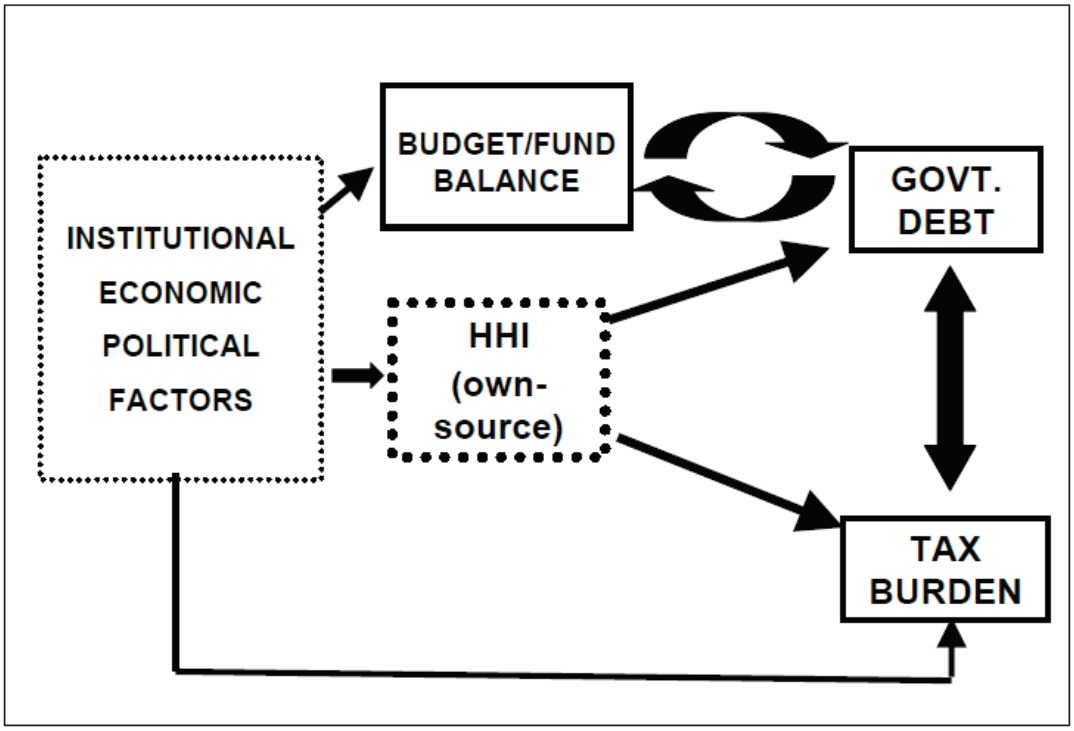


Figure III-1. Interactions between Government Debt, Revenue Diversification, and Tax Burdens over Time

The expectations employed in this study conform to existing theories, stipulated by median voter, tax capitalization, and Leviathan studies. In essence, by exploring possible reciprocal relationship between tax burdens and municipal debt this study contributes to the long-standing debate about the appropriate size and role of government. Through the decades of development of public finance as a discipline, various models have been developed to address

the issue of government expansion, from Wagner's law of continuously increasing government expenditures[9], to the Leviathan model suggested by Geoffrey Brennan and James Buchanan (Brennan & Buchanan 1980). At the same time, the literature on intergovernmental competition and fiscal federalism pointed to voter and capital preference "sorting" based on perceived attractiveness of the jurisdiction (Wilson & Wildasin 2004 and Tiebout 1956, respectively). Given this type of competitive environment, as well as political benefits of debt as a less "visible" source of revenue in the short run, the theory of budget-maximizing municipalities, realizing political benefits through higher levels of spending, should withstand empirical tests.

The main theoretical notion guiding all the hypotheses in the empirical research design as presented in subsequent sections, is that municipal governments with less diversified revenue structures will experience a positive relationship between debt and tax burdens as the increase in overall levels of debt results in heavier reliance on tax revenue, whereas governments with more diversified revenue structures will experience a revenue fungibility effect (i.e. greater levels of debt will result in no significant change in tax burdens). Hence, it can be expected that:

H1: Greater revenue diversity results in lower tax burdens over time, ceteris paribus (diversification as a policy tool hypothesis).

H2: Higher levels of GO debt leads to higher tax burdens if, and only if, the government revenue structure is less diversified (fungibility effect hypothesis).

While the first hypothesis assumes strategic determination of governments to diversify their revenue structures as a means to maintain long-term service levels and to avoid political costs of excessive tax levies (choosing to increase reliance on less costly non-tax sources), the

[9] Named after early 20th century German economist Adolph Wagner, the "law" stipulates that state spending exhibits continuous upward trend, predicting that the development of an industrial economy will be inevitably accompanied by growing public expenditures (Musgrave 1973).

second one is mostly concerned with actual outcomes of borrowing behavior and the extent to which diversification mitigates tax burdens by creating revenue fungibility effect. The research design addresses both of these hypotheses developing a simultaneous equation model while controlling, to the extent possible, for all the extraneous (economic, political, etc.) influences.

III. 3. Research Design and Data

III. 3.1. Data

Empirical analysis includes 351 municipal general purpose governments in the Commonwealth of Massachusetts. The data for the period encompassing years 2000-2009 is provided in an open-source online database maintained and owned by the Massachusetts Department of Revenue (MA-DOR).

The Commonwealth of Massachusetts, located in the Northeastern part of United States and known as one of the six New England states, has about 6.5 million of residents and features two separate metropolitan areas — the eastern Boston metropolitan area and the western Springfield metropolitan area, as well as the Knowledge Corridor along the Connecticut River, constituted from a mix of college towns and rural areas. Massachusetts is the third most densely populated state in the United States (U.S. Census 2010), and also has the US's sixth highest GDP per capita (U.S. Bureau of Economic Analysis, 2010).

According to Bradbury and Ladd (1982), the general level of property taxes can be considered relatively high in the Commonwealth due to restrictions not allowing local governments to levy income or sales tax. Besides property tax, however, municipalities in Massachusetts are allowed to levy certain excise taxes (motor vehicle and trailer registration, various local option taxes, etc.) that help diversify the tax base to a certain extent. Common non-

tax revenue sources include various user charges, regulatory fees, and other (miscellaneous) sources. Some cities also receive interlocal revenue, as well as state and/or federal aid.

Cutler et al. (1999) provide extensive review of the Proposition 2 ½ which was passed in 1980. The controversial initiative has been adopted in consequence of widespread tax revolts and rapidly growing local property tax burdens (reaching nearly twice the national average in 1977). Cutler et al. (1999) posit that the reasons for excessive property taxation were rooted in both higher overall tax burdens in the Commonwealth and a larger share of revenue being absorbed by property taxes. The Proposition 2 ½ imposed restrictions on property taxes by establishing a levy limit for each community to the lesser of current property taxes and the imposed levy "ceiling" of 2.5 percent of total assessed property values (even if this implies less than 2.5 percent annual growth in tax revenue).

This restriction is applicable to all residential, commercial, and industrial, as well as business personal property in the Commonwealth (see Mass. Gen. Laws Ch. 59 § 21C). The state law, however, also allows an increase in a community's property tax levy of a specific dollar amount over the Proposition 2½ limit in order to cover specific items of borrowing. Such an arrangement, known as the "debt exclusion", must receive a majority vote both at town meeting or city council and at a general election. The increase is temporary in nature in that it declines as the debt payments decline, and is eventually eliminated when the debt is paid off.

Because of a relatively limited role attributable to special districts and county governments in the Commonwealth, the Proposition had a significant impact on provision of local services (Bradbury and Ladd, 1982, Cutler et al. 1999), although Cutler et al. (1999) also indicate that the binding powers of the proposition mostly manifested themselves in the initial

period after the introduction of the Proposition, as well as during the time of economic recessions, when housing values were not increasing very substantially.

Like other U.S. states, Massachusetts has recently experienced the effects of the housing market "bubble" and the effects of the subsequent mortgage crisis, even though those effects were arguably less severe than in other states due to limited potential for building new real estate, given the size of the Commonwealth. While from 2000 to the peak of the housing market in late 2005, home prices in Boston, the largest city, increased around 80 percent, they fell only about 18 percent on average over the subsequent five years, which is a comparatively low decrease given the dramatic nationwide impacts of the crisis. Bluestone et al. (2010) indicate that, overall, the recession that started in 2001 and ended in 2002 had greater economic impact on the Commonwealth, with its economic indicators lagging for about two years well behind other states on their path to recovery. The current recession has proven overall to be much less severe, even though it lasted longer. Nevertheless, the over-inflated property values in the period of economic growth, especially in bigger cities, can be expected to have created some distortionary inflation on the property tax revenue during the first half of the period studied. Subsequent decreases in home values, stalling real estate sales, as well as growing number of foreclosures can be expected to have changed significantly the fiscal landscape of the Commonwealth, imposing an additional burden on local governments.

The MA-DOR data covers various aspects of financial performance by municipalities located in the Commonwealth, providing a rich source of data for government revenue, expenditure, and debt. In addition to financial indicators, MA-DOR maintains data on specific socio-economic factors such as population changes, unemployment rate, and prevailing political

orientation of voters. The data is organized by year and municipality (each of which is assigned a special DOR code), which makes it especially convenient for panel data studies.

While the dataset is limited to one state, it has a sufficiently large number of observations and provides an advantage of the uniformity across observations as to many relevant external factors. Although the use of single-state data can potentially undermine the generalizability of the study due to specific regional (sociodemographic and economic) variables that would remain uncontrolled, the uniformity of institutional framework in Massachusetts, as well as availability of complete and balanced panel, is also its greatest advantage. In consistence with the goals of this work, the data allows for exploration of the factors of interest in the uniform environment, thus eliminating the problems encountered by previous authors who used more diverse samples while failing to control for variation in the institutional context (e.g. Carroll 2009).

III. 3.2. Variables of Interest

Due to simultaneity inherent in interactions of many financial and economic indicators, the research design employs both government debt and tax burden as variables of response. Both debt and tax burden act as endogenous variables in the model, based on the anticipated feedback loop between the two. On the one hand, greater levels of debt need to be financed by increased tax collections, the main burden likely falling on the property tax revenue – a politically unattractive, if relatively stable, revenue choice. At the same time, the levels of debt are determined in part by the revenue capacity, as governments that have greater leverage in terms of revenue base and its structure can potentially take on more risk in incurring debt to advance their spending goals to remain competitive with other jurisdictions.

To evaluate the levels of municipal indebtedness, this research design uses the municipal *debt per capita* measure, which is consistent with the principal focus of this study, lying on the

general levels of municipal general obligation debt, and the relationship to revenue-generating strategies employed by different jurisdictions. In the discussion that follows, the notion of "levels of debt" and "indebtedness" in context of the research design pertains to this empirical measure, which is modeled as one of endogenous response variables in regression estimation (see section 4 for more details).

The variable reflecting municipal *property tax burden* is operationalized as a ratio of total property tax levy to the population recorded for each jurisdiction in a given year. The levy, confined within the limits imposed by the Proposition 2½, is determined by the general taxing capacity (tax base) and effective tax rate. A standard way of measuring property tax capacity in the Commonwealth of Massachusetts, used for distribution of local aid, determination of municipal debt limit and other purposes, is equalized property valuation, calculated as the full and fair cash value of all taxable property in each municipality as of January 1 of the current fiscal year (Massachusetts General Laws Chapter 44, §10).

The measure of property tax burden as described above is employed as a proxy for capturing the impact of jurisdictional taxing policies on the population. Additionally, the yield of property tax revenue as one of the most stable sources of government revenue inflows and thus represents an important indicator accounting for the "full faith and credit" debt which is loosely based on using property tax revenue as collateral.

One of the independent variables, acting as an endogenous instrument in estimation of simultaneous equation-based regression, is *fund balance per capita,* operationalized as a sum of "free cash" or unspent general fund surplus and a budget stabilization fund balance, divided by the total population in a given jurisdiction. Like the use of debt, the size and the use of general fund balance (i.e. the unrestricted surplus funds that could be carried over to the next budgeting

cycle) in local governments has received some attention in the local fiscal capacity and fiscal stress research. GFOA recommends that governments establish a formal policy on the level of unreserved fund balance that should be maintained in the general fund and establish its importance as a financial mitigation and planning tool (GFOA, 2009). There is little understanding, however, as to how big exactly the fund balances should be. For example, Kriz (2003) argues that a simple 5 percent (in terms of annual operating expenditures) balance rule for local governments is far too simplified and can be inadequate to support growing rates of government expenditures in the long run. Allan (1990) points out that a small fund balance (under 5 percent of annual operating expenditures) could also be looked upon negatively by the credit agencies and potential investors if the government has experienced financial difficulties in the past due to external factors, while a fund balance deficit is certain to be judged negatively in terms of the government's ability to provide revenue stability, balance the budget, and withstand future financial difficulties.

Employing the same rationale about revenue diversification as a factor for greater revenue stability, it can be expected that the governments with more diversified (stable) revenue structures have higher fiscal capacity and therefore tend to accumulate savings, especially when the long-term debt obligations increase. Therefore, a positive relationship between the size of the fund balance and overall level of municipal debt should exist. Hence:

H3: Municipalities with greater fund balances have higher levels of debt, ceteris paribus.

Another instrumental variable included in the model is a *debt limit* measure. Per statutory rules, all the municipalities in the Commonwealth are subjected to a 5 percent limit on debt, measured as 5 percent of equalized valuation, unless waivers to achieve higher levels are granted by the Municipal Finance Oversight Board. While the communities can incur debt outside the

limit for some authorized purposes (Massachusetts General Law, Chapter 44, §8), most of the routine capital improvement and preservation projects, as well as litigation and long-term insurance expenses fall within designated limit.

Since the actual monetary limit varies depending on the property tax capacity of the jurisdiction, the measure of debt limit, operationalized as the total amount of allowable debt for a given year (calculated individually for each jurisdiction), represents a good indicator for the government's general capacity to borrow. On the other hand, high ratios of debt with respect to an established limit are likely to be viewed negatively by credit rating agencies, creditors, and voters alike, hence the variable can be considered a proxy for political as well as economic costs of borrowing. For the purposes of this study, given the assumption of budget-maximizing motivation by municipalities, it is expected that the actual allowable amount of debt will be positively related to debt per capita as a result of greater capacity/proclivity to borrow:

H4: Municipalities that accumulate higher amounts within allowable debt limit have higher levels of actual indebtedness (dent per capita), ceteris paribus.

The measure of *intergovernmental revenue per capita* (operationalized as a sum of federal, state and interlocal revenue received annually by the jurisdiction, divided by the number of population), represents a distinct source of funds that, unlike own-source revenues, is essentially "free" to local governments in that they do not impose a direct burden on the residents of the jurisdiction. At the same time, the governments have much less control over the distribution of these resources and, especially in the times of economic downturn, face greater uncertainty and have lesser amounts of discretion with regard to intergovernmental receipts. This makes intergovernmental revenue both a less reliable and less fungible source of funding as

compared to other "typical" general fund revenue categories, and justifies the decision to not include this source in the revenue diversity measure.

Early theories of public finance point to the ability of distribution of intergovernmental transfers to mitigate the tax imbalances (Musgrave 1959, Oates 2005). Numerous flypaper effect studies have indicated that higher levels of intergovernmental grants to local governments lead to higher levels of expenditures at the local level (Oates 1999; Deller and Maher 2006; Carroll, Eger, and Marlowe 2003, and others). Finally, according to Pagano and Johnston (2000), higher levels of intergovernmental revenue are positively tied to the fund balances which could be regarded as a measure of fiscal capacity. Thus, given that intergovernmental transfers, as an additional source of revenue, potentially add to the fiscal capacity of the jurisdiction, it can be reasonably expected that higher levels of such revenues, despite their somewhat limited fungibility, would be negatively influence property tax burdens. Hence, it is hypothesized that:

H5: Higher levels of intergovernmental revenue per capita lead to lower property tax burdens, ceteris paribus.

As revealed by the literature review, the levels of government debt can also be related to numerous economical, socio-demographic, and political factors. Based on this notion, as well as on availability of data, the model also includes the following variables:

- To control for the size of each municipality and the size of government, we employ a measure of a total *government budget per capita*. Used as control variable for the size of government, this variable reflects total amounts of operational expenditures per capita, and is expected to be positively associated with property tax burdens, especially for the municipalities that do not have well-diversified revenue structures.

- In a similar fashion, *local unemployment rate* variable is used as proxy for measuring economic growth/recession; worse economic condition of a municipality can serve both as a reason to increase tax levies due to revenue shortfalls *and* as a deterrent to incur political costs of greater tax burdens to be borne by residents, already affected by the economic downturn. Ultimately, the direction of influence of this variable should be empirically investigated.

- Finally, to account for voters' political preferences in each jurisdiction, a *voter orientation* variable is employed, based on the percentage of registered democrat voters within the jurisdiction. As democratic orientation is commonly associated with less conservative financial policies, it is expected that, in this design, the prevalence of democrat voters would have a significant positive effect on the tax burdens.

Full description of all variables in the design can be found in table III-1 below. The properties include the name of a variable, its type, and empirical definition. Both property tax burdens and the levels of outstanding debt are denoted as response (endogenous) variables, given theoretical expectations and the simultaneity of the empirical model. The distinction between exogenous and control variables, for the purposes of this design, is construed based on the theoretical importance of variables. While revenue diversification, fund balances, debt limit, and intergovernmental revenue receipts are expected to have a predicted theoretically relevant impact on response variables, the remaining variables are included in the model primarily to control for external effects of demographic, social, and economic forces (i.e. to strengthen the *ceteris paribus* condition) that are not the primary focus of this study.

Table III-1. Description of Variables Included in the Research Design
(source: *Massachusetts Department of Revenue, 2011*)

Variable	Type	Description
HHI	**exogenous**	**Revenue diversification measure (see Chapter II for a detailed description, as well as Suyderhoud 1994, Hendrick 2002, Carroll et al. 2003, etc)[10]**
PROPERTY TAX BURDEN PER CAPITA	**endogenous**	**A ratio of total property tax levied in the year "*t*" to the total population in the jurisdiction "*i*" as recorded for that year**
OUTSTANDING DEBT PER CAPITA	**endogenous**	**Total (long-term) debt outstanding divided by the total number of population for jurisdiction "*i*" in the year "*t*"**
FUND BALANCE PER CAPITA	**exogenous**	**A sum of general fund surplus ("free cash" available for appropriation in year "*t*" for jurisdiction "*i*"), and budget stabilization fund balance, if any**
DEBT LIMIT	**exogenous**	**Calculated amount of total allowable debt (based on 5% of equalized valuation or total assessed real property value divided by equalization ratio) for jurisdiction "*i*", recorded for year "*t*"; used as an instrument to capture the size of government and its general inclination to borrow**

(table continues)

[10] Since local governments have the greatest level of control over own-source revenue, we include only those sources in calculating the HHI measure. Own-source revenue sources in this design include the following:
- Total Tax Revenues (actual annual property and sales tax receipts, net of refunds)
- Total Charges for Services
- Total Licenses, Permits, and Fees
- Total Special Assessments
- Total Fines & Forfeitures
- Total Miscellaneous Revenues
- Total Other Financing Sources

Table III-1. *(continued)*

Variable	Type	Description
IGR PER CAPITA	**exogenous**	**Total amount of (annual) state, federal grants, and interlocal revenues received by jurisdiction "*i*" for year *"t"*, divided by the total number of population for the same entity and year**
OPERATING EXPENDITURES/ BUDGET PER CAPITA	**control**	**Total (annual) operating budget divided by the total number of population for entity "*i*", recorded for the year "*t*"**
UNEMPLOYMENT RATE	**control**	**Recorded as percent of persons unemployed in the local labor force in the year *"t"*; a proxy for the influence of economic cycle**
VOTER ORIENTATION	**control**	**Number of registered democrat voters (the numbers registered by party affiliation for biennial state primary elections, extrapolated for each of the intervening years to provide a complete series of values)**

III. 3.3. Pre-Model Analysis and Descriptive Statistics

Before estimating the final model, descriptive statistics and plots were generated for all the variables in the design to eliminate possible errors and discrepancies. According to the calculations presented in table III-2 below, all of the variables included in the final model possess sufficient variation as implied by the ratio of their standard deviations to statistical means (i.e. the coefficient of variation). Additionally, all the variables largely fall within a reasonable range: zero minimum values for some financial variables as well as unemployment rate can be explained by the properties specific to the data which captures all the municipalities in one state only, and thus reflecting true differences in size of each jurisdiction, its population and economic activity.

Due to significant differences in the magnitude of financial variables as compared to ratio variables (e.g. HHI, voter orientation, unemployment rate), most of the financial variables used in the analysis were recoded to represent thousands of dollars[11], to ensure consistent levels of magnitude for all the variables in regression models.

Table III-2. Summary Statistics for All Variables Included in Research Design

Variable	Reference Label	Mean	Standard Deviation	Min	Max	Coefficient of Variation
DEBT PER CAPITA*	**"DEBT_CP"**	1.57	1.39	0.00	13.54	88.35
PROPERTY TAX BURDEN*	**"PROP1"**	1.58	0.83	0.38	8.12	52.56
HHI/ REVENUE DIVERSITY	**"HHI"**	0.18	0.11	0.01	0.78	63.78
FUND BALANCE PER CAPITA*	**"FUND_BAL_ CP"**	0.29	0.48	-0.50	8.85	167.32
BUDGET PER CAPITA*	**"BUDGET_ CP"**	2.69	1.20	0.95	17.88	44.55
IGR PER CAPITA*	**"IGR_CP1"**	0.45	0.35	0.00	2.47	79.63
DEBT LIMIT**	**"DEBT_LIM"**	1073.35	2217.58	7.56	52938. 26	206.60
UNEMPL. RATE	**"UNEM"**	4.81	2.35	0.00	29.20	48.82
VOTER ORIENTATION	**"DEM_ALL"**	0.29	0.09	0.07	0.61	31.61

[11] All the variables transformed to $1,000-scale are marked in table III-2 with an asterisk. The debt limit measure, which, due to its magnitude, is transformed to $100,000-scale is marked with a double asterisk.

To ensure accurate understanding of probability distributions that may affect empirical modeling, both endogenous variables appearing in the model (debt per capita and property tax burden per capita), as well as key independent variable, HHI (measure of revenue diversification) are plotted and fitted into distributional patterns. While none of the above parameterization assumptions are intended to be used in modeling, these preliminary curve fits do provide basic information about the variables of interest and help to understand their expected behavior as part of our simultaneous equations system, their performance within models, and their general mathematical features. The fitted plots and statistical properties for all three variables appear in figures III-2 A and III-2B.

Per earlier discussion (see chapter II), the key independent variable HHI is standardized and ranges from 0 to 1, with higher values corresponding to higher level of diversification. While a wide range of possible parameterizations was attempted for this variable, the closest approximation was achieved by using inverse Gaussian distribution. While the mean of the normalized variable values occurs around 0.18 (18%), the most probable value is about 0.11 (11%) with the variation of about 3%, which means that based on the sample, a rather low relative levels of revenue diversification can be expected in our model for most municipalities. As can be further implied from the graph above (figure III-2B), frequency distribution of variable HHI is clearly described by clusters, with the values at first, second and third percentile constituting the majority of observations.

DEBT_CP1, the endogenous measure of debt, expressed as debt per capita (in thousands of dollars) has two distinct components evidently present in its spectrum: the first one has a mean close to zero and a relatively small variance, whole the second one has a distinct mean and the most probable values that can be readily ascertained. The smaller values of the first component

were successfully parameterized by a normal distribution and represent small fluctuations in debt for municipalities whose levels of debt were low to negligible. The second component of the variable could represent the sustained outstanding debt from year to year and was successfully parameterized via log-normal distribution. This parameterization is routinely used in economics research, often being employed in simulations of variables such as personal incomes, debt, logarithmic price changes, or stock price distributions.

Just like DEBT_CP1, the endogenous measure of property tax burden, PROP1, has been found to be well described by the lognormal distribution, implying its multiplicative nature, consisting of many independent random observations, each of which is positive. Given this distribution, the parameterized mean of PROP1 distribution of 1.4, represents a natural logarithm of an intrinsic parameter.

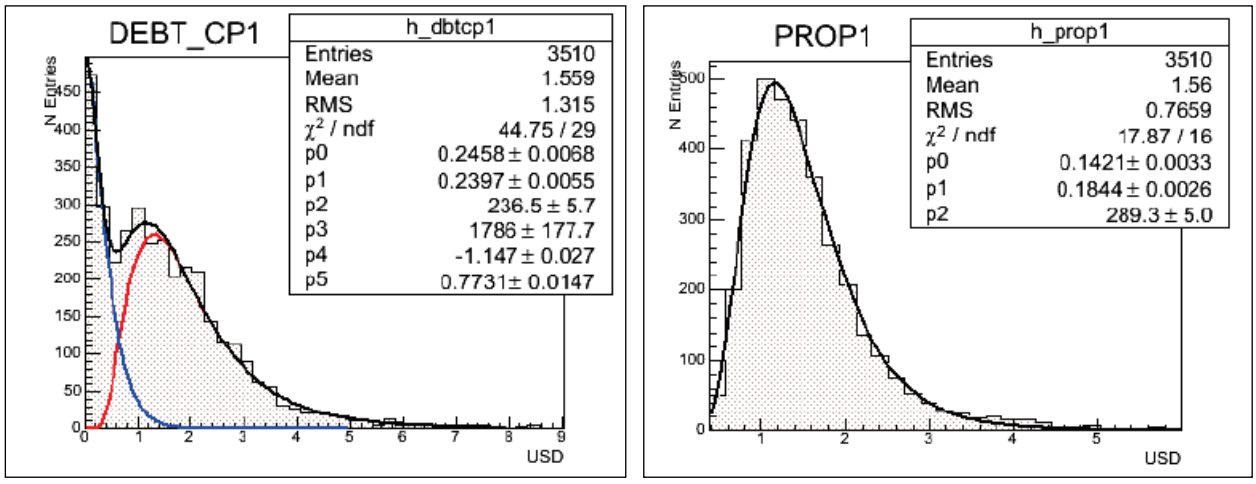


Figure III-2A. Probability Distributions for Endogenous Variables in the Research Design

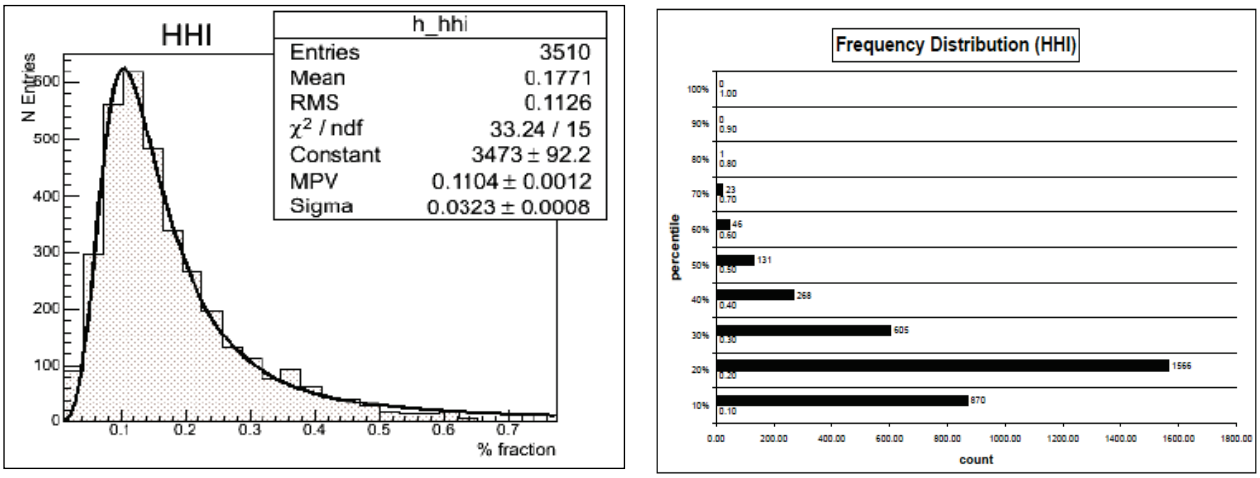


Figure III-2B. Probability and Frequency Distribution for HHI Variable.

III. 4. Methodology and Empirical Estimation.

III. 4.1. Empirical Model

To examine the potential feedback loops between government debt and tax burdens, empirical model in the research design is constructed as a simultaneous structural equation system. As per above discussion (see section 2), property tax burdens and levels of debt theoretically appear to be related, with both variables potentially indicating greater propensity for government spending. Since debt is a less visible source of revenue in the short run, the governments may favor borrowing over tax increases due to political reasons. However, it is also reasonable to expect that higher revenue efforts, reflected in higher tax burdens, will be a result of the higher propensity to spend and will positively influence debt burdens At the same time, the financing of previously incurred debt obligations, especially during the periods of economic recessions, often requires tax hikes, which lead to the increase of tax burdens. Since revenue diversification is expected to mitigate this relationship, the primary purpose of the models is to

determine the statistical significance and magnitude of its influence, as well as that of all other relevant factors as specified in theoretical hypotheses.

The population regression equations presented in Figure III-3 below reflect a model, construed as a simultaneous equation system. The model is based on total outstanding debt per capita, appearing as a response variable in the debt equation (E2) and, in a lagged form, as an independent variable in the tax burden equation (E1). This measure also appears as a lagged variable in the tax burden equation due to theoretically predicted temporal effects between (earlier incurred) existing levels of debt and (newly determined) tax burdens at each year "*t*". Similarly, the property tax burden variable also appears in the model both as a response variable, as well as one of determinants of the levels of actual government debt in the debt equation. In consistence with the stipulated hypotheses (specifically, the conditional hypothesis H2 in section 2 above), the model also includes an interactive term composed of a lagged debt measure and the revenue diversification measure.

As discussed in the subsequent sections, the disturbances in all the equations presented in the models reflect the impact of various unmeasured factors on response variables.

E1. Tax Burden Equation:

$$\begin{aligned}\Pr op\_Tax\_Burden_{it} &= \beta_{11} + \beta_{12}HHI_{it} + \beta_{13}BUDGET_{it} + \beta_{14}IGR_{it} + \beta_{15}UNEM_{it} + \\ &+\beta_{16}DEBT\_CP_{i(t-1)} + \beta_{17}VOTER\_OR_{it} + \beta_{18}HHI_{it} * DEBT\_CP_{i(t-1)} + \varepsilon_{1it}\end{aligned}$$

E2. Debt Equation:

$$\begin{aligned}Debt\_Cp_{it} &= \beta_{21} + \beta_{22}PROP\_TAX\_BURDEN_{it} + \beta_{23}HHI_{it} + \beta_{24}FUND\_BALANCE_{it} + \\ &+\beta_{25}BUDGET_{it} + \beta_{26}DEBT\_LIMIT_{it} + \varepsilon_{2it}\end{aligned}$$

Figure III-3. Empirical Model: Population Regression in Simultaneous Equation Form

III. 4.2. Generic Properties of Panel Data Models

Panel data can be described as a cross-sectional time series data, as it extends over numerous units of analysis AND over a (specific) period of time. The units of analysis have a common nature (e.g. countries, firms in the same industry, etc.), and time periods can range from days/weeks to quarters, to months or years. The issue of interest in studying this type of data is most commonly the variation among cross-sectional units.

One of the advantages of panel data analysis lies in its ability to account for unobserved heterogeneity (i.e. some exogenous factor that cannot be observed or measured directly but which does contribute to significant differences among cross-sections or time periods). In the case of the design presented in this work, potential unobserved effects can include both cross-sectional peculiarities, such as unique "culture" of borrowing and a level of financial conservativeness in every city, as well as time-specific effects, tied to the dynamics of nationwide economic growth/recession patterns that were defined by 9/11 and the housing bubble-induced crisis of 2007 and affected each entity individually.

Based on the distinct influence of specific effects, there are several possible specifications for panel data models. In *fixed effects models*, the cross-sectional (individual) effect is considered to be simple autonomous shifts, thus becoming a part of the estimated intercept(s). A *random effect model,* by contrast, estimates variance components for groups (or times) and calculated the model error assuming the same intercept and slopes. The unobserved heterogeneity in this model is a part of this error term and thus should not be correlated to any regressor.

Depending on the nature of unobserved effects, panel data models can also be constructed as *one and two-way regressions*. A one-way model includes only one set of heterogeneity

estimates (typically a cross-sectional dimension, e.g., state, firm, etc.), while a two way model considers two sets of such estimates to account for both time and cross-sectional unobserved effects (as is the case in the Massachusetts study, where both jurisdiction and year can be considered as having a potential for unobserved heterogeneity).

III. 4.3. Simultaneous Equation Models

Simultaneous equation models are specifically designed to estimate models with variables that are theoretically assumed to have reciprocal relationships or feedback loops that can cause estimation problems due to correlation between explanatory variables and disturbances in estimation of behavioral equations. In simultaneous equations, these relationships are determined by estimating structural parameters (intercepts and slopes of regression). Simultaneous equation models may also contain direct as well as indirect effects, depending on the presence of mediating variables in the model.

In a simple form, the simultaneous regression model can be generalized as a matrix-based system, as is presented in figure III-4 below (Greene 2003).

$$Y_i = X_i B + e_i \text{ , where:}$$

$$Y_i = \begin{pmatrix} Y_{i1} \\ Y_{i2} \\ \dots \\ Y_{iK} \end{pmatrix} \quad X_i = \begin{pmatrix} x_{i1}' & 0' & \dots & 0' \\ 0' & x_{i2}' & \dots & 0' \\ \dots & \dots & \dots & \dots \\ 0' & 0' & \dots & x_{iK}' \end{pmatrix}, \quad \beta = \begin{pmatrix} \beta_1 \\ \beta_2 \\ \dots \\ \beta_K \end{pmatrix}, \text{ and. } e_i = \begin{pmatrix} \varepsilon_{i1} \\ \varepsilon_{i2} \\ \dots \\ \varepsilon_{iK} \end{pmatrix}$$

In this notation, i = 1,2….. N for the number of observations
k = 1,2,3…K for the number of equations

Figure III-4. Generalized Model of a Simultaneous Equation System

The matrix notation employed in figure III-4 above includes a vector of all the endogenous variables Y_i that appear in the system of "*k*" equations, as well as all the X (exogenous) variables that act as instruments in the estimation procedure. The exogenous variables are included in a diagonal matrix which has "*k*" rows and "*k*" columns, and are represented as a transpose of a vector x_i encompassing all the observations of a variable in question. The parameter estimates β and regression errors (e_i) are also represented as vectors.

The variables that are not explained by the model are considered exogenous, while the variables that are determined by the model are considered to be endogenous. The regression errors are assumed to be uncorrelated with the exogenous variables so that $E(\varepsilon_i \mid X_i) = 0$, and having constant variance around regression line (homoskedastic), so that $\text{cov}(\varepsilon_i, \varepsilon_j) = 0$. Moreover, the errors also cannot be autocorrelated so that all the traditional assumptions for eventual regression estimation by the Ordinary Least Squares (OLS) procedure would hold. Since this condition is rarely met in studying real-world data, especially when dealing with panel data samples, the OLS estimation of simultaneous equation systems is routinely substituted with the Generalized Least Squares (GLS) or instrumental variable approaches.

For estimation purposes, simultaneous equation models are often expressed in reduced-form equations that are constructed in such as way as to express the endogenous variables solely as a function of the exogenous variables. In reduced form equations, only exogenous variables appear on the right-hand side, whereas all the endogenous variables are collected on the left-hand side. In any model, there is the same number of structural and reduced-form equations.

The identification of equation system is important in determining which modification of the OLS procedure should be employed. For just identified equations, or those that have the same number of endogenous variables as the number of equations, it is common to use the

Indirect Least Squares (ILS) Procedure, which regresses each endogenous variable of the system on all of the exogenous variables (using OLS) to obtain initial reduced equation parameter estimates that are then used to solve for the structural form parameter estimates.

Another popular approach is to use 2-Stage Least Squares (2SLS) procedure, based on instrumental variable approach. To identify and estimate this model, one needs to include at least one instrumental variable for each endogenous variable. This must be a variable that has a direct and significant relationship with the response variable in the equation it appears in but, at the same time, does not influence response variables in other equations of the system. To satisfy the order condition for identification, the system has to have enough instruments, i.e., to include at least as many (or more) purely exogenous variables that are excluded from a given equation and appearing elsewhere in the system as there are endogenous variables in the same equation. Instrumental variables, while uncorrelated with system errors, need to be strongly correlated with the response variables in the equation they appear in. This ensures consistency of the estimates obtained.

The 2SLS method is based on regressing each endogenous variable in the system on all exogenous variables of the system (using OLS) and obtaining fitted values for endogenous variables that are then used to estimate the original structural form equations (with fitted endogenous variables replacing right-hand side endogenous variables). A similar procedure, known as 3-Stage Least Squares (3SLS), is sometimes employed when cross-model correlation of error terms is relatively high. In 3SLS, the estimates for the original structural equations, obtained in a similar way as the one described above for 2SLS, are used to estimate the variance of the residual vector of the system of equations and then use this estimate to perform the Generalized Least Squares estimation of the system.

The logic of simultaneous equation system that describes the specific case of Massachusetts study is presented in detail as a path diagram in figure III-5 below. The system, as determined by theoretical expectations, laid out in preceding sections, implies that there is a reciprocal relationship between municipal government debt and property tax burdens. While both of these endogenous variables are autonomously influenced by different exogenous factors that can potentially act as instruments in the regression estimation, the relationship between the two is also mitigated by the HHI, employed as a revenue diversification measure in the design.

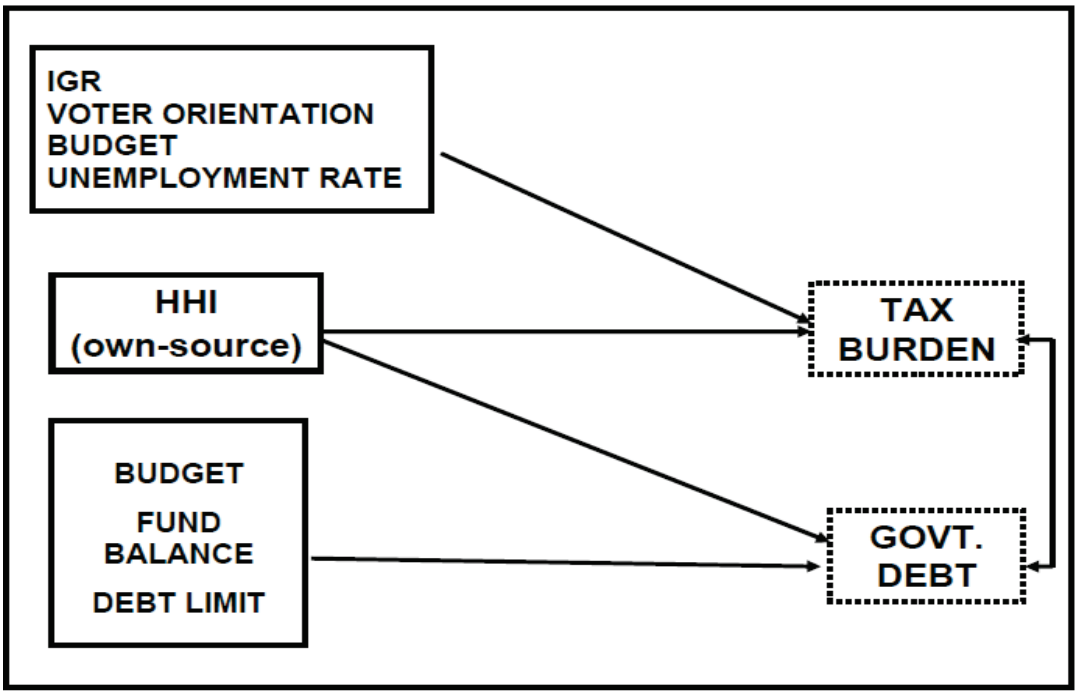


Figure III-5. Path Diagram of Generalized Simultaneous Equation Model for the Massachusetts Panel Study

In other words, the relationship between HHI and government debt is due to both the direct effect of HHI on the level of debt, and the indirect effect of HHI on debt though its influence on the tax burden. Since both jurisdiction and year effects are expected to be significant and considering possible presence of unobserved heterogeneity randomly distributed

among both cross-sectional and time observations, the empirically estimated model can be regarded as a two-way, random effects regression.

Given the expected reciprocity of the relationships and simultaneous influence between variables, the estimation of the model requires a non-standard approach that reconciles the properties of the panel with the specifics of simultaneous equations. The method employed to derive robust and reliable parameter estimates is discussed in more detail in the following subsection.

III. 4.4. The Estimation of Simultaneous Equations for Panel Data: Generalized Method of Moments

Using the same notation presented in Figure III-5 above, the typical *random effects model* of systems of regressions equations as applied to panel data can be expressed in a matrix form as follows:

(1) $Y_{nt} = X_{nt}\beta + \varepsilon_{nt}$, where $n = 1,2 \ldots N$, denoting cross-sectional observations, and $t = 1,2 \ldots T$, denoting time periods. Model parameters are represented here by a k-dimensional vector β, X_{nt} are (generally non-deterministic) model regressors, and ε_{nt} are arbitrary random values with overall zero expectation.

By the same token, the *fixed effects model* can be expressed as:

(2) $Y_{nt} = X_{nt}\beta + \alpha_n + \varepsilon_{nt}$, where α_n denotes individual effects (*i.e.* intercept terms that vary across units).

Common problems that arise in estimating panel data models include heteroskedasticity across observation units, serial correlation over time or covariance across equations within an observation unit, as well as the potential for correlation of explanatory variables and disturbances

when regressors include lagged dependent variables (Wooldridge 2002). Given these considerations, the estimation of regression model is implemented by employing the Generalized Method of Moments (GMM) framework, which primarily relies on instrumental variables (Cornwell, Schmidt, and Wyhowski 1992, Wooldridge 2002, Greene 2003). Among obvious advantages of GMM estimators is their consistency and asymptotic normality, regardless of assumptions about the data-generating process. Unlike OLS, GMM estimation does not require non-correlation between exogenous regressors and regression errors (disturbances), and is not dependent on parametric restrictions imposed by a number of standard estimation techniques (Greene 2003).

GMM, as a modification of the classical theory of the method of moments (Fisher 1925), was developed by Hansen (1982). The key idea behind GMM is to provide an algorithm of choosing parameters of the model in such a way so that the moments of the model would match to those of the data as closely as possible. Since the method is based on the information of the moment conditions contained in the sample, it is sometimes referred to as the *limited information method*. On the other hand, GMM represents a flexible and reliable way of estimating models without making strong parameterization assumptions and being less sensitive to certain non-ideal data properties.

The logic of GMM is based on an assumption that sample statistics tend to converge in probability to some constant which is a function of the unknown parameters of the distribution. To estimate the parameters $\beta_1 \ldots \beta_k$, we can compute a k – dimensional set of sample statistics $\bar{m}_1 \ldots \bar{m}_k$ with probability limits that define the parameters (as certain expectations are implied for the variables in the model of interest). For example, if

(3) $f(m) = E(y_i \mid X) = \mu$,

where E denotes expected value of y_i (equaling "true" population mean μ) and becomes by definition a first-order moment function. Thus, for any sample that contains a number of observations of y_i, the following is true:

$$(4) \quad f(\hat{m}) = \frac{1}{N}\sum_{i=1}^{N}(y_i - \hat{\mu}) = 0 .$$

This is known as an empirical moment function, and the sample estimator $\hat{\mu}$ satisfies the expectation of zero at the "true" value of population parameters (Greene 2003).

Thus, the GMM method essentially minimizes the sample averages of the moment conditions to ensure that $f(\hat{m})$ is as close to zero as possible. In other words, a GMM estimator of μ is a vector that minimizes the generalized distance of the sample moments $f(m)$ from zero, where this generalized distance is defined by the quadratic form:

$$(5) \qquad f'(m) f(m) = \sum_{j=1}^{l} f_j^2(m) .$$

As demonstrated by Hansen (1982), however, the resulting estimate m is *valid* but *inefficient*. Hence, instead of minimizing the sum of least squares of $f(m)$ vector's components, a more generalized minimization problem could be solved for *m*:

$$(6) \qquad f'(m)\, W\, f(m) \;\rightarrow\; \min ,$$

where W is a positively defined, $l \times l$ symmetric matrix called the *weighting matrix*. The resulting estimate m is considered a GMM estimate ($m = m_{GMM}$). Evidently, there may be numerous valid estimates m_{GMM} that would correspond to different weight matrices *W*. It has been proven (Hansen 1982), however, that an asymptotically optimal GMM estimate (*i.e.* the estimate that would have the minimal and asymptotically small covariance matrix) is obtained by

choosing the weighting matrix W_{OPT} to be the inverse of the covariance matrix of the vector of moments. Considering possible correlations among observations to be negligible,

$$(7) \qquad W_{OPT} = \left(E\left(f\left(y_i, m\right) f'\left(y_i, m\right)\right)\right)^{-1}.$$

Generally, W_{OPT} depends on the vector m of unknown parameters, hence the iteration procedure of two (or more) steps is devised to obtain the optimal estimate. The first step obtains the set of initial estimates m_0 by solving (5), i.e. assuming the weights matrix W to be an identity matrix. Then, based on the estimates obtained, a valid W_{OPT} is built:

$$(8) \qquad W_{OPT_N} = \left(\frac{1}{N} \sum_{n=1}^{N} g\left(y_n, \hat{m}_{(0)}\right) g'\left(y_n, \hat{m}_{(0)}\right) \right)^{-1}.$$

On the second step of the iteration procedure, (6) is solved using $W = W_{OPT_N}$, producing $m = m_{GMM}$ as a valid and efficient GMM estimate. The two-step iteration procedure as described above helps ensure that the asymptotically optimal solution is found.

Building on the above discussion, for the Massachusetts panel analysis, the nonlinear heteroskedastic 2-Stage Least Squares procedure is employed first to estimate the parameters and the residuals of regression. The nonlinear two stage least squares (N2SLS) is a variation of 2SLS and a commonly used single equation estimation method that consists of using instrumental variables that are uncorrelated with the disturbances to obtain predicted values for the endogenous variables. Such predicted values replace the right hand side endogenous variables in the model to obtain consistent estimates of the parameters.

Given potential non-ideal properties of the data, the N2SLS estimation needs to be further modified, to ensure efficiency of estimates. This is achieved by weighting observations with White's estimate of the error correlation matrix (see White 1980). As a result, N2SLS estimates

are transformed into GMM estimates where the variance of the moment function $\boldsymbol{V}$ is taken to be block-diagonal (Greene 2003). In consistence with the principles of GMM, the block-diagonal matrix $\boldsymbol{V}$ then becomes W_{OPT} and is used to obtain the H2SLS estimates via GMM estimation. The next section provides a brief discussion of model fit and presents estimation results.

III. 5. Results

With the exception of one lost value in the process of obtaining lagged variables, all 3510 (i.e. 351 cities over a period of 10 years) observations, included in the dataset, were employed in the analysis. Since the MA-DOR dataset represents a complete, balanced panel for the period studied, any potential outliers (observations that lie relatively far from the mean, or the "center", of the data) were deemed to be not disposable without compromising the quality of the dataset.

While multicollinearity (a condition of the data where two or more regressors are correlated with each other, thus posing an inefficiency problem for the Ordinary Least Squares (OLS) regression estimates) and autoregression (correlation of a time series with its own past and future values) can potentially present a problem for panel data modeling, the fact that the number of cross-sectional observations is relatively large, while the time period over which the data were collected encompasses only 10 years undermines the probability of these conditions. Multicollinearity and autoregression are known to be more likely to affect panel samples with a large time span (Wooldridge 2002); moreover, the use of GMM rather than OLS estimates greatly reduces the sensitivity of estimates to the potential influences of non-ideal data properties. Given these considerations, the estimates obtained and presented below are regarded s robust to the econometric specifications.

The general fit of the model was determined by testing for sufficiency of orthogonality conditions, with obtained values p=0.452 for chi-distributed objective function statistics not

allowing to reject the null hypothesis that the overidentifying restrictions fit the model. Additionally, the significance of an included interaction term, operationalized as debt measure multiplied by HHI, versus purely linear regression form was tested by establishing its significant autonomous influence on response variable ($p=0.10$)[12].

The GMM estimates for the model, obtained according to the procedure described in the preceding section, appears in table III-3 below. Above all, the results reveal that debt per capita variable is significantly related to all the regressors in the debt equation, although there is a lack of significance between debt per capita and property tax burden. The autonomous effect of HHI as a measure of revenue diversification is also not statistically significant. However, the relationship between interactive term (debt per capita multiplied by HHI) is significant ($p=0.10$), lending weight to the theoretical hypothesis on the mitigating role of revenue structure diversity (H2). At the same time, revenue diversification (HHI) and property tax burden have significant positive influence on the levels of debt (in both cases, $p<0.0001$, see under debt equation in table III-3), which supports the assumption that the direct impact of revenue diversification on debt manifests itself to a greater degree than its expected indirect effect resulting from the relationship between revenue diversity and property tax burdens (see figure III-5 above).

The expected direction of relationship between indebtedness and municipality's fiscal position (fund balance) is not upheld by the findings ($p<0.0001$), pointing out to fiscal need, exemplified by lower fund balances, as a possible catalyst for borrowing, instead of budget-maximizing motivation which served as a basis for theoretical hypothesis H3. Higher debt limits, however, were found to have the expected positive relationship ($p=0.002$) with actual levels of indebtedness (H4), implying that property-rich municipalities allow themselves to incur more

[12] For all statistical tests in this chapter, the selected level of tolerance for Type 1 error is $p \leq 0.10$.

debt than their less well-off counterparts. Finally, intergovernmental revenue, expected to act as an additional budget boost, was found to be significantly negatively related ($p<0.0001$) to property tax burdens (H5), lending weight to the role of this type of revenue as an important local fiscal capacity factor, providing additional leeway for spending and, as a result, reducing the need for tax increases.

Table III-3. GMM Estimates for Debt per Capita/Property Tax Burden Variables

Variable	Parameter Estimate	Standard Error	t-value	Pr > |t|
INTERCEPT (TAX BURDEN EQUATION)	-1.85	1.24	-1.49	0.14
HHI	6.93	4.82	1.43	0.15
EXPENDITURES/BUDGET PER CAPITA	0.81	0.06	13.73	*<.0001*
IGR PER CAPITA	-1.11	0.24	-4.61	*<.0001*
UNEMPLOYMENT RATE	0.09	0.05	1.65	*0.10*
VOTER ORIENTATION	0.77	0.57	1.35	0.18
DEBT PER CAPITA (LAGGED)	0.91	0.62	1.47	0.14
DEBT PER CAPITA (LAGGED) *HHI	-5.27	3.28	-1.61	*0.10*
INTERCEPT (DEBT EQUATION)	0.21	0.09	2.22	*0.03*
PROPERTY TAX BURDEN	0.82	0.06	13.88	*<.0001*
HHI	1.03	0.20	5.18	*<.0001*
FUND BALANCE PER CAPITA	-0.73	0.07	-10.04	*<.0001*
DEBT LIMIT	0.00004	0.00001	3.12	*0.002*

The model also reveals significant positive influence on tax burdens of control variables, such as unemployment rate ($p=0.10$) and budget per capita ($p<0.0001$). According to the findings, every dollar increase in the budget per capita (an indicator for increased government spending) leads to $0.81 increase in property tax burdens (per capita), pointing to ongoing substantial reliance of governments on property tax, despite their attempts to diversify revenue structures and seek other types of funding. The increases in unemployment rate (every one percent), employed as a proxy for economic downturns, lead to significant increases in tax burdens (approximately $90 per capita), revealing significant budget demands that need to be met in the times of already scarce resources. While generally expected to play an important role in fiscal behavior, voter orientation, operationalized as a percent of democrat voters in each jurisdiction, did not exhibit significant effect on property tax burdens, possibly due to sample limitations.

The magnitudes of statistically significant parameter estimates reveal several interesting trends. In addition to increases determined by increased budget per capita spending and growing unemployment rate, property tax burdens (per capita) decrease by 1.11 per capita for every dollar increase in IGR per capita. This allows for consideration of IGR as an important source of municipal revenue due to its apparent revenue substitution capacity and is consistent with earlier work in this area (Bartle 1995, Hendrick 2006, Carroll, Eger, and Marlowe 2003).

Property tax burden, determined to be statistically significant in the debt equation, contributes to increase in debt per capita by $0.82 for every dollar added to the burden per capita. The role of revenue diversification (HHI) in determining government debt is exemplified by predicted $10.30 increase in debt per capita for every 1 percent (1%=0.01) increase in HHI (see table III-3). At the same time, according to the model, every dollar increase in fund balance per

capita results in $0.73 decrease in debt (per capita), thus indicating yet another potential substitution effect in municipal revenue/expenditure structure. Finally, for every $100,000 increase in the overall amount defining municipal debt limit, debt per capita increases by $0.04.

Unlike other variables, the marginal effect of interactive debt and revenue diversification measure, having an estimated parameter value of -5.27, cannot be directly interpreted. Instead, it is obtained by applying a first partial derivative formula to the model equation such that

(9) $ME_{\substack{debt\_per\_capita/ \\ prop\_tax\_burden}} = \hat{\beta}_{16} + \hat{\beta}_{18} * HHI$, where HHI assumes any given value of he revenue diversification variable. For example, given a sample mean for HHI variable, the marginal effect of debt per capita on property tax burdens would equal as follows (see table III-3 above):

(10) $ME_{\substack{debt\_per\_capita/ \\ prop\_tax\_burden}} = 0.91 - 5.27 * 0.18 \approx -0.039$ (in thousands of dollars).

Since both variables are measured in thousands of dollars, it can be implied that, for every dollar increase in debt per capita, under condition where HHI equals sample mean, property tax burdens decrease by $39. In differing magnitudes, negative marginal effect of debt per capita can be observed for all HHI values that are greater than 0.173 (the value that approaches in magnitude the sample mean and, substituted into (10), sets the equation equal to zero).

Similarly, the marginal effect of HHI is calculated as follows:

(11) $ME_{\substack{HHI/ \\ prop\_tax\_burden}} = \hat{\beta}_{12} + \hat{\beta}_{18} * DEBT\_CP$, where DEBT_CP variable can take on any observed value of interest. Since the model uses lagged measure of DEBT_CP ($DEBT\_CP = DEBT\_CP_{t-1}$), the calculated sample mean of the variable is equal to 1.57. The value which sets the equation (11) to zero, implying that all the values of debt per capita

exceeding it will result in negative marginal effect of HHI, is equal to 1.315 (in thousands of dollars) and is less than one standard deviation away from the mean. According to the estimates presented in table III-3 above, when debt per capita is equal to sample mean,

(12) $$ME_{\substack{HHI/ \\ prop\_tax\_burden}} = 6.93 - 5.27 * 1.57 \approx -1.35 .$$

The above implies that, at a given (constant) amount of debt per capita, for every 1 percent (1%=0.01) increase in HHI as a measure of revenue diversification, property tax burdens per capita decrease by as much as $1,350, which is actually greater than the autonomous marginal effect of HHI on debt, revealed by the debt equation. This reaffirms the importance of revenue diversification as a determinant of fiscal capacity and invites further investigation of its interactions with government debt.

The marginal effects of revenue diversification and debt on revenue on property tax burdens can be illustrated by using several municipalities from the sample. For example, Boston, the largest city in the Commonwealth (pop. 609,023), in the year 2009 had approximately $1,497 per capita in outstanding long-term GO debt, while its calculated revenue diversification level (HHI) was equal to 0.28. Similarly, the second largest city, Worcester (pop. 175,011), had approximately $,3,466 in outstanding debt per capita recorded for the same fiscal year, and the revenue diversification level (HHI) of 0.14. Given equation (9) and the GMM estimation results presented in table III-3, the marginal effect of debt on property tax burdens for the city of Boston in 2009 is calculated as follows:

(13) $$ME_{\substack{debt\_per\_capita/ \\ prop\_tax\_burden}} = 0.91 - 5.27 * 0.28 = (-0.57)$$ or $570 decrease per capita.

Similarly, for the city of Worcester, this effect would be calculated as:

(14) $$ME_{\substack{debt\_per\_capita/ \\ prop\_tax\_burden}} = 0.91 - 5.27 * 0.14 = 0.17$$ or $170 increase per capita.

The marginal effect of revenue diversification is calculated by using equation (11) and, for the city of Boston, equals:

(15) $ME_{\substack{HHI/ \\ prop\_tax\_burden}} = 6.93 - 5.27 * 1.497 = (-0.96)$ or \$960 decrease per capita, while

for the city of Worchester, this effect is calculated as being equal to:

(16) $ME_{\substack{HHI/ \\ prop\_tax\_burden}} = 6.93 - 5.27 * 3.466 = (-11.43)$ or \$11,420 decrease per capita.

To provide a frame of comparison, marginal effects of debt on property tax burdens, are calculated, for the same fiscal year and according to the same rules, for two smaller-size cities in the Commonwealth. One of them is city of Winchendon, having a population which approaches median size within the sample (pop. 10,164), \$2,147 per capita in outstanding debt and revenue diversification level of 0.17, based on the data recorded for the fiscal year 2009. The marginal effect of outstanding debt per capita on property tax burdens for Winchendon is therefore equal to 0.01 (i.e. merely \$10 increase per capita), while marginal effect of revenue diversification (HHI) is equal to (-4.38), indicating \$4,380 decrease per capita. Finally, for the smallest municipality in the Massachusetts sample, the town of Gosnold (pop. 83), marginal effect of debt on property tax burdens equals (-2.25) or \$2,250 decrease per capita, while marginal effect of revenue diversification (HHI) equals (-18.65) or \$ 18,650 decrease per capita, given municipality's outstanding debt per capita (according to 2009 data) of approximately \$4,855 and calculated revenue diversification (HHI) level of 0.6.

As shown above, for two out of four cities referenced above, the HHI values substantially exceed threshold level (HHI=0.173). Consequently, according to the model, the cities of Boston and Gosnold experience overall negative impact of debt on property tax burdens, while, for example, the city of Worcester, having the lowest HHI value, experiences positive effect. Similarly, with respect to marginal effects of HHI, since all the selected cities have higher actual

outstanding debt per capita as compared to the threshold value (DEBT_CP=1.315), the overall impact of revenue diversification is positive for each one. Hence, a conclusion can be drawn that revenue diversification and municipal debt share an important relationship in influencing property tax burdens; when the levels of debt and revenue diversity are relatively high, the property tax burdens tend to decrease, pointing to the mitigating role of revenue diversity.

III. 6. Discussion

Overall, the study provides some important insights into a complex municipal financial management framework, providing some evidence that governments entities acting strategically to mitigate the consequences of potential fiscal stress. On the one hand, empirical results only partially support theoretical expectations with regard to the role of revenue diversification as a contributing factor for the growth of municipal government debt and property tax burdens. According to the results, while revenue diversification has direct significant positive influence on the levels of debt, it does not appear to be influencing property tax burdens directly. On the other hand, according to the results, revenue diversification does help reduce tax burdens when combined with higher levels of debt, thus exhibiting, to some degree, its theoretically predicted mitigating fiscal effect. Thus, essentially the results imply that the expected fungibility effect does manifest itself as predicted, alluding to slower growth of tax burdens when the degree of revenue diversity is higher, regardless of relatively high levels of government debt.

Among other important findings, the results show that property tax burden increases as government budgets increase and tends to decrease as the inflows of IGR increases, ceteris *paribus*. At the same time, property tax burden has a significant positive effect on the levels of debt, meaning that increasing tax burdens may indeed lead to increased debt financing of government activities, thus alluding to the notion of budget-maximizing motivation.

On the other hand, contrary to expectations, the role of fund balance points to a more conservative fiscal behavior, indicating that the governments tend to view the savings cushion more as a genuine "rainy day" source of revenue than as a risk-reducing incentive for acquiring more debt. It is also important to remember that addition of debt always comes at expense in terms of repayment of both principal and added interest; while more risk-averse, fiscally conservative governments may tend to avoid this option as long as they can do so. While the levels of debt are significantly positively related to the monetary size of debt limits (per capita), their influence may be explained by accounting for the size (and thus varying scale of spending demands) of different municipalities.

The lack of significance for voter orientation with regard to property tax burdens indicates that, given high theoretical relevance of the variable, its effects have to be investigated further, possibly considering different operationalization of the voting patterns. Further research is also necessary to establish a more precise connection between various aspects of strategic borrowing and specific revenue sources (e.g. property tax/sales tax ratio, intergovernmental revenue subtypes).

Perhaps one of the main limitations of this study is its somewhat limited data sample, based on one state data and a relatively short time period. These limitations have obvious ramifications for generalizability of the study and did not allow for inclusion of such potentially influential exogenous variables as political diversity of legislatures or election, or for employing diverse socio-economic indicators (e.g. population density, income) as control variables. Nevertheless, the findings of the study significantly contribute to the construction of a more comprehensive picture of local finances and the relationship between government debt and

revenue diversification – the topic which is continued to be explored in the cross-state study presented in chapter IV.

CHAPTER IV

THE CROSS-STATE STUDY OF MUNICIPAL GOVERNMENTS (U.S. CENSUS 2002)

IV. 1. Background

The notion of revenue fungibility and implicit dynamics of revenue diversification-debt relationship is subject not only to the influence of internal factors such as financial position and intra-jurisdictional characteristics of a government entity but also to the impact of a wider external institutional environment. While the Massachusetts panel study was primarily concerned with the former, the study presented in this chapter goes beyond individual characteristics of municipalities, concentrating attention on fiscal rules that govern fiscal decisions at the local level of governance. To this end, in addition to financial and demographic variables, the research design presented below incorporates state-imposed limitations with respect to municipal spending, revenue-raising, and indebtedness.

In the modern system of fiscal federalism, state legislatures tend to retain control over the sources of revenue, especially the taxing authority, available to their local governments, as well as the authority to define the tax base (e.g. determining the sales tax exemptions). State constitutions or statutes also determine the basic governmental structure within each state and the expenditure assignments of each type of government (e.g. spending on education-related purposes). Finally, state governments impose specific tax and/or expenditure limits (TELs), as well as debt limits (tied to revenue base or voter approval requirements), all of which can act as additional constraints (Kiewiet and Szakaly 1996, Wandschneider, Faas, and Young 1982).

Based on the Leviathan model of fiscal federalism (Brennan & Buchanan 1979, 1980), state-imposed limits and regulation serve a distinct purpose of preventing the overuse of power by local officials, even if the rules imposed are not consistent with demands of the local median

voter or fail to account for individual differences in the resource base or goals of localities. We use this notion as a basis of our theoretical expectations with regard to the role of state-imposed tax, expenditure, and debt limits in determining local fiscal choices.

As revealed by the literature review in Chapter II, TELs as well as municipal debt limits are imposed with the intention of protecting taxpayers from excessive tax burdens and assuring safety and soundness of municipal borrowing. However, these constraints may also have unintended effects on local revenue structures due to the manner in which they restrict local government borrowing and taxing powers. For example, the debt and/or tax limits that restrict the power of local governments to borrow out of proportion to local property wealth, which can be related to fiscal prudence but also to potential revenue constraints in the times of recession. According to Mullins (2010), the ability of municipalities to respond to TELs is a function of underlying fiscal capacity in the face of undiminished demands for local services.

With respect to both local government debt and revenue diversity, the existing literature points to mixed impacts of state-imposed constraints. Saxton, Hoene, and Erie (2002), (1991), Shadbegian (1999), Sokolow (2000), McCabe and Feiock (2005) note that imposition of TELs potentially leads to decrease of property tax reliance by local governments. However, many authors have also found that TELs also led to greater levels of borrowing among local governments (Mullins and Joyce, 1996, Joyce and Mullins, 1991, Mullins, 2001, 2004; Danziger, 1980, Downs and Figlio 1999, and others).

With respect to debt limits, previous studies have concluded that they do not always constrain local fiscal behavior (e.g. see Kiewiet & Szakaly 1996), due to government's ability to circumvent the constraints by legislative or fiscal manipulations. Since voter referendum requirement and other limitations only directly influence general obligation debt, it is relatively

easy for municipalities to compensate the constrained capacity for issuing this type of bonds by greater reliance on revenue bonds which do not require the "full-faith-and-credit" guarantee and are not serviced by property taxes. Alternatively, local governments are free to use loopholes such as lease exceptions (e.g. Offner-Dean lease in California) or create project-oriented Tax Increment Districts (TIFs), financed through additional property tax collections but nor included in the state-imposed quantitative (revenue base-contingent) debt limit. Moreover, the focus on constraining *ad valorem* revenues becomes less effective when the share of those revenues in municipal revenue structures is gradually declining (Eddy-Nichols 1984). Finally, as argued by Eddy-Nichols (1984), the preference for revenue bond financing, resulting from constraints imposed on municipalities, can have negative externalities in a sense of much-needed capital funding being diverted from crucial but non-revenue-generating projects.

Some authors, however, do find that the limits tied to the property tax revenue base have at least some capacity to lower the levels of debt. For example, Farnham (1985) finds that state statutory debt limits tied to revenue base are actually capable to significantly lower the levels of debt (both general obligation and non-guaranteed) in local governments. This leads to the conclusion that, rather than concentrating on the mere presence of debt limits, specific types and combinations of constraints should also be considered.

Thus, while still adhering to the assumption of the fungibility argument which constitutes the core of the framework presented in Chapter II and describes the relationship between revenue diversification on municipal debt, the main goal of the cross-state study presented below is to address the influence and role of institutional fiscal constraints an the extent to which this role is mitigated by diversity of revenue structures. This idea has not yet been addressed in literature and thus represents the main theoretical contribution of this study. In similarity to the

Massachusetts panel study, the theoretical assumptions and hypotheses presented in the next section are based on the underlying assumption that municipal revenue structures are being arranged strategically, to ensure continuing financing of current and long-term goals/activities, at the same time being mindful of the state-imposed constraints.

IV. 2. Theory and Hypotheses

The theoretical expectations for this study rely on the already existing knowledge base on the binding/non-binding influence of state-imposed rules and potential strategic responses to their impacts by municipalities (Joyce & Mullins 1991, Kiewet & Shakaly 1996, Johnson & Kriz 2005, Mullins 2010, and others). Given varying constraining intent of the restrictions and their different combinations among the states, it is reasonable to expect that the cities located in states that share particular institutional constraints will differ with respect to their fiscal behavior, including their outstanding debt, from those that do not have those types of limitations.

The theoretical model reflecting potential influence of state-imposed fiscal rules is presented in figure IV-1 below. While the constraints municipalities are subjected to include both state and local restrictions, this study concentrates specifically on the role of the sovereign powers of the state and strategic behavior of municipalities to circumvent them (see McCabe 2000 and others). To this end, the analysis includes state-imposed TELs as well as debt limits designed to prevent local governments from engaging in Leviathan-like irresponsible fiscal behavior.

In accordance with the hypothesis on revenue diversification as a mitigating factor for fiscal stress, it is reasonable to expect that more diversified municipal revenue structures would generally contribute to higher levels of debt due to more stable revenue structure contributing to greater probability of debt repayment. However, given varying power of state-imposed

constraints, the actual outcome of revenue diversification can be expected to differ among municipal governments located in different states. In other words, greater diversity of revenue structures may affect binding powers of certain state-imposed limits but not others, as particular institutional arrangements in the form of state-imposed fiscal rules impact fiscal landscape of cities in a different way, depending on their home state. This expected impact of revenue diversification on both types of constraints (TELs and debt limitations), operationalized as Hirschman-Herfindahl Index (HHI) measure, is presented in figure IV-1 below.

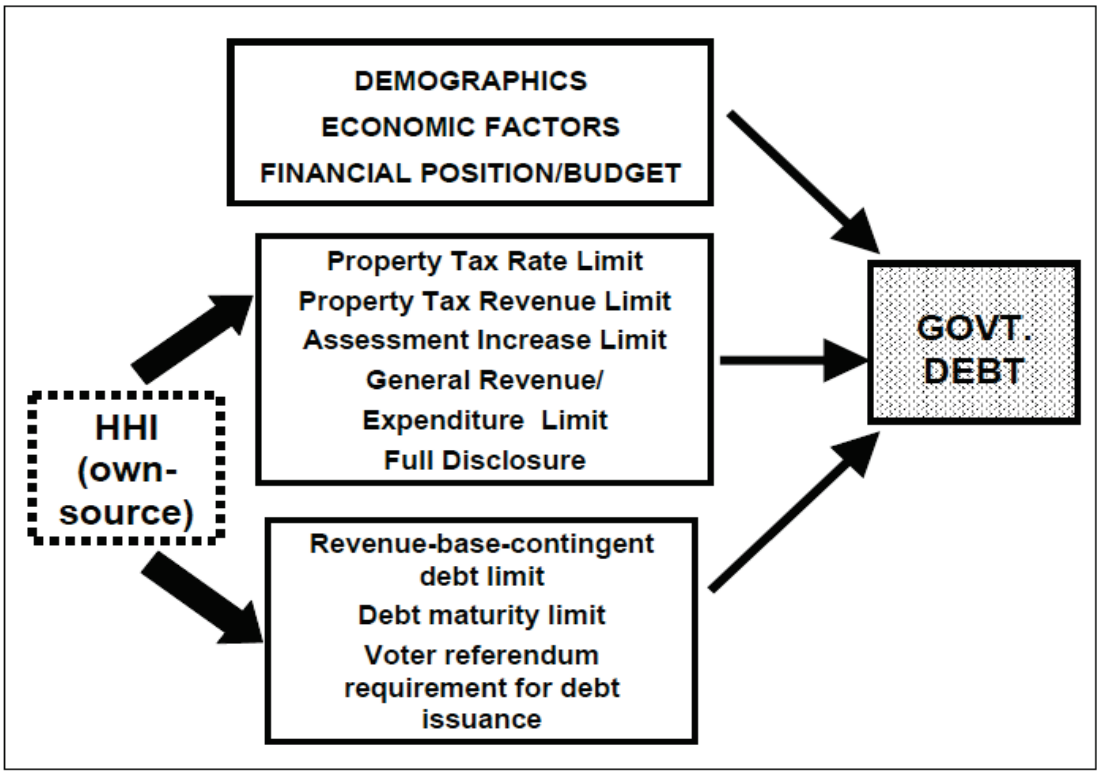


Figure IV-1. Institutional Influences on Revenue Diversification-Debt Relationship

Apart from a mere presence of an institutional limitation, the specific type and binding power are important, since these two dimensions differ for each of the limits commonly imposed on municipal governments. For example, full disclosure restriction on taxation (also known as "the truth in taxation" requirement) essentially requires the taxing municipality to keep citizens

fully informed of any extraordinary increases in the property tax rate, providing an opportunity for eventual roll-back of the effective rate, should it exceed the predetermined level. However, the relative binding power of this constraint is weak, since it can be easily overruled by the municipal legislature. On the other hand, general revenue and expenditure limits, just like debt limits that are specifically tied to the revenue base, can be considered significantly binding.

In general, the limitations placed on the taxing authority (assessment limits, property tax rate limits, and property tax levy limits) of municipalities are bound to negatively affect the levels of general obligation debt issuance, given the constraint on overall revenue that will be used to fund debt repayment. However, Joyce and Mullins (1991) indicate that property tax revenue limits especially can become nonbinding if revenue structures are sufficiently diversified.

With respect to the general tax limits, their constraining intent can be expected to be more pronounced due to the fact that they are less susceptible to mitigating impacts of revenue diversification than the limits pertaining only to property tax revenue. This notion is consistent with the suggestions made earlier by Joyce and Mullins (1991), who call general tax and revenue limits "formidable constraints" due to their almost universally-binding power. Additionally, as indicated by Johnson and Kriz (2005), the limitations on revenue can play a significant role in reducing the attractiveness of a jurisdiction as a potential debt issuer in the eyes of investors, thus raising the interest costs on debt.

Hence, it would be reasonable to expect that the governments that are bound by the general revenue limits would avoid incurring debt commitments that may constrain their future operational capacity and increase default risk. The same authors also point out that expenditure limits, stricter balanced budget rules, and restrictions on debt issuance are indirectly associated

with lower interest costs because they lead to lower default risk and thus higher credit rating (Johnson & Kriz 2005). While the data do not allow for including specific credit risk measures into the design (although most of the information reflected in credit ratings can be indirectly captured by included control variables), the presence of expenditure limits is expected to have a significant positive impact on municipal debt levels, especially if the revenue structure is diversified.

With respect to debt limits, their effect on the overall levels of municipal debt is expected to be negative, especially when both a quantitative (revenue-contingent) limit and an additional restriction requiring voter referendum are present, as in this case the solicitation of citizen approval would not be feasible if the costs of debt are expected to exceed the imposed cap. Similarly, whenever debt maturity limit is imposed to reduce borrowing-related risks, municipalities have less leeway in arranging the terms of debt financing and thus would be less inclined to borrow as opposed when such constraints are absent. Hence, it can be expected that, whenever the debt maturity limit is imposed, and, especially, when it is coupled with the quantitative limit, municipalities will tend to have lower levels of debt.

IV. 2.1. State-Imposed Fiscal Rules and Municipal Debt

In accordance with the primary goal of the study, the response variable employed in the research design is a measure of *total outstanding debt per capita* (including short-term and long-term obligations as reported by Census) at the beginning of the year. In consistence with the goals of the study, this measure of indebtedness includes only general obligation debt. Defined as DEBT_OUT_CP for modeling purposes, the measure of debt per capita is deemed to be more accurate than other measures recorded by Census as, unlike total debt issued and total debt

retired during the fiscal year, it is collected for all government units, including smaller cities and townships.

As this research design essentially concentrates on three types of institutional constraints – tax, expenditure, and debt limits, all the theoretical hypotheses can be divided into three groups. With regard to the debt restriction hypotheses, three main types of debt limits are included – the revenue base-contingent limit (that imposes a cap on outstanding debt, tying to the total assessed property value in the jurisdiction), debt maturity limit, and the debt referendum limit. For the purposes of hypothesis testing, dummy variables are constructed based on the categories describing state-imposed municipal debt limits as follows:

- *The existence and size of revenue base-contingent, quantitative debt limit* – the design is based on defining three categories of limits: "low" (5% or less of taxable property base), "medium" (from 5% to 10%), and "high" (more than 10%). Since quantitative debt limits, at least theoretically, constrain the ability of municipalities to borrow, negative relationship between these limits and debt per capita can be expected.
- In a similar fashion, the *GO debt maturity limit* is defined, according to the state-imposed rules, as "low" (requiring that all qualifying debt would be repaid in 25 years or less), "medium" (more than 25 but not exceeding 40 years), and "high" (more than 40 years allowed for debt repayment or the limit is not imposed by state-level rules). While not as direct a constraint as a quantitative limit, state-imposed lower debt maturity limits require that all the debt incurred be repaid faster. In certain circumstances, this can impose additional hardship to local governments and affect the decisions related both to the issuance and repayment of bonds; hence, it is reasonable to expect a negative association of this variable with the overall level of debt.

- *Voter approval/referendum requirement***,** given its politically constraining nature, can be expected to have negative autonomous effect on the levels of debt, even though this effect was not confirmed in previous studies (e,g, Farnham 1985). Specific rules for voter approval of debt differ among the states. As analysis of state-imposed rules for municipalities reveals, the most common type of voter approval required is simple majority vote. Only as few as nine states currently require supermajority voter approval for GO debt, while many do not impose the voter approval requirement at all. Given this notion, for the purposes of the analysis the data was divided into two groups, based on the presence of voter approval requirement rather than its stringency.

The following hypotheses on the impact of these limits with respect to municipal debt are formulated:

H1: Cities in states that impose stricter (i.e. lower) revenue base-contingent, quantitative debt limits on municipalities have lower levels of debt, ceteris paribus.

H2: Cities in states that impose a voter referendum requirement (simple or supermajority) on municipalities (a) have lower levels of debt, and especially so when (b) referendum requirement is combined with the presence of stricter (lower) quantitative debt limits, ceteris paribus.

H3: Cities in states that impose low debt maturity limits on municipalities have lower levels of debt when low maturity limit is combined with a low quantitative limit, ceteris paribus.

To test the above hypotheses, two interaction measures are introduced in the design. The "VOTE*Q_DEBT" measure is used to capture the multiplicative effect of either "low" or "medium"-sized quantitative debt limit and voter approval requirement (H2), while "Q_DEBT_Low*MATURITY" is used to account for the presence of both low quantitative and

low maturity limits (H3). As indicated by the analysis of state-level rules, a total of twelve states impose both "low" quantitative debt limits and voter referendum requirement, while another four impose referendums but use "medium"-sized quantitative limits.

The interaction measure "VOTE*Q_DEBT" includes cities in states belonging to either of the aforementioned groups. In a similar fashion, due to scarcity of states that impose "low" municipal debt maturity requirements together with "low" quantitative limits, the measure "Q_DEBT_LOW*MATURITY" includes the states with both "low" and "medium" maturity requirement. The total number of states imposing both voter referendum and limiting debt maturity up to 40 years, according to the analysis, is sixteen.

Based on expected mitigating effects of revenue diversification, the analysis also includes an interaction effect variable to reflect potential multiplicative influence between HHI (as a revenue diversification measure) and low debt maturity limits. Since shorter debt maturity periods would potentially create additional borrowing risk by requiring quicker bond repayment, the cities that have more diversified and thus more stable revenue structures would be able to absorb such risk better. Hence, it is stipulated that:

H4: Cities in states that impose low debt maturity limits but have more diversified revenue structures have higher levels of debt as compared to those that are constrained by the same limits but lower levels of revenue diversity, ceteris paribus.

To address this hypothesis, the research design includes an interaction measure of "MATURITY*HHI_REV", accounting for multiplicative impact of municipal revenue diversification and state-imposed low or medium debt maturity limits, present, according to the analysis of fiscal rules, in as many as thirty-five states.

To reiterate, if the state-imposed municipal debt limitations are effective, it can be expected that their negative impacts on the actual amount of indebtedness will be quite profound. Moreover, even assuming that revenue base-contingent quantitative limits are binding, cities may have an incentive to prevent excessive debt, especially if they also have lee-than-generous limits on the length of bond maturity. At the same time, the influence of debt maturity limits may potentially be mitigated by the use of more diversified revenue structures. Voter referendum requirement, even though not confirmed to be a significant influence by Farnham (1985), is also expected to reduce the levels of debt due to its politically restraining nature, especially when combined with quantitative debt limit. The distribution of states by fiscal rules imposed on municipalities with respect to debt is summarized in table IV-1 below.

Table IV-1. Distribution of Fiscal Rules on Municipal Debt among the States

	Revenue-Contingent Quantitative Debt Limit (Q_DEBT)	**Debt Maturity Limit (MATURITY)**		**Voting on GO Debt (VOTE)**
"Low"	21	10	**Supermajority**	9
"Medium"	13	25	**Simple Majority**	13
"High"	14	13	**No Requirement**	26
Total	**48**	**48**	**Total**	**48**

To examine the role of all the commonly imposed TELs, remaining consistent with the framework suggested by earlier studies (Joyce & Mullins 1991, Mullins & Wallin 2004, Deller & Stallman 2007), several dichotomous dummy variables are created, reflecting on the types and properties of specific limitations. The following limits, imposed in selected states, can be both binding and non-binding depending on specific circumstances:

- *Property Tax Rate Limit (Y/N)* – imposed as a maximum rate that can be levied by the municipality. Previous research finds the rate limit binding if coupled with assessment

increase limit (Joyce & Mullins 1991), which currently is the case in eleven states. To this end, the variable reflecting the combined effect of these two limits (PTRL*PAIL) for the states in question is included in the design.

- ***Property Tax Revenue (Levy) Limit ((Y/N)*** – imposing a cap on overall municipal property tax revenue and potentially binding; however, as showed by (Joyce & Mullins 1991), its binding power can be mitigated to a certain extent through diversification of revenue sources. Thus an interaction measure of HHI_REV*PTLL is included in the design to reflect on the multiplicative impact of the two factors with respect to municipal debt in 25 states that impose PTLL requirement.
- *Assessment Increase Limit (Y/N)* – constrains taxing powers of municipalities by imposing a "ceiling" on annual increase in property assessment values. As mentioned above, the limit is only binding if coupled with an overall or specific property tax rate limit (Joyce & Mullins 1991).
- *General Revenue Limit (Y/N)* – this measure, indexed to the rate of inflation, limits overall revenue received by the municipalities in a given year and is potentially binding as a "formidable constraint" on municipal powers (Joyce & Mullins 1991).
- *General Expenditure Limit (Y/N)* - this measure, indexed to the rate of inflation, limits overall government expenditures in a given year and, like the General Revenue Limit, is potentially binding as a stand-alone constraint, influencing government's fiscal decisions (Joyce & Mullins 1991).
- *Full Disclosure (Y/N)* – the measure requiring a specifically designed system which would allow the taxpayers to receive a timely notice of proposed property tax rate changes so that to afford them an opportunity to express their views on these municipal

financial decisions. The variable reflecting on the presence of this constraint is included in the design even though, as a stand-alone limitation, full disclosure requirement so far has largely been considered nonbinding as it requires only a formal vote (generally a simple majority) of the local legislature to increase the tax rate or levy (Joyce & Mullins 1991).

The empirical distribution of TELs across the states, as described and classified by Mullins & Wallin (2004), is presented in table IV-2 below. As can be seen from this summary, only a few states impose general revenue or expenditure limits on municipalities, while more than half of them have limits on property tax rate and/or levy. Additionally, as many as nineteen states impose a full-disclosure requirement, and twelve have rules preventing excessive property assessment increases.

Table IV-2. Distribution of Municipal TELs among the States (source: *Mullins & Wallin 2004*)

Definitions	Property Tax Rate Limit (PTRL)	Property Tax Levy Limit (PTLL)	Property Assessment Increase Limit (PAIL)	General Revenue Limit (GRL)	General Expenditure Limit (GEL)	Full Disclosure (FD)
"YES"	34	25	12	4	5	19
"NO"	14	23	36	44	43	29

Based on the literature review presented in Chapter II and on the properties of individual tax limits described above, negative autonomous impact with respect to the levels of debt can be expected from the presence of all property tax and general revenue limits, provided they are binding. To this end, the research design includes appropriate interaction effect variables in the model to account for these properties of specific constraints. At the same time, general expenditure limits are specifically designed to encourage fiscal conservativeness and make more current revenue available for spending purposes, although they also tend to decrease borrowing

costs for municipalities by boosting their creditworthiness (as a result of adopting more conservative fiscal practices) from investors' point of view.

Thus, whenever general expenditure limits are present, municipalities may still be inclined to borrow more for their capital needs, especially if their revenue structures are well-diversified. Potential mitigating impacts can be therefore achieved through greater revenue diversification by individual municipalities with respect to both property tax revenue (levy) and general expenditure limit. Given all of the above, the following hypotheses, addressing the role of TELs, are included in the research design:

H5: Cities in states with binding property tax rate limit (i.e. in cases where this limit is combined with a limit on assessment increase) have lower levels of debt than cities in states where such limits are not imposed or lack binding power, ceteris paribus.

H6: Municipal governments with less diversified revenue structures (as determined by HHI), located in the states with a municipal property tax revenue (levy) limit have lower levels of debt as compared to local governments that are constrained by the limit but have more diversified structures, ceteris paribus.

H7: Cities in states with general revenue limit have lower levels of debt than cities in states without such limits, ceteris paribus.

H8: Cities in states with general expenditure limit have lower levels of debt than cities in states without such limits, ceteris paribus.

All dummy variables reflecting on state-imposed TELs and debt limits are presentedd in detail in table IV-3.

Table IV-3. Description of Dummy Variables Employed in the Research Design

Type	Dummy Variable	Name	Description
TAX AND EXPENDITURE LIMITS	PTRL	Property Tax Rate Limit	Assigned a value of "1" if the state imposes this limitation on municipalities and "0" otherwise
	PTLL	Property Tax Levy Limit	Assigned a value of "1" if the state imposes this limitation on municipalities and "0" otherwise
	PAIL	Property Assessment Increase Limit	Assigned a value of "1" if the state imposes this limitation on municipalities and "0" otherwise
	GRL	General Revenue Limit	Assigned a value of "1" if the state imposes this limitation on municipalities and "0" otherwise
	GEL	General Expenditure Limit	Assigned a value of "1" if the state imposes this limitation on municipalities and "0" otherwise
	FD	Full Disclosure Requirement	Assigned a value of "1" if the state imposes this limitation on municipalities and "0" otherwise

(table continues)

Table IV-3. *(continued)*

Type	Dummy Variable	Name	Description
D E B T L I M I T S	**Q_DEBT**	**State-imposed quantitative (revenue contingent) debt limit**	**Defined as:** **"Low" (up to 5%) – included group (Y/N) – assigned a value of "1" if the state imposes this requirement and "0" otherwise** **"Medium" (5-10%) – included group (Y/N) - assigned a value of "1" if the state imposes this requirement and "0" otherwise** **High"" (more than 10% or limitation undefined) – base group**
	MATURITY	**State-imposed debt maturity limit (maximum period for repayment of bonds**	**Defined as:** **"Low" (up to 25 years) – included group (Y/N) – assigned a value of "1" if the state imposes this requirement and "0" otherwise** **"Medium" (25-40 years) – included group (Y/N) - assigned a value of "1" if the state imposes this requirement and "0" otherwise** **High"" (more than 40 years debt maturity or no explicit limitation imposed) – base group**
	VOTE	**State-imposed voter municipal debt-specific referendum requirement**	**Assigned a value of "1" if the state imposes either simple or supermajority vote requirement on municipal debt issuance; otherwise, a value of "0" is assigned**

IV. 2.2. Other Variables of Interest

Among the key independent variables in the design, the measure of *revenue diversification based on the HHI* has the greatest theoretical relevance (see Chapter II for more thorough discussion of its instrumental properties). For the purposes of this study, given

feasibility considerations and availability of data, the HHI measure was constructed using five most common own-source revenue streams, used by municipal governments. Specific sources include municipal property and sales taxes, user charges and fees, other taxes (not specified as separate categories), and miscellaneous revenue. In much the same way as Massachusetts study, the design does not include municipality's proprietary income, fund transfers or investment fund revenue, concentrating instead exclusively on own-source general fund receipts and corresponding GO debt financing of governmental activities.

Another variable of interest in the design is the level of *statewide special district revenue*, recorded for each state annually by Census. Existing research reveals that, within the modern institutional environment of the U.S. federal system, state governments exercise control over local fiscal decisions not only through direct grants, TELs and other fiscal constraints, but also through the influence on governmental organization (Krueger & Bernick 2010). Based on several previous studies (Carr 2006, Deller & Stallmann 2007), the number of special districts in the state can be expected to significantly increase if fiscal activity of municipal governments is constrained. Moreover, Chernick et al. (2011) find that that in states which rely more heavily on special districts, municipal general revenues tend to be lower. The research design developed for this study includes the same measure of special district influence as introduced by Chernick et al. (2011), expecting that that greater share of special district revenues, defined as a percentage of overall local government general revenue in the state will be negatively related to the levels of debt for municipalities in that state. The related hypothesis stipulates that:

H9: Cities located n the states that have greater share of special district revenues will have lower levels of debt, ceteris paribus.

As recorded by Census, municipal fund balances are divided into three groups: the sinking fund, holding revenue dedicated as an offset to all outstanding debt (i.e. essentially acting as a debt service fund for all GO and other debt), bond funds, which hold proceeds of bond issues pending their disbursement, and "other" funds, which encompass other types of assets (including but not limited to cash, commercial paper and other securities, etc.). All of the assets in the aforementioned funds as accounted for by Census are considered to be liquid (cash and marketable securities), exclude receivables and investment/trust assets, as well as investment income and prepaid expenses. Since the measure of fund balance, operationalized in the Massachusetts study as "free cash" plus stabilization fund holding, if any (see Chapter III for more details), is not available in the Census 2002 data, the research design employs a measure of these *liquid fund assets per capita*, as a proxy for the size of municipal government assets and its fiscal feasibility. Given this notion, it is expected that the size of these assets would be directly related to the levels of outstanding debt, with more asset-rich governments having an ability to incur more leverage in the form of debt financing, as compared to their less endowed counterparts:

H10: Cities having higher balances of liquid fund assets per capita will have higher levels of debt, ceteris paribus.

To ensure more robust specification of the model, several control variables are employed in the design. First, the level of *median income* is expected to influence fiscal decisions, with income-richer municipalities potentially more willing to assume the risk of increased financial obligations, translating into higher levels of debt. Median personal income can therefore be reasonably expected to have a positive relationship with debt, both due to potentially higher borrowing capacity, as well as to positive elasticity of demand for capital goods (Farnham 1985).

On the other hand, previous studies indicate greater opposition to government borrowing by higher-income residents (Adams 1977), which leads to the conclusion potential impact of income variable needs to be empirically established. Ultimately, median income, as well as *percent of residents living in poverty* variable which also appears in the design, are used to capture the wealth of jurisdictions, the former focusing on sheer potential for spending and taxing activities, and the latter reflecting on the income inequality aspect of the problem.

Even though empirical effects of *geographic regions* need to be investigated, it would be reasonable to assume that, as a general rule, the cities located in more fiscally conservative states in Southeast and a large part of the Western USA would have lower levels of debt as compared to their more liberal counterparts. To this end, the design includes dummy variables for U.S. regions, based on the classification used by Census (see appendix E for more details).

With regard to *intergovernmental revenue per capita*, the same rationale as in the Massachusetts study (see section 2.3.2) is employed, expecting that higher levels of intergovernmental revenue would potentially lead to lower levels of municipal debt due to their ability to increase local fiscal capacity (as earlier suggested by Clingermeier & Wood 1995). Finally, with respect to the overall size of the annual municipal expenditures (including both operational and capital spending during the fiscal year), we expect a positive relationship with municipal debt, stipulating that higher levels of overall spending, under a *ceteris paribus* condition, would require greater revenue effort, including debt financing.

A summary of the properties and descriptions of all the variables in the design except state-level constraint dummies, appear in table IV-4 below. Due to a large number of variables included in the design, the table includes variable names as well as their operational abbreviations, followed by their type (with total outstanding debt per capita appearing as a

response variable and all the others assigned either to "exogenous" or to "control" group) and their empirical description.

Table IV-4. Description of U.S. Census Variables Included in the Research Design

Variable	Type	Description
HHI (HHI_REV)	**exogenous**	**Revenue diversification measure (see chapter II, as well as Suyderhoud 1994, Hendrick 2002, Carroll et al. 2003, etc)[13]**
TOTAL OUTSTANDING DEBT PER CAPITA (DEBT_OUT_CP)	**response**	**Total outstanding debt per capita for each municipality, recorded at the beginning of the fiscal year and divided by the total population**
SPECIAL DISTRICT REVENUE RATIO (SD_RATIO)	**exogenous**	**Statewide total of revenues from special districts as a share of total local government general revenue**
LIQUID FUND ASSETS PER CAPITA (LIQUID_ASSETS_CP)	**exogenous**	**Total amount of assets held by municipality in governmental funds excluding bonds fund and sinking fund, divided by the total population.**
TOTAL GOVERNMENT EXPENDITURES PER CAPITA (EXPEND_CP)	**control**	**Total (annual) expenditures divided by total population in the municipality; includes both operating and capital expenditures**

(table continues)

[13] Own-source revenue sources in this design include the following:
- Total Property Tax Revenues
- Total General Sales Tax Revenues
- "Other" Taxes (including local income tax, excise taxes, etc.)
- Total General Charges for Services
- Total Miscellaneous Revenue (including interest, special assessments, property sale, etc.)

Table IV-4. *(continued)*

Variable	Type	Description
IGR PER CAPITA (IGR_CP)	**control**	**Total amount of (annual) state, federal grants, and interlocal revenues received by municipality**
MEDIAN PERSONAL INCOME (MED_INCOME)	**control**	**Recorded individually every year for each county; a proxy for measuring wealth and public service demand of the jurisdiction**
PERCENT LIVING IN POVERTY (PCT_POVERTY)	**control**	**Recorded individually every year for each county; percent of local total population living below established poverty threshold (measuring the extent of local income inequality and wealth)**
REGION (NE, MW, STH)	**control**	**Assigned in accordance with the geographic location of the jurisdiction:** **- *Northeast* (included group); a value of 1" is assigned to municipalities located in the states defined as part of the region and "0" to all others;** **- *Midwest* (included group); a value of 1" is assigned to municipalities located in the states defined as part of the region and "0" to all others;** **- *South* (included group); a value of 1" is assigned to municipalities located in the states defined as part of the region and "0" to all others;** **- *West* (base group)**

IV. 3. Data and Methods

IV. 3.1. Data

To evaluate municipal indebtedness and other fiscal indicators, the study uses the 2002 U.S. Census data on local government finances (U.S. Census 2007), encompassing all the U.S. states except Alaska, Hawaii, and District of Columbia [14], and a wide array of financial variables. To ensure proper model specification, relevant demographic measures, borrowed from the Demographic U.S. Census for the same year, also appear in the design. The best attempt was made to include as many observations as possible in the design; however, due to missing data and discrepancies of records the number of potential candidates for analysis was reduced from more than 35,000 to 12,446 observations.

Collection of data on fiscal rules (tax, expenditure, and debt limits imposed on municipalities by states) was implemented by consulting original sources such as state constitutions and statutes, as well as prior literature. Specifically, the types and state classifications on state-imposed tax and expenditure limits were drawn from an earlier work by Mullins & Wallin (2004), while data on state-imposed municipal debt limits was compiled from original sources. As revealed by detailed analysis of the TELs and debt limitations imposed by different states, the constraints on municipal borrowing vary greatly by jurisdiction.

[14] The above states are excluded from the analysis due to their unique local governance structures. In Alaska, this structure is based on the division of the entire state into organized or unorganized (regional) boroughs, where a mix of local public services is provided by overlapping municipal, borough, and state government jurisdictions. In Hawaii, municipal corporations do not exist as such and their functions are performed by several designated county governments. Finally, the District of Columbia, being under the direct authority of the U.S. Congress, has unique powers, more similar to those granted to other states rather than municipalities. Given the lack of similarity of these structures to other states, all the three aforementioned states were considered significant outliers for the purposes of the study and thus were not included in the sample.

According to the data compiled by Mullins and Wallin (2004), more than half of U.S. states impose a limit on municipal property tax rate. The limits on property tax revenue (levy) are also quite common, with 25 states imposing this requirement. General revenue and expenditure limits are comparatively rare, even though potentially having the highest binding power. Ultimately, the goal of the study is to evaluate not only autonomous but also combined effects of different TELs, which are reflected in the regression model in the form of interaction effects.

With respect to quantitative debt limits, most states impose limitations expressed as a certain percentage of taxable property (assessed value) in the jurisdiction. The percentage is usually calculated based on most current tax base valuation data, even though some states use modified measures. For example, New Jersey requires that municipalities calculate the equalized property valuation average over the period of last three years (New Jersey Statutes §40A-2-6), while in Connecticut, the calculation of the debt limit is quite unique in that it requires that most regular debt be confined to no more than 2.25 times annual receipts from taxation, while the overall debt can reach as much as 7 times (General Statutes of Connecticut § 7-374-b). Limits on indebtedness imposed on GO debt usually do not include bonds issued by the city for the purpose of acquiring, enlarging, extending or improving their utilities, especially storm or sanitary sewer systems nor some specific types of street infrastructure improvements. Additionally, the quantitative municipal debt limit generally does not include debt approved prior to issuance in a referendum, tax anticipation notes, authorized lease-purchase transactions and other types of "irregular" debt commitments. Moreover, a few states (e.g. West Virginia, Mississippi) have special provisions in their law, allowing municipalities to exceed established quantitative debt limits to secure debt financing for certain capital improvement projects.

In some states, select cities are exempt from general constitutional or statutory requirements by special provisions - the cities of Sheffield and Tuscumbia are authorized to incur higher levels of debt by the Constitution of the State of Alabama (Alabama State Constitution of 1901, § 222), while the City of New York enjoys similar special treatment in the state of New York Code (NY LFN §2-8-104.00b). At the same time, some states impose different restrictions on the cities depending on their size (e.g. Kentucky, Illinois, andAlabama). The state of Nevada imposes different requirements on entities qualified as "cities" and those qualified as "towns", with the former having higher state-imposed statutory debt limits than the latter. Similar provisions distinguishing between the types of municipalities are present in the statutes of Ohio (Ohio Revised Statutes §133). To the extent possible, appropriate adjustments were made in the dataset to reflect these provisions.

The majority of states do impose a simple majority-based voter approval requirement for municipal bond issuance, requiring the option to be specifically addressed in general or special election. Only a few, however, require a supermajority voter approval (i.e. requiring more than 50% plus one vote). A few states (including North Carolina, New Jersey, Vermont, and Wisconsin) require debt referendum to be held only upon written voter protests over new debt issuance. In some states, the debt limits are different for voter approved and non-approved debt. For example, while the Constitution of the State of Washington allows the cities to borrow up to 5% of assessed property value, no more than 1.5% of GO debt can be incurred without majority voter approval. In Pennsylvania, only the non-voter-approved debt is capped.

Three states – Florida, Nebraska, and Tennessee do not impose any direct requirements on municipal government debt. State of Maryland, while imposing a rather generous 40 year municipal debt maturity limit (Maryland Code, sec. 23A-40), does not have a quantitative debt

limit or specific voting requirement for debt issuance. In Arizona, only the debt exceeding certain percentage requires voter approval (Arizona Revised Statutes §35-456-d). Similarly, the citizens of North Dakota, Maryland, and South Carolina can vote to increase existing municipal debt limits, should they acknowledge a need to do so.

Finally, several states impose additional restrictions on municipalities by requiring that debt issuance be approved by a state-imposed regulatory agency. In Louisiana, municipal debt is constitutionally subjected to the State Bond Commission approval, while the state-level Local Government Commission has dedicated powers to limit maturity of municipal GO debt in North Carolina (North Carolina General Statutes §159-65-a3). In a similar fashion, the Commonwealth of Massachusetts and the State of Rhode Island while imposing a general municipal borrowing limit tied to a specific percentage of assessed property value in municipal jurisdictions, allow for additional indebtedness provided the approval of state finance authority is secured (Massachusetts General Law §44-10, Rhode Island Statutes §45-12-11). Since the state-imposed regulatory authority is relevant only in a few selected states, it was not introduced as a separate factor in the research design; however, the assigned rating for quantitative debt limitation for the purposes of modeling was changed to "low" instead of "medium" it would have qualified for otherwise (see section 2.2. for more details). Similarly, the allowable debt maturity rating for the state of North Carolina was assigned to the "low" category due to implicit constraint resulting from state regulatory agency approval requirement.

The lack of uniformity among state-imposed rules allows for comparison of their influence on municipal fiscal decisions. Combined with the US Census data on government finance, it provides a deeper insight into the role and significance of state financial policies and

their relationship to local strategic behavior. A detailed description and operationalization of state-imposed rules appears in the next section.

IV. 3.2. Models and Estimation

IV. 3.2.1. Empirical Model Specification

Based on theoretical expectations laid out in previous sections, the intrinsically linear regression model is constructed as presented in figure IV-2 below.

$$DEBT\_OUT\_CP_i = \beta_1 + \beta_2 HHI\_REV_i + \beta_3 LIQUID\_ASSETS\_CP_i + \beta_4 IGR\_CP\_LOG_i$$
$$+\beta_5 EXPEND\_CP\_LOG_i + \beta_6 SD\_RATIO_i + \beta_7 INCOME\_MED + \beta_8 PCT\_POVERTY +$$
$$+\beta_9 GRL_i + \beta_{10} GEL_i + \beta_{11} FD_i + \beta_{12} Q\_DEBT\_LOW_i + \beta_{13} Q\_DEBT\_MED_i + \beta_{14} VOTE_i +$$
$$+\beta_{15} VOTE_i * Q\_DEBT_i + \beta_{16} Q\_DEBT\_LOW_i * MATURITY_i + \beta_{17} MATURITY_i * HHI\_REV$$
$$+\beta_{18} NE_i + \beta_{19} MW_i + \beta_{20} STH_i + \beta_{21} PTRL_i * PAIL_i + \beta_{22} HHI\_REV_i * PTLL_i + \varepsilon_i$$

Figure IV-2. Empirical Model: Regression Equation in Population Form

As seen in figure IV-2, several interaction terms are included in the model to reflect on multiplicative influences of certain variables above and beyond their stand-alone effects. The model also contains several dummy variables, which, according to the logic of econometric modeling, are used to account for qualitative traits (see table 3 above for more details). The dummy variables cannot take on any other value but 0 and 1 so as not to introduce bias into the estimation as, numerically, any value greater than 1 attributed to a certain trait would imply rank ordering of the categories rather than their qualitative differences. Hence, the number of dummy variables for every "*n*" number of characteristics should be equal to *n-1*, with one trait serving as a "base" group for which no dummy is assigned but which can be evaluated by referencing the absence of all other (*n-1*) traits. The detailed description of data properties and econometric estimation of the model appears in the next section.

IV. 3.2.2. Estimation of Intrinsically Linear Regression: Feasible Generalized Least Squares (FGLS)

Given the properties of the sample and the goals of the design, the analysis of U.S. census data was based on regression analysis. The most commonly used method for estimating intrinsically linear regression models is the Ordinary Least Squares (OLS) procedure, based on minimization of the total sum of residuals. The ideal OLS estimates, however, are subject to certain conditions that need to be satisfied by the data utilized in the analysis. The set of such conditions, known as Gauss-Markov Theorem, requires the following (Wooldridge 2002):

- In a linear model in which the errors (residuals) have expected value of 0 (conditional on the independent variables such that $E(u \mid X) = 0$), which ensures that regressors are truly exogenous
- The errors in aforementioned model also should be uncorrelated ($\text{cov}(u_s, u_j) = 0$ for every $s \neq j$, i.e. no autocorrelation) and have constant variance (i.e. be homoskedastic). Given these two conditions, the OLS produces Best Linear Unbiased Estimators (or OLS is BLUE).

In addition to the above, for an efficient regression model, the regressors themselves should all be non-stochastic (i.e. fixed in repeated samples), have sufficient variation, and be correctly specified (i.e., no omitted relevant variables and no irrelevant variables are included in the model). Assuming correct specification of the model, (based on theoretical relevance of variables and given the constraints imposed by limited availability of data), as well as non-stochastic and sufficiently diverse nature of the variables in the design, the tests were performed to evaluate the potential for presence of heteroskedasticity and multicollinearity conditions in the sample.

To account for possible multicollinearity, the correlation matrix of residuals was evaluated for all the variables in the sample, using both Condition Index and Variance Inflation Factor tests (Greene 2003). While both tests indicated the presence of low to moderate multicollinearity, its established levels were deemed unlikely to influence significantly estimation results. The results of White's General Test (White 1980) for heteroskedasticity, however, indicated the presence of unequal variance among residuals, thus effectively eliminating the possibility of producing optimal regression estimates through the OLS procedure.

Given these considerations, the Feasible Generalized Least Squares (FGLS) procedure was employed to estimate the model. Similar to OLS, the FGLS procedure relies on fixed independent variables, measured without error, and random residuals. However, it does not require that the residuals be independently and identically distributed, which makes it a viable option when ideal properties of the data cannot be guaranteed. The FGLS estimation is based on the use of $\hat{\sigma}_i$, obtained through the following steps:

- Original model residuals ($\hat{u}_i$) are calculated by means of OLS regression and the following relationship is established: $\sigma_i^2 = f(X_i)$;
- $\hat{\sigma}_i$ is estimated by regressing $\hat{u}_i$ on all the right hand-side variables in the original model so that $\hat{u}_i = f(X_i) + v_i$;
- The original model is transformed by introducing "weights" obtained by dividing each term of the original equation by $\hat{\sigma}_i$ so that

(1) $$\widehat{\beta}_{FGLS} = \frac{\sum_{i=1}^{N}(X_i^* - \overline{X}_i)(Y_i^* - \overline{Y}_i)}{\sum_{i=1}^{N}(X_i^* - \overline{X}_i)^2}$$, where $X_i^* = X_i / \hat{\sigma}_i$ and $Y_i^* = Y_i / \hat{\sigma}_i$

By using FGLS, the weights are assigned differently to observations, depending on their error variance, with those having higher variance being given lower weight and vice versa. In this respect, the GFLS estimation is similar to the Weighted Least Squares (WLS) procedure, except that it is based on the assumption that the exact form of error variance is unknown, to avoid possible misspecification (Greene 2003). Thus the estimates obtained by FGLS in this case can be considered unbiased and asymptotically more efficient than those obtained by using simple OLS procedure (Greene 2003).

IV. 3.2.3. Pre-Model Analysis and Descriptive Statistics

To ensure the absence of systematic errors resulting from data discrepancies, descriptive statistics for all the data used in the analysis were generated. Their summaries, reflecting on statistical properties of both continuous and dummy variables that appear in the research design, are presented in tables below. Additionally, before deciding on the exact form of the regression, all the continuous variables were plotted against the response variable DEBT_CP_OUT to evaluate the character of their dependency. As a result, two original variables, IGR_CP and EXPEND_CP were transformed into logged functions in order to reflect their relationship with the response variable more accurately (see table IV-5). The main variable of interest, HHI_REV, was also fitted into a distributional pattern, to help understand its expected behavior in the model. Fitted plot, as well as frequency distribution chart for HHI_REV variable appears in figure IV-3 below.

Table IV-5. Descriptive Statistics for Continuous Variables[15]

Variable	Reference Label	Mean	Standard Deviation	Min	Max	Coefficient of Variation[16]
DEBT PER CAPITA	**DEBT_OUT_CP**	2.56	19.92	0.00	1210.39	776.92
HHI/ DIVERSIFICATION	**HHI_REV**	0.70	0.22	0.01	0.998	31.82
LIQUID FUND ASSETS PER CAPITA	**LIQUID_ ASSETS_CP**	2.28	14.35	0.00	823.22	629.61
IGR PER CAPITA	**IGR_CP_ LOG**	-1.77	1.56	-8.76	5.98	87.97
TOTAL EXPENDITURES PER CAPITA (LOGGED)	**EXPEND_CP _LOG**	-0.25	1.41	-7.04	6.92	560.18
SPECIAL DISTRICT REVENUE RATIO	**SD_RATIO**	17.62	12.56	2.94	64.30	71.25
MEDIAN INCOME (BY COUNTY)	**INCOME_ MED**	41.60	10.48	17.48	93.93	25.19
PERCENT LIVING IN POVERTY (BY COUNTY)	**PCT_ POVERTY**	10.37	4.22	2.00	39.00	40.66
DEBT MATURITY TERM * HHI	**MATURITY* HHI_REV**	0.57	0.33	0.00	0.998	57.95
PROPERTY TAX LEVY LIMIT * HHI	**HHI_REV* PTLL**	0.34	0.39	0.00	0.998	117.58

[15] All of financial variables included in the design are expressed in thousands of nominal U.S. dollars.

[16] Expressed in absolute values.

As can be seen from table IV-5, all continuous variables in the design possess sufficient degree of variation and reasonable mean values, determined by social, economic, and/or demographic differences of jurisdictions that represent individual observations. These differences include substantial levels of variation between levels of income and poverty, fiscal policies (government expenditures per capita, levels of revenue diversification), as well as dramatic difference with regard to reliance on special districts among states (SD_RATIO) variable.

The frequency distribution for HHI_REV variable reveals that more than a half of observations fall into the last quartile of data. The distribution of the variable can generally be construed as the sum of two Gaussian distributions, with the wider one peaking at 0.43 and representing "chaotic" behavior in the diversification of revenues, and the other with the mean of 0.84 that corresponds to a second sub-population of municipalities having comparably higher diversified revenue structures.

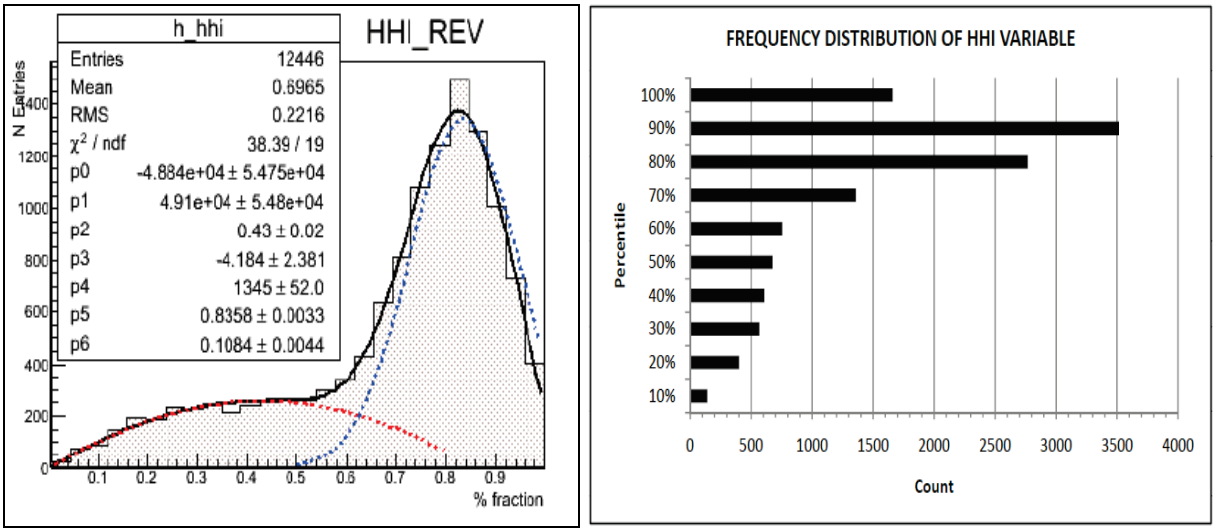


Figure IV-3. Probability and Frequency Distribution for HHI Variable

Unlike in table IV-5, descriptive analysis of dummy variables, presented in table IV-6, does not include coefficient of variation since the only values these variables can take are 0 (base

group) and 1 (included group). For the same reason, standard deviation is also not used. The descriptive statistics, however, includes mean, used for determining the actual level of variation within a variable. Given that possible values of a variable can only be 0 or 1, the "ideal" value for mean would be 0.5 or 50% cases in each group.

Table IV-6. Descriptive Statistics for Dummy Variables

Variable	Reference Label	Mean	Min	Max	Sum
GENERAL REVENUE LIMIT	GRL	0.11	0	1	1333
GENERAL EXPENDITURE LIMIT	GEL	0.08	0	1	1006
FULL DISCLOSURE REQUIREMENT	FD	0.32	0	1	4037
"LOW" QUANTITATIVE DEBT LIMIT	Q_DEBT_ LOW	0.52	0	1	6470
"MEDIUM" QUANTITATIVE DEBT LIMIT	Q_DEBT_ MED	0.23	0	1	2845
VOTING REQUIREMENT	VOTE	0.49	0	1	6056
"LOW" QUANTITATIVE DEBT LIMIT * DEBT MATURITY TERM ("LOW" OR "MEDIUM")	Q_DEBT_ LOW* MATURITY	0.43	0	1	5372
VOTING REQUIREMENT *QUANTITATIVE DEBT LIMIT ("LOW" OR "MEDIUM")	VOTE* Q_DEBT	0.32	0	1	3991

(table continues)

Table IV-6. *(continued)*

Variable	Reference Label	Mean	Minimum	Maximum	Sum
"NORTHEAST" REGION	**NE**	**0.26**	**0**	**1**	**3259**
"MIDWEST" REGION	**MW**	**0.47**	**0**	**1**	**5812**
"SOUTH" REGION	**STH**	**0.17**	**0**	**1**	**2120**
PROPERTY TAX REVENUE LIMIT * **ASSESSEMENT INCREASE LIMIT**	**PTRL*** **PAIL**	**0.27**	**0**	**1**	**3327**

As it appears in table IV-6, only two variables (Q_DEBT_LOW and VOTE) approach the ideal proportion, whereas many of the others have significantly lower averages. The dummy variables for certain regions and those reflecting the influence of General Revenue and Expenditure limits can be considered particularly unbalanced. While geographical location is used as a control variable, the state-imposed fiscal rules have a substantial theoretical relevance which can potentially be dismissed by the results due solely to small proportion of included group observations. Nevertheless, since the limitations in question are imposed in relatively few states, the data largely represents an accurate and consistent picture of fiscal constraints in place and the two variables are still deemed to merit inclusion into the model. The sum function in the last column of table IV-6 reveals actual numbers of included group observations within each variable.

IV. 4. Results and Discussion

IV. 4.1. Model Fit

General goodness of fit of the model was evaluated by means of General F-test as well as R-square measure, accounting for the ratio of explained variance in the model. While the F-test evaluates the hypothesis that a proposed regression model fits the data well, the R-square is a measure of correlation between regressors and the dependent variable, drawing comparison between the actual variables and their predicted values in terms of how much variation in Y can be explained by the regressors (hence 0<R-square<1). The measure of Adjusted R-square, which accounts for degrees of freedom or the number of unconstrained observations in the sample, and can range take on any value in the interval [-1; 1], is sometimes used as a greater precision-level alternative to R-square. In addition to the above, the number of significant slopes in the theoretically correctly specified model and the intuitive interpretation of coefficient signs were considered.

The analysis of the estimated model revealed statistical significance of General F-Test ($p<0.001$), as well as reasonable values of R-square ($r^2 \approx 0.232$, Adj. $r^2 = 0.231$), given that the model is based solely on cross-sectional data. The model also produced a number of significant slopes for theoretically relevant control and exogenous variables, reasserting its robust specification given data constraints and some level of discrepancy in records (e.g. while most financial variables are recorded by Census for each individual municipality, the income and poverty data is only available for county units).

IV. 4.2. Regression Results

As revealed by the summary of FGLS estimation results presented in table IV-7 below, with respect to hypotheses posed earlier (H1-H9, see sections 2.1. and 2.2. above), the findings reveal partial support for initial theoretical expectations. The role of HHI as a revenue diversification measure in determining municipal indebtedness is exemplified by its statistically significant autonomous effect (p=0.002), as well as by significant interaction variable MATURITY*HHI_REV (p=0.0008). While the slope for HHI_REV (autonomous) variable is negative, indicating decrease in outstanding debt per capita by approximately $480 with each 0.01 unit increase in HHI, the added effect of revenue diversification for municipalities subject to state-imposed low or medium-size debt maturity limit, as expected (H4) is equal to approximately $340 increase in total outstanding debt per capita with each 0.01 unit increase in HHI. Thus, it is reasonable to argue that debt maturity limits play significant role in municipal fiscal decisions, with jurisdictions subject to such limits being more prone to borrow as their revenue structures become more diversified. This can be potentially explained by the role debt maturity limits play in reducing municipal borrowing costs, as well as by potentially lesser amount of uncertainty related to debt repayment prospects, given more limited time frame allowed for retirement of obligations.

The effect of HHI on mitigating the impact of property tax levy limit (PTLL), reflected by variable HHI_REV*PTLL, conforms to initial expectations (H4), having a positive, statistically significant slope (p=0.007). According to estimation results, the effect of 0.01 unit increase in HHI for municipalities constrained by PTLL equals approximately $180 in added outstanding debt per capita under *ceteris paribus* condition. Given that the slope of original (HHI_REV) variable is negative, it can be said that the overall negative effect of revenue

diversification is lesser (i.e. less negative) for municipalities constrained by the presence of state-imposed PTLL (as stipulated in H5), thus rendering the binding power of PTLL severely undermined.

In practical terms, the influence of revenue diversification (HHI) in mitigating the effects of property tax levy and debt maturity limits can be illustrated by calculating marginal effects of revenue diversification with respect to debt per capita for cities in states that impose aforementioned limitations on municipalities but differ with respect to their revenue diversity levels. For example, the state of Minnesota imposes a "medium"- sized maturity requirement but does not have a property tax levy limit which means that the effect of interactive term PTLL*HHI in the case of all cities in that state is equal to zero. Thus, the marginal effect of revenue diversification (HHI) for cities in Minnesota would be determined by adding the values of coefficients $\hat{\beta}_2$ (autonomous effect of HHI) and $\hat{\beta}_{17}$ (combined effect of HHI and debt maturity limit, see figure IV-2).

In the case of the biggest city in the state, Minneapolis (pop. 382618), which had a recorded HHI value of 0.87 for the year 2002, the marginal effect of HHI would equal to (-0.48)+0.34*0.87=(-0.18), predicting a decrease in debt per capita by $180 for each point increase in HHI (see table IV-7). Similarly, marginal effect of revenue diversification can be calculated for Kansas City, the biggest municipality in the state of Missouri (pop. 441,545), which has a recorded value of HHI equal to 0.91. The state of Missouri mandates both "low" debt maturity requirement and "low" municipal debt limit, and has a property tax levy limit. Thus, the overall marginal effect of revenue diversification on debt per capita is calculated by adding the values of coefficients $\hat{\beta}_2$, $\hat{\beta}_{17}$, and $\hat{\beta}_{22}$, and is equal to (-0.48)+0.34*0.91+0.18*0.91=(-0.01), indicating a

very slight decrease in outstanding debt per capita ($10 for each additional point increase in HHI), as compared to the autonomous effect of HHI ($\hat{\beta}_2 = (-0.48)$ or $480 per capita.

The significance of state-imposed quantitative debt limits (H1), according to the results, is mixed. Out of two stand-alone variables (Q_DEBT_LOW and Q_DEBT_MED) only one (Q_DEBT_LOW, accounting for debt limits set to include up to 5% of assessed property value within jurisdiction) is significant (p=0.007). Contrary to expectations (H1), the results reveal significant positive influence of this constraint, stipulating that municipalities bound by it (i.e. observations in the included group) tend to have higher levels of debt per capita as opposed to those where the limit is not present (i.e. the observations in the "base group).

The interaction effect of quantitative debt limit and voting requirement (reflected by variable VOTE*Q_DEBT), however, implies that whenever both of these constraints are present, the outstanding debt tends to decrease (p=0.001), thus providing strong support for initial hypothesis (H2b). At the same time, as a stand-alone constraint, voter referendum requirement has statistically significant positive influence (p=0.009), which likely indicates that the two municipal debt constraints considered have a binding negative (i.e. preventative) effect only when combined together. Similarly, the interaction effect of a "low" quantitative debt limit and limit on debt maturity (Q_DEBT_LOW*MATURITY), as expected (H3) indicates significant (p=0.04) negative impact on outstanding debt, implying that, for quantitative limit to be binding given its original purpose, it has to be combined with other restrictions.

Marginal effects of the aforementioned interaction terms are, again, best illustrated by providing specific examples from the sample. Among the states imposing both a "low" quantitative debt limit and a voter approval requirement are Illinois, Colorado, and West Virginia, while the states that have a "medium"- sized municipal debt limit and require voter

approval include Alabama and Michigan. For all of these states, as per regression model equation (see figure IV-2) and FGLS estimation results presented in table IV-7 above, the coefficient $\hat{\beta}_{15}$ would be equal (-0.37). The total marginal effect of voting requirement with respect to debt per capita for these states is then calculated by adding the value of coefficients $\hat{\beta}_{14}$ (a constitutive term, reflecting the autonomous effect of voter approval) and $\hat{\beta}_{15}$. The marginal effect of voter approval requirement whenever it is combined with "low" or "medium"- sized quantitative debt is therefore equal to 0.24-0.37=(-0.13).

Thus, the overall impact of voting requirement for municipalities that are subject to both this requirement and "low" or "medium"- sized, state-imposed, debt limit, is negative, indicating a decrease in outstanding debt per capita by $130, under *ceteris paribus* condition. Similarly, the impact of "low" debt limit, imposed by states, can be calculated by adding the coefficients on constitutive term ($\hat{\beta}_{12}$) and interactive term ($\hat{\beta}_{15}$). Given the above, this effect is equal to 0.35-0.37=(-0.02), indicating a decrease in the levels of debt per capita by $20 under *ceteris paribus* condition.

In a similar fashion, marginal effect of "low" quantitative debt limit for cities in states that impose these limits together with municipal debt maturity term is calculated. In states like Indiana, Montana, Massachusetts and New Hampshire marginal effect of "low" quantitative debt limit when combined with maturity term limitation equals 0.11, indicating $110 increase in debt per capita, above and beyond other influencing factors. This effect, although positive, plays a significant mitigating role, given that municipalities subject to "low" quantitative limit but not constrained by debt maturity limitation or voter approval requirement would experience autonomous effect of the quantitative limit equaling $350 increase in debt per capita.

In consistence with extant literature (Joyce and Mullins 1991), the effect of full disclosure requirement was found to be statistically insignificant. However, the analysis of other limits on municipal expenditures and revenues, expected to influence the levels of outstanding debt (see H6, H7 and H8), produced results that were contradictory with respect to initial expectations. Firstly, neither the presence of general revenue limit or general expenditure limit were found to be statistically insignificant, possibly due to data issues (extremely limited number of observations in "included" groups for both GRL and GEL variables). Moreover, the expected interaction between property tax rate limit and assessment increase limit (as stipulated in H6) was not found to be statistically significant, suggesting that municipal property tax revenue base possibly has much lesser impact on local debt decisions. While this finding diverges from the stipulations on binding property tax limits by Joyce and Mullins (1991), it is quite consistent with the revenue fungibility hypothesis, as well as with literature emphasizing increasing reliance of local governments on non-tax revenue sources (Jung, Roh, and Kang 2009) and non-guaranteed (revenue) debt (Kiewiet & Shakaly 1996).

The impact of special district revenue ratio, recorded annually for each state and used as a proxy for reliance on special districts (H9), was not found to be statistically significant. Since the role of special district formation as an answer to state-imposed fiscal constraints on municipalities has been confirmed by previous studies (Carr 2006, Deller & Stallmann 2007 and others), the lack of significance of SD_RATIO variable in the model is most likely related to measurement precision issues: the amounts ate recorded by state, thus yielding only 48 unique observations; additionally, the measure does not take into consideration the actual number of districts but uses total revenue as a proxy.

Another variable of interest, the amount of liquid fund assets held by municipalities (LIQUID_ASSETS_CP), conformed to initial expectations (H10) by producing statistically significant positive estimate ($p<0.0001$). According to regression results, each $1000 increase in liquid fund assets per capita results in additional $870 in outstanding debt per capita. Thus, the hypothesis about asset-richer governments being more prone to incur debt obligations is supported and may help explain the mechanics of risky fiscal decisions.

The role of total expenditures per capita and intergovernmental revenue per capita variables, due to their logarithmic dependency with respect to response variable, is interpreted differently from other continuous variables. The variable IGR_CP_LOG has a negative and statistically significant slope ($p=0.005$), which conforms to initial expectations and provides support for the revenue fungibility argument. Since intergovernmental revenue streams appear to reduce the overall amount of outstanding debt (according to the results, for each percent increase in intergovernmental revenue per capita, overall levels of debt per capita decrease by approximately $0.06/100*1000, or $0.60 per capita), it is reasonable to assume that intergovernmental revenue adds significantly to local fiscal capacity– a notion previously explored and well acknowledged in literature (Clingermayer & Wood 1995, Martell & Smith 2004). On the other hand, the effect of EXPEND_CP_LOG variable, measuring overall municipal expenditures per capita, is significant ($p<0.0001$) and positive, lending support to the government expansion theory as more spending activity, according to the results of the regression, appears to be strongly related to increase of debt obligations (for each percent increase in expenditures per capita, total outstanding debt per capita increases by approximately $0.25/100*1000, or $2.50).

While it is worthwhile to remember that the distinction between this study and the Massachusetts sample in measuring government expenditures lies in the fact that EXPEND_CP_LOG includes both operational and capital municipal spending, the ultimate conclusions about their impact remains the same: in both cases, increases in spending are strongly related to the levels of outstanding debt, which suggests the importance of municipal borrowing as a means for governments to achieve both short-term and long-term goals.

Finally, with respect to demographic indicators included in the model, all regional variables were found to have significant, positive slopes (in all cases, $p<0.01$). This indicates and quite accurately defines the differences between political culture and fiscal preferences. For conservative South, as well as for the Western states, the levels of outstanding debt per capita are the lowest, with substantially higher levels for municipalities in the Northeast and Midwest. Finally, the findings for two other control variables reflecting on median income and poverty levels (INCOME_MED and PCT_POVERTY) did not yield statistically significant results. The reason for this outcome is most likely the problem of imprecise measurement (the data for these two variables was drawn from Census demographic sets, which use counties as units of analysis rather than individual municipalities). In this respect, the aforementioned two measures used as proxies of wealth, similarly to the measure capturing municipal reliance on special districts, need to be reconsidered and improved for future use.

The results of FGLS estimation are presented in table IV-7 below, while generalized discussion on the results and implications of the study appear in the next subsection.

Table IV-7. FGLS Estimation Results[17]

Variable	Parameter Estimate	Standard Error	t-value	Pr > |t|
INTERCEPT	-0.48	0.28	-1.72	*0.08*
HHI/ DIVERSIFICATION	-0.48	0.15	-3.12	*0.002*
LIQUID FUND ASSETS PER CAPITA	0.87	0.02	49.99	*<.0001*
IGR PER CAPITA (LOGGED)	-0.06	0.02	-2.83	*0.005*
TOTAL EXPENDITURES PER CAPITA (LOGGED)	0.25	0.03	9.64	*<.0001*
SPECIAL DISTRICT REVENUE RATIO	-0.0003	0.002	-0.13	0.89
MEDIAN INCOME (BY COUNTY)[18]	0.000002	0.000003	0.71	0.48
PERCENT LIVING IN POVERTY (BY COUNTY)	0.01	0.009	1.64	0.10
GENERAL REVENUE LIMIT	0.16	0.12	1.36	0.17
GENERAL EXPENDITURE LIMIT	0.03	0.10	0.33	0.74
FULL DISCLOSURE REQUIREMENT	0.08	0.06	1.37	0.17
"LOW" QUANTITATIVE DEBT LIMIT	0.35	0.13	2.7	*0.007*

(table continues)

[17] For all statistical tests in this chapter, the selected level of tolerance for Type 1 error is $p \leq 0.10$.

[18] Due to extremely small magnitude of estimates and standard errors for this variable, the measurement in (nominal) dollars rather than thousands of dollars is included in the results table.

Table IV-7. *(continued)*

Variable	Parameter Estimate	Standard Error	t-value	Pr > |t|
"MEDIUM" QUANTITATIVE DEBT LIMIT	0.0001	0.09	0.002	0.99
VOTING REQUIREMENT	0.24	0.09	2.6	*0.009*
VOTING REQUIREMENT *QUANTITATIVE DEBT LIMIT ("LOW" OR "MEDIUM")	-0.37	0.11	-3.26	*0.001*
"LOW" QUANTITATIVE DEBT LIMIT * DEBT MATURITY TERM ("LOW" OR "MEDIUM")	-0.24	0.11	-2.09	*0.04*
DEBT MATURITY TERM * HHI	0.34	0.10	3.35	*0.0008*
"NORTHEAST" REGION	0.44	0.11	4.2	*<.0001*
"MIDWEST" REGION	0.44	0.09	4.91	*<.0001*
"SOUTH" REGION	0.25	0.10	2.65	*0.008*
PROPERTY TAX REVENUE LIMIT * ASSESSEMENT INCREASE LIMIT	0.05	0.05	0.99	0.32
PROPERTY TAX LEVY LIMIT * HHI	0.18	0.07	2.7	*0.007*

IV. 4.3. Discussion

Overall, regression results provide several interesting and new findings with respect to local fiscal behavior. First, the model suggests the significance of evenue diversification (HHI),

reaffirming the importance of revenue structures in strategic debt decisions, albeit favoring a more conservative view toward municipal financial management practices than initially expected. As more diversified structures lead governments to incur less debt obligations, it can be implied that the extent of revenue diversity is primarily related to providing more of and steadier resources to ensure service delivery, rather than playing a part in strategic debt accumulation and/or serving as a "license to spend" of sorts. At the same time, statistically significant interactions of HHI with debt maturity limits and property tax levy limit point to visible differences in fiscal behavior among municipalities, determined by such factors as the borrowing risk and related cost of indebtedness debt (lowered by stricter limits on maximum maturity periods), as well as the mitigating power of HHI with respect to property tax-related revenue constraints.

The findings on the influence of TELs and their relationship with municipal debt reveals a mixed picture, partially due to data issues, and partially to continuing decrease in reliance on municipal property tax base as the main means of financing debt obligations. The use of revenue debt for financing different projects, privatization of public facilities, as well as increasing use of innovative financing strategies can be expected to help governments achieve a better balance between their service needs and their revenue capacity, reducing relative importance of property tax in the long run.

At the same time, debt limits appear to be a strong determinant of municipal debt when they are imposed in combinations. According to the results, specific state-imposed limits capable of reducing the amount of outstanding debt are low quantitative limits, combined with voter referendum (supermajority or simple majority) requirement, or the same limits combined with strict maturity period limitations. The notion that all types of debt limitations are effective in

their restraining intent if, and only if, combined with each other, represent an important contribution to existing literature on municipal debt.

The results also provide a compelling insight into intergovernmental revenue as an important determinant of debt, alluding to the role of this type of revenue in revenue fungibility mechanisms, as well as its significance to overall fiscal capacity of municipalities. While greater streams of intergovernmental revenue allow municipalities to avoid incurring excessive debt obligations, the amount of liquid fund assets held in their unrestricted funds, according to the estimation results, can provide an incentive to borrow more. Lured by potentially lower borrowing costs and reasonable assurance of repayment, governments appear to be inclined to take greater risks in debt markets – especially when faced with greater demand for expenditures, as revealed by the strong positive relationship between levels of outstanding debt and levels of overall municipal expenditures.

Finally, the results also reaffirm certain regional differences among municipalities, rather predictably suggesting that jurisdictions in regions traditionally perceived as more fiscally conservative would tend to accumulate lesser amounts of debt than their more "liberal" counterparts, *ceteris paribus*.

The main instrumentation-related weakness of the research design is data constraints, as well as discrepancies between the units of measurement, possibly contributing to the lack of significance of several strongly theoretically relevant variables (income, poverty measures, data on general revenue and expenditure limits, as well as a proxy measure for reliance on special districts). Future research incorporating these measures would warrant greater precision and/or modification. The omitted variables due to unavailability of data include various local debt limits, stipulated in municipal charters, as well as long-term obligations other than guaranteed

and non-guaranteed debt which are contractual (e.g. retirement benefits) and thus may exert significant influence on the fiscal capacity of a jurisdiction.

Future directions of research on state-imposed fiscal rules and municipal fiscal capacity would benefit from inclusion of revenue debt, as well as from incorporation of proprietary income into the revenue diversification measure. Additionally, the inclusion of creative financing mechanisms (e.g. public-private partnerships), municipal bond underwriting practices and credit quality measures may warrant attention in order to construct a more comprehensive picture of determinants and patterns of long-term municipal debt.

CHAPTER V

CONCLUSION

The relationship between government revenue diversification and debt is a new topic in the academic inquiry geared toward fiscal sustainability and management of public financial resources. At the same time, it draws on a substantial body of research in public finance, public administration, and empirical economics, merging the literature on government borrowing with the existing findings on revenue diversity as a determinant of fiscal capacity. Greater methodological significance of this work, however, is in development of an analytical framework that incorporates both municipal government debt and revenue diversification using a prism of institutional and fiscal interactions, with a potential to explain strategic patterns of government borrowing and revenue structures at any level of analysis. Modeling of simultaneous relationships between debt and property tax burdens as presented in Massachusetts study, as well as incorporation of both TELs and debt limits into the research design in cross-state analysis allow for exploration of fiscal effects in two distinct contexts, each of which complement and extend the findings of another to construct a more comprehensive picture of the revenue diversity-debt dimension.

As it is alluded above, the recurrent and unifying theme in the two studies presented above is the relationship between revenue diversification and municipal debt. The main theoretical hypothesis is based on the notion of strategic financial management, exemplified by the efforts to diversify revenue structures in an attempt to create greater stability, which is crucial to be able to support debt obligations in the long run. Ultimate repayment of debt depends on both overall revenue capacity (and revenue effort), and the predictability of the above over time. Revenue diversification, as acknowledged by literature (Gentry & Ladd 1994, Hendrick 2002,

Hannarong & Akoto 2004, and others) stands out as one of the prominent strategic tools to ensure this predictability.

While the notion of diversification is a prominent one in corporate and investment finance, its use in the public sector has a similarly high potential. Given inevitability of recurring economic recessions, revenue-driven public budgets are bound to suffer in direct dependency on their use of procyclical revenue sources. As limited revenue capacity leads to lower service levels, dwindling population, falling property values, and slowing economic activity reduce this capacity even further, bringing about vicious circle of decline. Revenue diversification helps ensure greater stability of the revenue structure (Misiolek & Perdue 1987, Gentry & Ladd 1994, Carroll 2005) and as such serves an important fiscal purpose. At the same time, it is reasonable to expect that revenue diversification potentially allows governments to feel more confident in leveraging their taxing power by incurring general obligation debt. Finally, more diversified revenue structures at the local level potentially render the entities less dependent on the need for federal and/or state aid, which reduces the exposure to risk of funding cuts from those sources.

In addition to fiscal purposes, revenue diversification also allows governments to forward their goals of fairness and equity by helping them to move away from highly visible and/or regressive taxes to a wider variety of revenue sources[19]. The most recent research on the subject (Carroll 2005, Carroll 2009) does not indicate that revenue diversification would lead to greater expenditures by contributing to fiscal illusion pertaining to service costs and availability of

[19] Although it can be argued that the shift to alternative revenue sources is bound to have its own negative implications on equity (e.g. benefit-based charges are often perceived to impose a disproportionate burden on low-income families), the idea of diversification is primarily based on lower concentration (share) of each source in the revenue structure, thus attempting to distribute negative effects, if any, more widely and equally among different population groups.

funds. Hence, it can be argued that negative effects of diversification, if any, are significantly outweighed by its benefits.

The levels of debt at the local level of government are influenced by a multitude of factors, including economic indicators that determine borrowing costs and climate, political preferences, and debt affordability. In this context, the levels of outstanding municipal debt can be construed as a function of economic necessity and fiscal capacity. Falling municipal revenues and threats of debt defaults that defined the aftermath of the Great Recession all have contributed to growing interest toward reevaluation of the local fiscal realities, including the balance between revenue effort and indebtedness. This work thus attempts to fill the gap in the knowledge base by empirically exploring these linkages.

The Massachusetts study had the primary goal of exploring the relationship between debt and revenue diversification while tying it to the size of property tax burdens, operationalized as a ratio of property tax to the population. The rationale for this is the expected reciprocity of the relationship between debt and property tax burdens, based on potential budget-maximizing behavior of the political leaders, concerned with electoral dividends and dynamics of interjurisdictional competition. Municipalities in Massachusetts, having their fiscal powers significantly constrained by Proposition $2\frac{1}{2}$, have been fighting two recessions during the decade encompassing the data panel, providing compelling material for a municipal finance case study. The levels of debt, operationalized as total outstanding debt per capita in a given year, were assumed to be a result of strategic decision-making and as such having a relationship with property tax burdens, where additional obligations to be repaid may potentially require higher revenue effort (including greater levels of *ad valorem* taxation). Revenue diversification, operationalized as Hirschman-Herfindahl Index (HHI), was expected to act as mitigating factor,

reducing the need for politically undesirable tax hikes during the periods of economic downturn. The main hypothesis tested in the research design thus stipulated the existence of a positive relationship between property tax burdens and levels of debt when municipal revenue structures are less diversified. Given this notion, the revenue fungibility effect is assumed to compensate for the decreases in specific, highly economically sensitive sources, also potentially decreasing reliance on property tax.

First and foremost, the Massachusetts study reveals that revenue diversification is, indeed, a statistically significant determinant of debt per capita, while also having an indirect effect on property tax burdens. Calculated marginal effects of the statistically significant interaction term that defines the combined impact of revenue diversification measure (HHI) and debt per capita suggest the presence of the expected strong mitigating effect of revenue diversity on property tax burdens. This notion not only satisfies theoretical predictions for the study but also lays ground for further review of the role revenue diversification as a municipal financial management strategy.

In addition to the above, the results reveal many of the expected relationships between financial variables and levels of debt. Specifically, significant negative impacts on debt per capita, exhibited by intergovernmental revenue and fund balance (defined as the sum of general fund surplus and stabilization fund balance, if any), suggest their unequivocal contribution to local fiscal capacity. By complementing own-source revenue streams and providing a "safety cushion" in hard times, intergovernmental grants and accumulated savings allow governments to become less reliant on borrowing in order to finance the spending for special projects. At the same time, the analysis reasserts the positive impact of growing municipal expenditures on borrowing, while also indicating that the municipalities enjoying higher borrowing capacity (as

determined by the total allowable debt cap, calculated based on the value of property tax base) tend to accumulate higher actual levels of debt per capita. This suggests that municipalities, while being reasonably risk averse and legitimately concerned with the viability of their future revenue base (as shown by the effects of revenue diversification on debt and property tax burdens), are not afraid to spend and borrow given favorable conditions to do so. The purpose of revenue diversification then becomes to contribute to creation of those favorable conditions by providing additional reassurance of fiscal stability in the long run.

The cross-state study based on U.S. Census 2002 financial data on municipalities seeks answers to several questions. First, in exploring the relationship between revenue diversification and debt, it provides continuity to the goals defined for the Massachusetts panel analysis. Although the focus is the same, the Census study introduces a new - institutional, dimension into the analysis, exploring rational, strategic arrangement of revenue structures within a constrained institutional environment. These environments, exemplified by state-imposed rules on local taxation, spending, and borrowing, differ among states, thus raising the question of effectiveness of these varying sets of limitations with respect to municipal debt. The literature shows that the presence of institutional fiscal limits such as TELs and debt limits does increase local strategic behavior in the form of proliferation of special districts and interlocal cooperation agreements (MacManus 1981, Foster 1997, McCabe 2000, Krueger & Bernick 2010). In this context, revenue diversification can be expected to become one of the strategic tools, employed to mitigate the constraining impacts of the limits imposed.

To ensure more accurate representation of binding limits, both stand-alone and interaction measures of the state-imposed tax, expenditure, and limits were included in the research design. The notion of revenue diversification as a borrowing risk-rearranging factor and

a tool for increasing revenue stability still at the center stage, the binding power of at least one limitation, the municipal property tax levy limit, has been acknowledged in literature (Joyce and Mullins 1991) as being negatively related to the level of diversification of the revenue structure – the notion reaffirmed by the results of the Census data analysis.

Moreover, revenue diversification has also been found to significantly impact debt maturity, with municipalities having more diverse revenue structures and being subjected to binding maturity limits (up to 40 years allowed for debt repayment), tending to accumulate significantly more debt. Contrary to Massachusetts study, the findings for the cross-state analysis reveal significant negative relationship between total outstanding debt per capita and a stand-alone measure of revenue diversification, which is likely, to some extent, be influenced by the differences in operationalization of debt measure (the Massachusetts study includes only long-term debt as a more appropriate measure given the panel dimension of the data, while Census sample employs a cumulative measure of short-term and long-term debt). Given the above, future studies in this area may benefit from delving deeper into the dynamics of each of these two types of municipal debt.

The interactions between several other limits have also been found to be statistically significant. While autonomous impact of both low quantitative debt limits and the voter approval requirement (50% or more) had significant positive effect on debt per capita, the combined effect of these two limitations with respect to debt was shown to be significant and negative. Similarly, the quantitative debt limit had significantly negative impact on debt per capita when combined with maturity limits. Unfortunately, relative lack of states that impose "formidable constraints" on municipalities in the form of general revenue and/or expenditure limits did not allow for in-depth analysis of these restrictions. Moreover the expected interaction effect of municipal

property tax rate limit and assessment increase limit, presumed to increase the binding power of these restrictions (Joyce & Mullins 1991) was not confirmed by the data, possibly indicating decrease of overall importance of the property tax in municipal debt decisions. Nevertheless, most importantly, the aforementioned findings related to interaction measures between debt limits indicates that single institutional rules do not amount to much when fiscal needs and wants dictate the decision-making a the local level. On the other hand, when the limits are combined, they become rather effective in their constraining intent.

Similar to the findings of the Massachusetts study, the results reveal significant negative impact of intergovernmental revenues on debt and significant positive impact of government expenditures. The liquid fund assets per capita variable, used as a proxy for distinguishing between "resource-rich" governments and their less well-off counterparts, was found to have a significant positive effect on the levels of debt. As compared to the Massachusetts study where only the fund balance variable was used for similar purposes, this finding suggests that the operationalization of generalized government "savings" is an important factor in the analysis. At the same time, the greater inclination of resource-rich governments to borrow points to budget maximizing potential which ties in very well with the theoretical framework of this work.

Overall, the two studies set the stage for further exploration of local fiscal effects and the role of revenue diversification on government borrowing. Both the Massachusetts study and the cross-state study based on Census data provide preliminary evidence on the existence of a meaningful relationship between revenue diversification and municipal debt. In the Massachusetts study, there is evidence to suggest that governments with more diversified revenue structures tend to accumulate more debt but also have lower property tax burdens. In the Census study, largely concerned with combined effects of revenue diversification and the

demands of fiscal federalism, the autonomous effect of revenue diversification is negative; however, in combination with state-imposed debt limits revenue diversification tends to increase the levels of debt per capita, thus counteracting the constraining intent of these limits and contributing to the boost in creditworthiness that municipalities with both debt limits and well diversified revenue structures are likely to experience. The latter notion encourages further inquiry on the impact of revenue diversification on municipal credit quality and borrowing costs.

Given limited scope of data in both studies and the novelty of the research question, further analysis of various aspects of the revenue diversification-debt relationship is warranted. Subsequent refinements may prove to be beneficiary with respect to each of the above two components. Perhaps one of the major challenges with analyzing the effects of revenue diversification is the difficulty of capturing economic sensitivity of different revenue sources, both tax and non-tax, and incorporating it into the empirical measure of diversity. Accounting for various types of revenue and their relative weights rather than simply their share in the revenue structure would provide substantial improvement in precision and scope of the measurement. Classical portfolio theory and efficient frontier approach (the precedent for application of this type of analysis to tax structures being set by Gentry & Ladd (1994)) represents one of the feasible means to advance this effort. Additionally, the distinction between tax and non-tax diversification is an important notion for further inquiry as well, especially given the fact of decreasing reliance by local governments on property tax revenue, a "traditional" and the most steady source (Bartle et al. 2003).

Naturally, the issuance of debt is subject to numerous risks, not all of which can be diversified. Both of the studies presented in this work concentrate on default risk, or the inability of the government entity to honor debt payments due to changes in economic circumstances.

Since future outlays for debt service depend on a variety of uncertain variables, revenue stability becomes a tool to reduce their impacts over time, thus mitigating the risk of insolvency. The investigation of other risks related to municipal debt issuance would include interest rate risk, market risk, as well as the tax risk that pertain to investors' expectations on returns. Last but not least, the analysis of very distinct types of risks posed by proliferation of innovative bond financing techniques also warrants academic attention.

Coinciding closely with the objectives of research presented in this work is also the idea of "debt diversification" which is likely to gain more prominence as strategic goals of the local governments further increase the use of guaranteed debt which is based on the issuance of revenue bonds and thus not subject to as many institutional constraints. Further research on revenue diversification-debt relationship would therefore benefit greatly from inclusion of revenue debt and private-purpose project financing into the research design.

While focused on specific aspects of local fiscal behavior, the broader objective of this work is exploration of "good" financial management practices, exemplified by the constant quest of fairness, social welfare, and legitimacy. As such, it ties in with the broader context of public administration and public management. Financial accountability encompasses much more than balanced budgets and transparent fiscal policies – it seeks to provide outcomes that would ensure "good" governance. Spillover effects, social inequality, and perpetual budget constraints given existing demands all represent but a few among many challenges faced by local governments in implementing their mission as efficient and effective service providers. The research presented in this work explores a small but distinct part of the local fiscal landscape, and is expected to encourage further inquiry into its complex settings and interactions. At the same time, the

implications of the findings are expected to encourage exploration of dependencies between revenue structures and government indebtedness on the state and federal levels of governance.

APPENDIX A

KEY TERMS AND DEFINITIONS (CHAPTERS I-V)

Term	Definition
Fiscal Capacity vs. Fiscal Sustainability	The ability of the government entity to finance its operations and meet its debt obligations vs. long-term viability of government's fiscal activities
Revenue Diversity	The outcome of diversification; the extent to which jurisdiction's revenue is composed of different sources, measured by evaluating the share of each of the revenue sources in the overall revenue structure;
Revenue Fungibility	The ability of one revenue source to substitute for another; can be expected to contribute to stability of the revenue structure as less income elastic revenue streams get substituted by the more elastic ones during the periods of economic growth while eventual decreases of revenue from more elastic sources are offset by receipts from less sensitive sources
Revenue Stability	The ability of the revenue structure to withstand economic or other external shocks in the long run
Risk vs. Uncertainty	The measurable probability of some (unfavorable) future event vs. the perceivable probability of some (unfavorable) future event, the likelihood of which is indefinite or incalculable (Knight 1921)
Portfolio Theory	A theory of risk management in investment finance, stipulating that the problem of uncertain future returns on assets can be mitigated by diversifying the holdings of those assets so as to reduce dispersion of possible returns relative to their expected values (Markowitz 1959)
Fiscal Illusion	(*Pertaining to government debt*): creation of a perception for current taxpayers that expenditures financed with debt are cheaper than using current taxes, based on the notion that the benefits from the project financed accrue immediately and the repayment of debt can be stretched out into the future
Revenue bond	A type of bond issued by a state or a local government which is backed (guaranteed) by the future proceeds of a revenue-generating project for which debt is underwritten
GO Bond	General obligation bond issued by a state or a local government which is based on full-faith and credit of the issuing jurisdiction (also known as "non-guaranteed debt")

(table continues)

(continued)

Term	Definition
Outstanding Debt	Total outstanding debt of the jurisdiction (for detailed operational definitions used in two empirical studies please refer to Chapter III and Chapter IV).
Quantitative Debt Limit	Municipal debt limit (as opposed to debt restrictions such as full disclosure or voter referendum requirement), tied to the property tax revenue base (e.g. total assessed property value in the jurisdiction)
Voter Referendum Requirement	The requirement of voter approval for bond issuance (simple or supermajority)
Property Tax Burden	The total property tax revenue (levy) by a jurisdiction, divided by the total population in the same jurisdiction
Full Disclosure Requirement	Restriction on local taxation, requiring a specifically designed system which would allow the taxpayers to receive a timely notice of proposed property tax rate changes so that to afford them an opportunity to express their views on these changes
TELs (Tax and Expenditure Limits)	Statutory or constitutional restrictions on the ability of a government to generate revenue or increase expenditures (Brooks & Phillips 2008)
Own-source Revenue	Includes all the revenue independently generated by the jurisdiction in a given fiscal year (i.e. excluding intergovernmental receipts, if any)
Fund Balance vs. Liquid Fund Assets	Operational general fund surplus plus fund stabilization balance, if any (Massachusetts study) vs. total amount of assets held by municipality in governmental funds excluding bonds fund and sinking fund, as well as and investment/trust assets, investment income and prepaid expenses
Hirschman-Herfindahl Index	A popular measure of industry concentration in economics; reflects the level of revenue diversity by considering the relative weight of each source included in the revenue structure

APPENDIX B

LOCAL GOVERNMENT REVENUE DISTRIBUTION BY SOURCE AND STATE

Table B-1. U.S. Local Governments: Own-Source Revenue Distribution by Source and State (U.S. Census 2007)[20].

	GENERAL REVENUE FROM OWN SOURCES											
	TOTAL	Tax Revenue									Current Charges and Misc. General Revenue	Current Charges and Misc. Revenue as % of Total
		Property	Property Tax as % of Total Revenue	Sales and Gross Receipts	Sales Tax as % of Total Revenue	Individual Income	Corporate Income	Income Taxes as % of Total Revenue	Other Taxes	Other Taxes as % of Total Revenue		
UNITED STATES	840,421	376,952	24.49	86,880	5.65	23,964	7,677	2.06	30,340	1.97	314,608	20.44
Alabama	9,977	1,822	9.27	2,032	10.34	120	0	0.61	687	3.50	5,316	27.05
Alaska	2,142	970	24.49	248	6.25	0	0	0	39	0.98	886	22.37
Arizona	14,420	5,296	18.27	3,009	10.38	0	0	0	624	2.15	5,491	18.94
Arkansas	3,309	715	8.52	1,031	12.28	0	0	0	41	0.48	1,522	18.12
California	121,894	46,337	17.37	13,703	5.14	0	0	0	5,077	1.90	56,776	21.29
Colorado	15,930	5,665	22.79	3,144	12.65	0	0	0	610	2.45	6,511	26.20
Connecticut	9,639	8,070	51.33	2	0.01	0	0	0	173	1.10	1,395	8.87
Delaware	1,298	569	18.51	3	0.10	48	0	1.56	133	4.32	546	17.76
District of Columbia	6,748	1,516	13.31	1,330	11.68	1,313	417	15.19	616	5.41	1,555	13.66
Florida	60,906	26,805	27.75	5,071	5.25	0	0	0	2,278	2.36	26,751	27.69
Georgia	25,110	9,440	22.63	4,918	11.79	0	0	0	476	1.14	10,276	24.63
Hawaii	1,975	1,137	43.18	160	6.09	0	0	0	157	5.98	521	19.79
Idaho	2,893	1,114	21.38	31	0.59	0	0	0	80	1.54	1,668	32.00
Illinois	36,615	20,391	31.49	3,697	5.71	0	0	0	925	1.43	11,602	17.92
Indiana	14,210	6,165	25.16	92	0.38	603	0	2.46	264	1.08	7,085	28.92

(table continues)

[20] Note: all revenue figures are in thousands of nominal dollars.

Table B-1. *(continued)*

	GENERAL REVENUE FROM OWN SOURCES											
	TOTAL	Tax Revenue									Current Charges and Misc. General Revenue	Current Charges and Misc. Revenue as % of Total
		Property	Property Tax as % of Total Revenue	Sales and Gross Receipts	Sales Tax as % of Total Revenue	Individual Income	Corporate Income	Income Taxes as % of Total Revenue	Other Taxes	Other Taxes as % of Total Revenue		
Iowa	7,565	3,616	28.56	693	5.47	75	0	0.59	80	0.63	3,101	24.49
Kansas	7,163	3,385	27.39	965	7.80	2	0	0.01	110	0.89	2,702	21.86
Kentucky	6,521	2,086	16.57	493	3.92	1,000	122	8.91	108	0.86	2,711	21.53
Louisiana	11,013	2,572	13.65	3,859	20.49	0	0	0	189	1.01	4,393	23.32
Maine	2,690	2,021	47.35	2	0.04	0	0	0	24	0.55	643	15.07
Maryland	15,503	5,952	23.36	521	2.04	4,064	0	15.95	1,434	5.63	3,532	13.86
Massachusetts	15,133	11,039	35.59	165	0.53	0	0	0	222	0.71	3,708	11.95
Michigan	22,942	12,208	25.58	277	0.58	468	0	0.98	284	0.59	9,705	20.33
Minnesota	12,333	5,441	21.08	225	0.87	0	0	0	227	0.88	6,440	24.95
Mississippi	5,709	2,159	18.68	91	0.79	0	0	0	87	0.76	3,372	29.18
Missouri	13,791	5,232	23.29	2,358	10.50	333	0	1.48	543	2.42	5,326	23.71
Montana	1,743	905	28.82	5	0.17	0	0	0	41	1.32	792	25.21
Nebraska	5,023	2,379	23.12	384	3.73	0	0	0	325	3.16	1,935	18.81
Nevada	7,725	2,690	19.72	952	6.98	0	0	0	497	3.64	3,586	26.29
New Hampshire	3,169	2,526	53.25	0	0	0	0	0	41	0.87	601	12.67
New Jersey	28,169	21,479	52.12	106	0.26	0	0	0	355	0.86	6,229	15.12

(table continues)

Table B-1. *(continued)*

	GENERAL REVENUE FROM OWN SOURCES											
	TOTAL	Tax Revenue									Current Charges and Misc. General Revenue	Current Charges and Misc. Revenue as % of Total
		Property	Property Tax as % of Total Revenue	Sales and Gross Receipts	Sales Tax as % of Total Revenue	Individual Income	Corporate Income	Income Taxes as % of Total Revenue	Other Taxes	Other Taxes as % of Total Revenue		
New Mexico	3,112	953	12.45	852	11.13	0	0	0	122	1.60	1,185	15.47
New York	94,393	38,076	22.90	13,012	7.83	8,083	6,994	9.07	4,700	2.83	23,527	14.15
North Carolina	18,904	7,306	19.91	2,160	5.89	0	0	0	342	0.93	9,095	24.78
North Dakota	1,318	697	30.84	101	4.46	0	0	0	19	0.85	501	22.18
Ohio	30,022	13,315	25.18	1,936	3.66	4,019	86	7.76	641	1.21	10,025	18.95
Oklahoma	6,610	1,931	16.02	1,613	13.38	0	0	0	137	1.14	2,929	24.30
Oregon	8,863	3,936	24.09	322	1.97	16	57	0.45	674	4.13	3,857	23.61
Pennsylvania	31,117	14,851	26.06	554	0.97	3,819	0	6.70	2,047	3.59	9,847	17.28
South Carolina	10,389	4,284	25.85	286	1.73	0	0	0	536	3.23	5,283	31.88
South Dakota	1,661	819	29.94	273	10	0	0	0	32	1.17	537	19.62
Rhode Island	2,498	1,962	48.02	13	0.32	0	0	0	45	1.10	478	11.71
Tennessee	13,466	4,524	15.75	2,420	8.42	0	0	0	484	1.68	6,039	21.02
Texas	64,225	34,193	32.60	6,529	6.22	0	0	0	1,000	0.95	22,504	21.45
Utah	5,249	2,038	20.42	859	8.61	0	0	0	120	1.20	2,231	22.35
Vermont	636	348	15.12	11	0.49	0	0	0	12	0.52	265	11.50
Virginia	19,109	9,997	29.66	2,442	7.25	0	0	0	1,268	3.76	5,402	16.03

(table continues)

Table B-1. *(continued)*

	GENERAL REVENUE FROM OWN SOURCES											
	TOTAL	TAX REVENUE									Current Charges and Misc. General Revenue	Current Charges and Misc. Revenue as % of Total
		Property	Property Tax as % of Total Revenue	Sales and Gross Receipts	Sales Tax as % of Total Revenue	Individual Income	Corporate Income	Income Taxes as % of Total Revenue	Other Taxes	Other Taxes as % of Total Revenue		
Washington	**17,783**	**5,680**	**16.47**	**3,231**	**9.37**	**0**	**0**	**0**	**925**	**2.68**	**7,947**	**23.05**
West Virginia	**2,480**	**1,132**	**23.16**	**96**	**1.97**	**0**	**0**	**0**	**231**	**4.73**	**1,021**	**20.88**
Wisconsin	**12,959**	**8,277**	**32.50**	**357**	**1.40**	**0**	**0**	**0**	**212**	**0.83**	**4,113**	**16.15**
Wyoming	**2,368**	**930**	**22.98**	**246**	**6.08**	**0**	**0**	**0**	**45**	**1.11**	**1,146**	**28.31**

Table B-2. U.S. Local Governments: Total Revenue by Source and State (Census 2007)[21].

	Total Revenue	Intergovernmental Revenue	Intergovernmental as % of Total Revenue	General Revenue from Own Sources	Utility Revenue	Liquor Store Revenue	Insurance Trust Revenue
UNITED STATES	**1,539,014**	**504,407**	**32.77**	**840,421**	**117,675**	**1,024**	**75,487**
Alabama	**19,650**	**6,534**	**33.25**	**9,977**	**2,590**	**0**	**549**
Alaska	**3,960**	**1,481**	**37.40**	**2,142**	**285**	**0**	**52**
Arizona	**28,995**	**10,198**	**35.17**	**14,420**	**3,956**	**0**	**420**
Arkansas	**8,399**	**4,252**	**50.63**	**3,309**	**792**	**0**	**44**
California	**266,702**	**97,671**	**36.62**	**121,894**	**19,810**	**0**	**27,327**
Colorado	**24,855**	**5,952**	**23.95**	**15,930**	**2,187**	**0**	**786**
Connecticut	**15,723**	**4,540**	**28.88**	**9,639**	**695**	**0**	**848**
Delaware	**3,074**	**1,301**	**42.33**	**1,298**	**371**	**0**	**103**
District of Columbia	**11,389**	**2,999**	**26.33**	**6,748**	**813**	**0**	**829**
Florida	**96,597**	**25,573**	**26.47**	**60,906**	**8,395**	**0**	**1,723**
Georgia	**41,718**	**11,666**	**27.96**	**25,110**	**4,313**	**0**	**628**
Hawaii	**2,632**	**408**	**15.49**	**1,975**	**249**	**0**	**0**
Idaho	**5,213**	**2,101**	**40.29**	**2,893**	**218**	**0**	**1**
Illinois	**64,761**	**18,712**	**28.89**	**36,615**	**3,259**	**0**	**6,175**
Indiana	**24,498**	**8,243**	**33.65**	**14,210**	**1,956**	**0**	**90**
Iowa	**12,662**	**4,228**	**33.39**	**7,565**	**863**	**0**	**6**
Kansas	**12,360**	**3,893**	**31.50**	**7,163**	**1,166**	**0**	**138**
Kentucky	**12,591**	**4,585**	**36.42**	**6,521**	**1,406**	**0**	**79**
Louisiana	**18,837**	**6,298**	**33.44**	**11,013**	**1,210**	**0**	**316**
Maine	**4,269**	**1,465**	**34.32**	**2,690**	**114**	**0**	**0**
Maryland	**25,480**	**7,265**	**28.51**	**15,503**	**580**	**223**	**1,909**
Massachusetts	**31,017**	**11,219**	**36.17**	**15,133**	**2,802**	**0**	**1,863**
Michigan	**47,726**	**19,497**	**40.85**	**22,942**	**2,201**	**0**	**3,086**
Minnesota	**25,813**	**10,857**	**42.06**	**12,333**	**1,748**	**259**	**615**

(table continues)

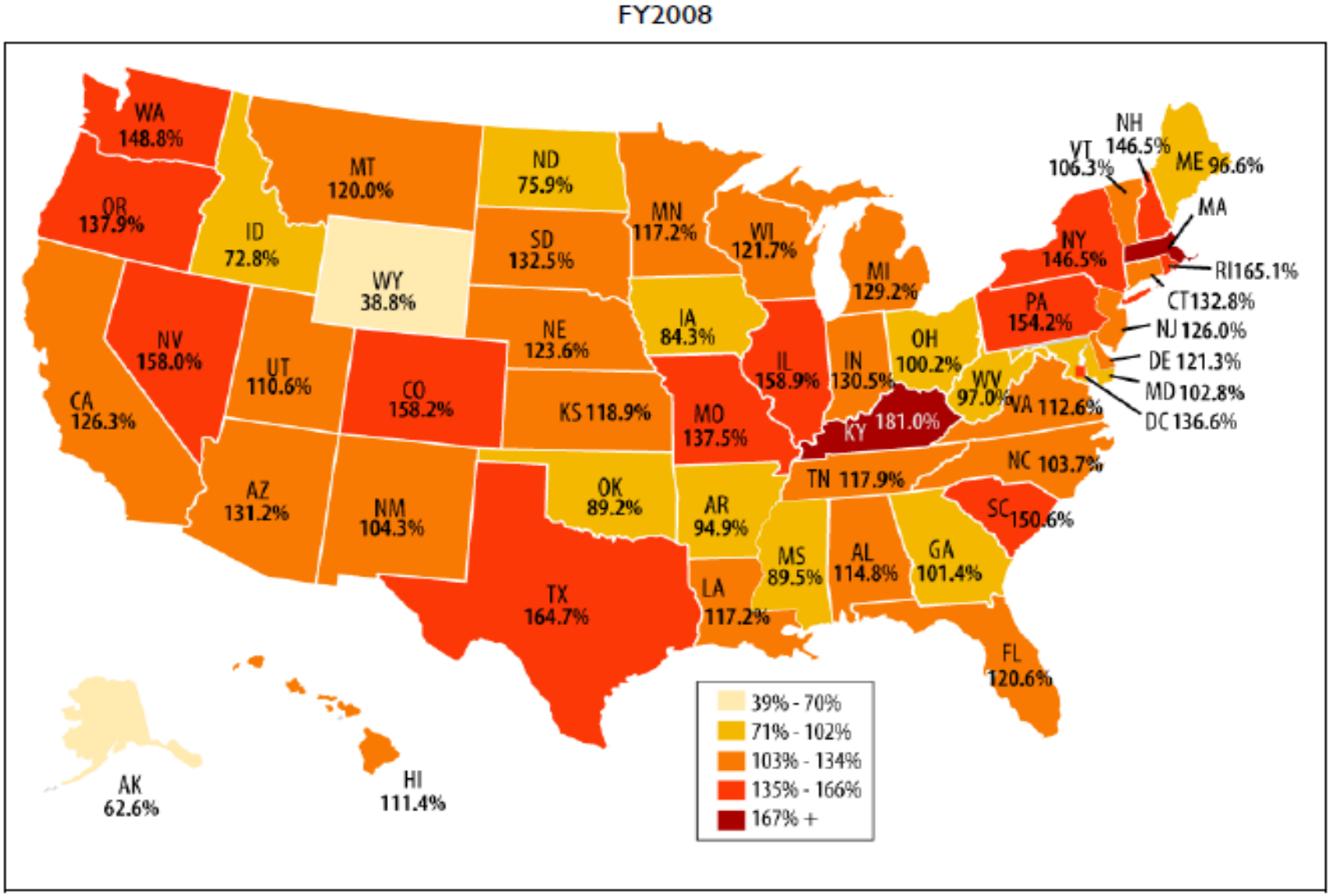
[21] Note: all revenue figures are in thousands of nominal dollars.

Table B-2. *(continued)*

	Total Revenue	Intergovernmental Revenue	Intergovernmental as % of Total Revenue	General Revenue From Own Sources	Utility Revenue	Liquor Store Revenue	Insurance Trust Revenue
Mississippi	**11,555**	**5,035**	**43.58**	**5,709**	**810**	**0**	**0**
Missouri	**22,466**	**6,088**	**27.10**	**13,791**	**1,702**	**0**	**885**
Montana	**3,141**	**1,288**	**41.02**	**1,743**	**109**	**0**	**0**
Nebraska	**10,288**	**1,987**	**19.32**	**5,023**	**2,938**	**0**	**340**
Nevada	**13,641**	**4,998**	**36.64**	**7,725**	**919**	**0**	**0**
New Hampshire	**4,745**	**1,460**	**30.78**	**3,169**	**90**	**0**	**26**
New Jersey	**41,211**	**12,126**	**29.42**	**28,169**	**897**	**0**	**18**
New Mexico	**7,656**	**4,048**	**52.87**	**3,112**	**496**	**0**	**0**
New York	**166,271**	**50,232**	**30.21**	**94,393**	**5,278**	**0**	**16,368**
North Carolina	**36,699**	**13,676**	**37.27**	**18,904**	**3,520**	**520**	**79**
North Dakota	**2,259**	**803**	**35.57**	**1,318**	**116**	**0**	**22**
Ohio	**52,889**	**20,308**	**38.40**	**30,022**	**2,344**	**0**	**215**
Oklahoma	**12,052**	**4,304**	**35.72**	**6,610**	**943**	**0**	**194**
Oregon	**16,336**	**6,121**	**37.47**	**8,863**	**1,351**	**0**	**2**
Pennsylvania	**56,995**	**21,827**	**38.30**	**31,117**	**2,677**	**0**	**1,374**
South Carolina	**16,571**	**4,624**	**27.90**	**10,389**	**1,553**	**0**	**5**
South Dakota	**2,735**	**764**	**27.94**	**1,661**	**232**	**21**	**57**
Rhode Island	**4,086**	**1,275**	**31.21**	**2,498**	**162**	**0**	**150**
Tennessee	**28,727**	**6,177**	**21.50**	**13,466**	**7,767**	**0**	**1,316**
Texas	**104,900**	**26,523**	**25.28**	**64,225**	**10,626**	**0**	**3,526**
Utah	**9,982**	**3,034**	**30.39**	**5,249**	**1,700**	**0**	**0**
Vermont	**2,302**	**1,431**	**62.17**	**636**	**208**	**0**	**27**
Virginia	**33,704**	**11,049**	**32.78**	**19,109**	**1,717**	**0**	**1,828**
Washington	**34,480**	**10,377**	**30.10**	**17,783**	**5,806**	**0**	**514**
West Virginia	**4,889**	**2,169**	**44.37**	**2,480**	**204**	**0**	**35**
Wisconsin	**25,468**	**10,212**	**40.09**	**12,959**	**1,381**	**0**	**916**
Wyoming	**4,048**	**1,531**	**37.82**	**2,368**	**149**	**0**	**0**

APPENDIX C

STATE AND LOCAL DEBT OUTSTANDING AS PERCENT OF OWN-SOURCE REVENUE



Source: Maguire (2011), based on United States Census Bureau publication *State and Local Government Finances FY2008*.

APPENDIX D

STATE-IMPOSED MUNICIPAL TAX AND EXPENDITURE LIMITS

State	Property Tax Rate Limit	Property Tax Revenue Limit	Assessment Increase Limit	General Revenue Limit	General Expenditure Limit	Full Disclosure
Alabama	Y					
Alaska	Y					
Arizona	Y	Y	Y		Y	
Arkansas	Y	Y	Y			
California	Y		Y	Y	Y	
Colorado	Y	Y		Y	Y	Y
Connecticut						
Delaware						
Florida	Y		Y			Y
Georgia						Y
Hawaii						Y
Idaho	Y	Y				Y
Illinois	Y	Y				Y
Indiana		Y				
Iowa	Y		Y			
Kansas	Y	Y				
Kentucky	Y	Y				Y
Louisiana	Y	Y				
Maine						
Maryland			Y			Y
Massachusetts	Y	Y				

(table continues)

(continued)

State	Property Tax Rate Limit	Property Tax Revenue Limit	Assessment Increase Limit	General Revenue Limit	General Expenditure Limit	Full Disclosure
Michigan	Y	Y	Y			Y
Minnesota	Y			Y		Y
Mississippi		Y				
Missouri	Y	Y				
Montana	Y	Y				Y
Nebraska	Y	Y			Y	Y
Nevada	Y	Y		Y		Y
New Hampshire						
New Jersey					Y	
New Mexico	Y	Y	Y			
New York	Y		Y			
North Carolina	Y					
North Dakota	Y	Y				
Ohio	Y	Y				
Oklahoma	Y		Y			
Oregon	Y	Y	Y			
Pennsylvania	Y					
Rhode Island		Y				Y
South Carolina						Y

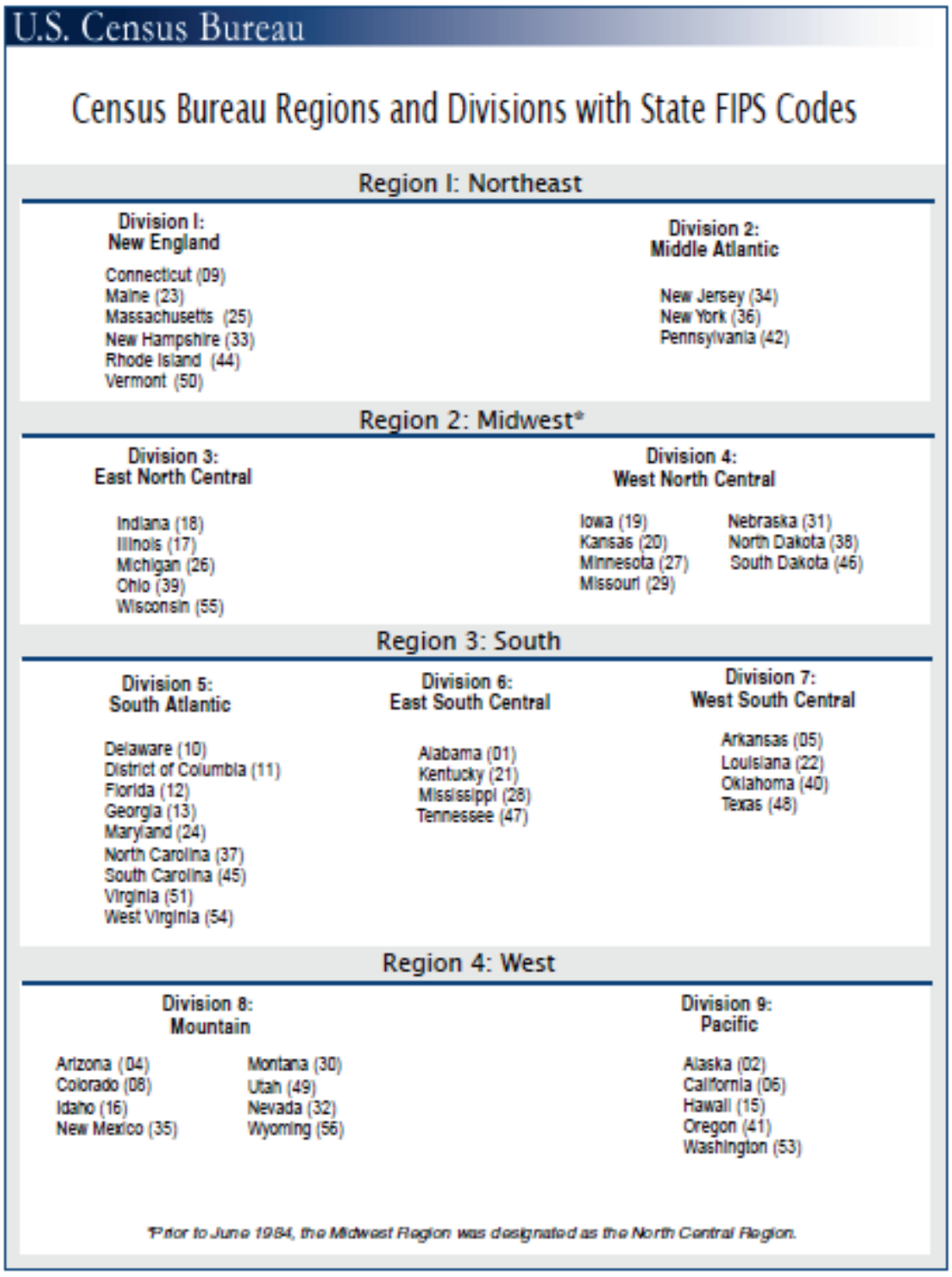
(table continues)

(continued)

State	Property Tax Rate Limit	Property Tax Revenue Limit	Assessment Increase Limit	General Revenue Limit	General Expenditure Limit	Full Disclosure
South Dakota	Y					
Tennessee						Y
Texas	Y	Y				Y
Utah	Y	Y				Y
Vermont						
Virginia						Y
Washington	Y	Y	Y			Y
West Virginia	Y	Y				
Wisconsin						
Wyoming	Y					

APPENDIX E

CENSUS BUREAU REGIONS AND DIVISIONS (U.S. CENSUS 2002)



U.S. Census Bureau

Census Bureau Regions and Divisions with State FIPS Codes

Region 1: Northeast

Division 1: New England

Connecticut (09)
Maine (23)
Massachusetts (25)
New Hampshire (33)
Rhode Island (44)
Vermont (50)

Division 2: Middle Atlantic

New Jersey (34)
New York (36)
Pennsylvania (42)

Region 2: Midwest*

Division 3: East North Central

Indiana (18)
Illinois (17)
Michigan (26)
Ohio (39)
Wisconsin (55)

Division 4: West North Central

Iowa (19)
Kansas (20)
Minnesota (27)
Missouri (29)
Nebraska (31)
North Dakota (38)
South Dakota (46)

Region 3: South

Division 5: South Atlantic

Delaware (10)
District of Columbia (11)
Florida (12)
Georgia (13)
Maryland (24)
North Carolina (37)
South Carolina (45)
Virginia (51)
West Virginia (54)

Division 6: East South Central

Alabama (01)
Kentucky (21)
Mississippi (28)
Tennessee (47)

Division 7: West South Central

Arkansas (05)
Louisiana (22)
Oklahoma (40)
Texas (48)

Region 4: West

Division 8: Mountain

Arizona (04)
Colorado (08)
Idaho (16)
New Mexico (35)
Montana (30)
Utah (49)
Nevada (32)
Wyoming (56)

Division 9: Pacific

Alaska (02)
California (06)
Hawaii (15)
Oregon (41)
Washington (53)

*Prior to June 1984, the Midwest Region was designated as the North Central Region.

Source: U.S. Census. 2012. http://www.census.gov/geo/www/us_regdiv.pdf (accessed May 6th 2012).

BIBLIOGRAPHY

Adams, Roy D. 1977. Individual Preferences as Supply Determinants in the Municipal and Federal Bond Markets. *Public Finance Quarterly* 5(2): 175-202.

Advisory Commission on Governmental Relations. 1961. *State Constitutional and Statutory Restrictions on Local Government Debt*. Washington DC: Government Printing Office.

Alesina, Alberto, and Guido Tabellini. 1990. A Positive Theory of Fiscal Deficits and Government Debt. *Review of Economic Studies* 57: 403-414.

Alm, James, and Mark Skidmore. 1999. Why Do Tax and Expenditure Limitations Pass in State Elections? *Public Finance Review* 27(5): 481-510.

Amon, Elizabeth. 2011. Moody's Fitch, S&P Must Face New Mexico Securities Lawsuit. *Bloomberg Brief: Municipal Market* (October 5).

Asefa, Sally A., Roy D. Adams, and Dennis R. Starleaf. 1981. Municipal Borrowing: Some Empirical Results. *Public Finance Quarterly* 9(3): 271-80.

Bahl, Roy, and William Duncombe. 1993. State and local debt burdens in the 1980s: A study in contrast. *Public Administration Review* 53 (1): 31-40.

Baribeau, Simone. 2011. Bondholders Fight Bankruptcy. *Bloomberg Brief: Municipal Market* (September 28).

Barro, Robert. 1979. On the Determination of the Public Debt. *Journal of Political Economy* 87(5): 940-947.

Bartle, John. 1995. The Fiscal Impact of Federal and State Aid to Large U.S. Cities: An Empirical Analysis of Budgetary Response. *Public Budgeting & Finance* 15(4): 56-67.

Bartle, John, R., Carol Ebdon, and Dale Krane. 2003. Beyond the Property Tax: Local Government Revenue Diversification. *Journal of Public Budgeting, Accounting & Financial Management* 15 (4): 622-648.

Berry, Frances Stokes, and William D. Berry. 1992. Tax Innovation in the States: Capitalizing on Political Opportunity. *American Journal of Political Science* 36(4): 715-42.

Bland, Robert L. 2005. *A Revenue Guide for Local Government*. 2nd ed. Washington, D.C.: International City/County Management Association.

Bland, Robert L., and Phanit Laosirirat.1997. Tax Limitations to Reduce Municipal Property Taxes: Truth in Taxation in Texas. *Journal of Urban Affairs* 19(1): 45-58.

Bluestone, Barry, Chase Billingham, Jessica Casey and Anna Gartsman, with Eleanor White and Tim Davis. 2010. *The Greater Boston Housing Report Card 2010: Taking Stock in an*

Uncertain Time. The Kitty and Michael Dukakis Center for Urban and Regional Policy Northeastern University for The Boston Foundation, Citizens' Housing and Planning Association (CHAPA) and The Warren Group. http://www.northeastern.edu/dukakiscenter/documents/Greater_Boston_Housing_Report_Card_2010.pdf (accessed May 1, 2012).

Boyd, Donald J. 2010. National Trends in State and Local Government Employment and Finances. New York State Division of the Budget. New York, NY: The Nelson A. Rockefeller Institute of Government. http://www.rockinst.org/pdf/government_finance/2011-03-18-Boyd_GIOA.pdf (accessed May 1, 2012).

Bradbury, Katharine L., and Helen F. Ladd. 1982. Proposition 2 ½ : Initial impacts Part I. *New England Economic Review* 14 (1), 13–24.

Breeden, Charles H., and William J. Hunter. 1985. Tax Revenue and Tax Structure. *Public Finance Quarterly* 13 (2): 216-24.

Brennan, Geoffrey and James M. Buchanan. 1979. The Logic of Tax Limits: Alternative Constitutional Constraints on the Power to Tax. *National Tax Journal* 32(2): 11-22.

Brennan, Geoffrey, and James M. Buchanan. *The Power to Tax: Analytic Foundations of a Fiscal Constitution*. Cambridge, UK: Cambridge University Press.

Brooks, Lea and Justin H. Phillips. 2008. An Institutional Explanation for the Stickiness of Federal Grants. *The Journal of Law, Economics, & Organization* 26(2): 243-264.

Brownlee, W. Elliott. 2004. *Federal Taxation in America: A Short History*. Cambridge, UK: Cambridge University Press.

Buchanan, James. 1958. *Public Principles of Public Debt*. Homewood, IL: Richard D. Irwin.

Bunch, Beverly S. 1991. The Effect of Constitutional Debt Limitations on State Governments' Use of Public Authorities. *Public Choice* 68(1): 57-69.

Burns, Nancy. 1994. *Formation of American Local Governments: Private Values in Public Institutions.* New York, NY: Oxford University Press.

Burnside, Craig. 2005. Theoretical Prerequisites for Fiscal Sustainability Analysis. In *Fiscal Sustainability in Theory and Practice,* edited by Craig Burnside, 11-34. Washington DC: World Bank.

Carroll, Deborah A. 2005. Are State Governments Prepared for Fiscal Crises? A Look at Revenue Diversification during the 1990s. *Public Finance Review* 33(5): 603-633.

Carroll, Deborah A. 2009. Diversifying Municipal Government Revenue Structures: Fiscal Illusion or Instability? *Public Budgeting & Finance* 29(1): 27-48.

Carroll, Deborah A. and Terri Johnson. 2010. Examining Small Town Revenues: To What Extent Are They Diversified? *Public Administration Review* 70(2): 223-235.

Carroll, Deborah A., Robert J. Eger III, and Justin Marlowe. 2003. Managing Local Intergovernmental Revenues: The Imperative of Diversification. *International Journal of Public Administration* 26(13): 1495–1519.

Chernick, Howard, Adam Langley, and Andrew Reschovsky. 2011. The impact of the Great Recession and the Housing Crisis on the Financing of America's Largest Cities. *Regional Science and Urban Economics* 41(4): 372-381.

Church, Steven, Selway, William, and Dawn McCarty. 2011. Jefferson County Alabama Files Biggest Municipal Bankruptcy. *The Bloomberg News* (November 9).

Clingermayer, James C. and B. Dan Wood. 1995. Disentangling Patterns of State Debt Financing. *American Political Science Review* 89(1): 108-120.

Confessore, Nicholas, and Thomas Kaplan. 2011. With Cuts, Cuomo Offers Shrunken Budget. *The New York Times* (February 1).

Corkery, Michael. 2011. Bondholders Win in Rhode Island. *The Wall Street Journal* (August 4).

Edwards, Kathleen. Keen on Bankruptcy. Bloomberg Brief: Municipal Market (August 23).

Cornwell, Christopher, Peter Schmidt, and Donald Wyhowski. 1992. Simultaneous Equations and Panel Data. *Journal of Econometrics* 51(1-2): 151-181.

Craig, Steven, and Robert P. Inman. 1982. Federal Aid and Public Education: An Empirical Look at the New Fiscal Federalism. *Review of Economics and Statistics* 64(4): 541-552.

Cukierman, Alex and Allan H. Meltzer. 1989. A Political Theory of Government Debt and Deficits in a Neo-Ricardian Framework. *American Economic Review* 79(4): 713-33.

Culter, David M., Douglas W. Elmendorf, and Richard J. Zeckhauser. Restraining the Leviathan: Property Tax Limitation in Massachusetts. *Journal of Public Economics* 71(3): 313-334.

Cutler, David M., Elmendorf, Douglas W., and Richard Zeckhauser, R.1999. Restraining the Leviathan: Property Tax Limitations in Massachusetts. *Journal of Public Economics* 71(3): 313–334.

Danziger, James N. 1980. California's Proposition 13 and the Fiscal Limitations Movement in the United States. *Political Studies* 28(4): 599–612.

Downes, Thomas A., and David N. Figlio. 1999. Do Tax and Expenditure Limits Provide a Free Lunch? Evidence on the Link Between Limits and Public Sector Service Quality? *National Tax Journal* 52(1): 113-128.

Dye, Richard F., and Therese J. McGuire. 1997. The Effect of Property Tax Limitation Measures on Local Government Fiscal Behavior. *Journal of Public Economics* 66(3): 469-487.

Deller, Steven C. and Craig S. Maher, 2006. A Model of Asymmetries in the Flypaper Effect. *Publius: The Journal of Federalism*, 36(2): 213-229.

Eddy-Nichols, Tracy. 1994. The Referendum Requirement: A Constitutional Limitation on Local Government Debt in Florida. *University of Miami Law Review* 38(677): 1-41.

Eichenberger, Reiner, and David Stadelmann. 2010. How Federalism Protects Future Generations from Today's Public Debts. *Review of Law and Economics* 6(3): 395-420.

Farnham, Paul. 1985. Re-examining Local Debt Limits: A Disaggregated Analysis. *Southern Economic Journal* 51(4): 1186-1201.

Fischel, William A. 2001. *The Homevoter Hypothesis: How Home Values Influence Local Government Taxation, School Finance, and Land-Use Policies*. Cambridge, MA: Harvard University Press.

Fisher, Ronald A. 1925. Statistical Methods for Research Workers. Edinburgh UK: Oliver & Boyd.

Foster, Kathryn A. 1997. *Political Economy of Special-Purpose Government.* Washington, DC: Georgetown University Press.

Frier, Sarah, and Michelle Kaske. 2011. S&P Cuts AAA Ratings on Thousands of Municipal Bonds After U.S. Downgrade. *The Bloomberg News* (August 9).

Gallu, Joshua, and William Selway. 2011. RBC to Pay $30 Million for CDO Losses. *Bloomberg Brief: Municipal Market* (September 28).

Gargan, John J. 1981. Consideration of Local Government Capacity. *Public Administration Review* 41(6): 649-658.

Gentry, William M. and Helen F. Ladd. 1994. State Tax Structure and Multiple Policy Objectives. *National Tax Journal* 47(4): 747-772.

Gold, Steven D., and Ronnie Lowenstein. 1996. Federal Aid Cuts, the Balanced Budget Amendment, and Block Grants: Impacts on the States. In *Proceedings of the Eighty-eighth Annual Conference*. Washington, D.C.: National Tax Association.

Goldman, Henry, and Michael Marois. 2011. New York City's Proposed `Crash Tax' Opposed by Insurers, Council Members. *The Bloomberg News* (January 14).

Goldman, Henry. 2011. New York City Seeks $2 Billion in Budget Cuts. *Bloomberg Brief: Municipal Market* (October 5).

Gordon, Tracy. 2011. Buy and Hold (on Tight): The Recent Muni Bond Rollercoaster and What It Means for Cities. Brookings Institution. http://www.urban.org/uploadedpdf/1001557-Buy-and-Hold.pdf (accessed April 21, 2012).

Greene, William H. 2003. *Econometric Analysis.* 5th ed. Upper Saddle River NJ: Prentice Hall.

Hanel, Joe. 2010. Colorado Voters Reject Ballot Initiatives. *The Durango Herald* (November 4).

Hannarong, Shamsub and Joseph B Akoto. 2004. State and Local Fiscal Structures and Fiscal Stress. *Journal of Public Budgeting, Accounting & Financial Management* 16(1):40-61.

Hansen, Lars P. 1982. Large Sample Properties of Generalized Methods of Moments Estimators. *Econometrica* 50(4):1029-1054.

Hendrick, Rebecca. 2002. Revenue Diversification: Fiscal Illusion or Flexible Financial Management. *Public Budgeting and Finance* 22(4): 52-72.

Hendrick, Rebecca. 2006. The Role of Slack in Local Government Finances. *Public Budgeting & Finance* 26(1): 14-46

Hildreth, W. Bartley, and C. Kurt Zorn. 2005. The Evolution of the State and Local Government Municipal Debt Market over the Past Quarter Century. Public *Budgeting & Finance* 25(4s): 127-153.

Hildreth, W. Bartley, and Gerald J. Miller. 2002. Debt and the Local Economy: Problems In Benchmarking Local Government Debt Affordability. *Public Budgeting & Finance* 22 (4): 99-113.

Hildreth, W. Bartley. 1993. State and Local Governments as Borrowers: Strategic Choices and the Capital Market. *Public Administration Review* 53(1): 41-49.

Howe, Edward T., and Donald J. Reeb. 1997. The Historical Evolution of State and Local Tax Systems. *Social Science Quarterly* (University of Texas Press) 78(1):109-121.

Hyman, David N. 2011. *Public Finance: A Contemporary Application of Theory to Policy*. 10th ed. Mason, OH: South-Western College Publications.

Johnson, Craig. L., and Kenneth A. Kriz. 2005. Fiscal Institutions, Credit Ratings and Borrowing Costs. *Public Budgeting and Finance* 25(1): 84-103.

Joyce, Philip G., and Daniel R. Mullins. 1991. The Changing Fiscal Structure of the State and Local Public Sector: The Impact of Tax and Expenditure Limitations. *Public Administration Review* 51(3): 240-53.

Jung, Changhoon, Chul-Young Roh, and Younguk Kang. 2009. Longitudinal Effects of Impact Fees and Special Assessments on the Level of Capital Spending, Taxes, and Long-Term Debt in American Cities. *Public Finance Review* 37(5): 613-636.

Kelly, M. Janet and Jane Massey. 1996. Debt Limits and Borrowing Patterns in Twelve Southeastern States: Where There is a Will…." *Southern Political Review* 24(2): 338-360.

Kiewiet, D. Roderick and Kristin Szakaly. 1996. Constitutional Limitations on Borrowing: an Analysis of State Bonded Indebtedness. *Journal of Law, Economics & Organization* 12(1): 62-97.

Knight, Frank H. 1921. *Risk, Uncertainty, and Profit*. Boston, MA: Hart, Schaffner & Marx, Houghton Mifflin Co.

Krane, Dale, Platon N. Rigos, and Melvin B. Hill, Jr., eds. 2001. *Home Rule in America: A Fifty State Handbook*. Washington, DC: CQ Press.

Kraus, Michael. 2011. *Mortgage Delinquency Still a Problem in Massachusetts*. Total Mortgage Services. Milford, CT 06460. http://www.totalmortgage.com/blog/mortgage-rates/could-mortgage-cramdowns-solve-foreclosure-crisis/6541 (accessed May 1, 2012).

Krueger, Skip, and Ethan M. Bernick. 2010. State Rules and Local Governance Choices. *Publius: The Journal of Federalism* 40(4): 697-718.

Ladd, Helen F. 1975. Local Education Expenditures, Fiscal Capacity, and the Composition of the Property Tax Base. *National Tax Journal* 28(2): 145-158.

Ladd, Helen F. 1978. An Economic Evaluation of State Limitations on Local Taxing and Spending Powers. *National Tax Journal* 31(1): 1-18.

Ladd, Helen F., and Dana R. Weist. 1987. State and Local Tax Systems: Balance among Taxes vs. Balance Among Policy Goals. In *The Quest for Balance in State-Local Revenue Structures*, edited by Frederick D. Stocker. Cambridge, MA: Lincoln Institute of Land Policy.

Ladd, Helen F., and J. Yinger. 1989. *America's Ailing Cities: Fiscal Health and the Design of Urban Policy*. Baltimore, MD: Johns Hopkins University Press.

Lewis, Blane D. 2003. Local Government Borrowing and Repayment in Indonesia. Does Fiscal Capacity Matter? *World Development* 31(6): 1047–1063.

Loviscek, Anthony L., and Frederick D. Crowley. 1990. What is in a Municipal Bond Rating? *The Financial Review* 25 (1): 25-63.

MacManus, Susan A. 1981. "Special District Governments: A Note on Their Use as Property Tax Relief Mechanisms in the 1970s." Journal of Politics 43(November): 1206-14.

Maguire, Steven, and Congressional Research Service. 2011. State and Local Government Debt: an Analysis. State and Local Government Debt: CRS Report for Congress. http://nasbo.org/LinkClick.aspx?fileticket=4sLYo0HTYI8%3D&tabid=81 (accessed May 1, 2012).

Martell, Christine and Bridget M. Smith. 2004. Grant Levels and Debt Issuance: Is There a Relationship? Is There Symmetry? *Public Budgeting and Finance* 24(3): 65-81.

Massachusetts General Laws Annotated. 2011. St. Paul, MN: West Publishing Co.

McGuire, Martin C. 1975. An Econometric Model of Federal Grants and Local Fiscal Response. In *Financing the New Federalism*, edited by W. E. Oates. Baltimore, MD: The Johns Hopkins University Press.

McGuire, Therese J., and Kim S. Rueben. 2006. *The Colorado Revenue Limit: The Economic Effects of TABOR*. Briefing Paper. Washington DC: Economic Policy Institute.

Markowitz, Harry M. 1959. *Portfolio Selection: Efficient Diversification of Investments*. New York: John Wiley & Sons.

McCabe, Barbara C. and Richard C. Feiock. 2005. Nested Levels of Institutions: State Rules and City Property Taxes. *Urban Affairs Review* 40(5): 634-654.

McCabe, C. Barbara. 2000. Special-District Formation among the States. *State and Local Government Review*. 32 (2): 121-131.

Misiolek, Walter S., and D. Grady Perdue. 1987. The Portfolio Approach to State and Local Tax Structures. *National Tax Journal* 40(1): 111-114.

Misiolek, Walter S., and W. Elder Harold. 1988. Tax Structure and the Size of Government: An Empirical Analysis of the Fiscal Illusion and Fiscal Stress Arguments. *Public Choice* 57(3): 233-246.

Mullins, Daniel R. 2001. *The Effects of Tax and Expenditure Limitations on the Fiscal Structure of Local Government*. Denver, CO: Lincoln Land Institute, Conference on Tax and Expenditure Limitations.

Mullins, Daniel R. 2004. Tax and Expenditure Limitations and the Fiscal Response of Local Government: Asymmetric Intra-local Fiscal Effects. *Public Budgeting and Finance* 24(4): 111–47.

Mullins, Daniel R. 2010. Fiscal Limitations on Local Choice: the Imposition and Effects of Local Government Tax and Expenditure Limitations. In *State and Local Fiscal Policy: Thinking Outside the Box?,* edited By Sally Wallace, 201-265. Cheltenham, UK: Edward Elgar Publishing Limited.

Mullins, Daniel R., and Phillip G. Joyce. 1996. Tax and Expenditure Limitations and State and Local Fiscal Structure: an Empirical Assessment *Public Budgeting and Finance* 16 (4): 75-101.

Mullins, Daniel R. and Bruce A. Wallin. 2004. Tax and Expenditure Limitations: Introduction and Overview. Public Budgeting and Finance 24(4): 2-15.

Musgrave, Richard A. 1959. *The Theory of Public Finance: A Study in Public Economy*. New York, NY: McGraw-Hill.

Musgrave, Richard A. 1973. *Public Finance in Theory and Practice*. New York, NY: McGraw-Hill.

Nice, David C. 1991. The Impact of State Policies to Limit Debt Financing. *Publius: The Journal of Federalism* 21(1): 69-82.

Nichols, Russell. 2010. The Pros and Cons of Privatizing Government Functions. *Governing Magazine* (December 1).

Niedowski, Erika. 2011. Central Falls, R.I., Files for Bankruptcy; Layoffs Loom. *Associated Press* (August 1).

Niskanen, William. A. 1971. *Bureaucracy and Representative Government*. Chicago, IL: Aldine-Atherton.

Nordhaus, William D. 1975. The Political Business Cycle. *Review of Economic Studies* 42(2): 169-190.

Oates, Wallace E. 1968. The Theory of Public Finance in a Federal System. *Canadian Journal of Economics* 1(1): 37-54.

Oates, Wallace E. 1999. An Essay on Fiscal Federalism. *Journal of Economic Literature* 37(3): 1120-1149.

Oates, Wallace E. 2005. Toward A Second-Generation Theory of Fiscal Federalism. *International Tax and Public Finance* 12(4): 349-373.

Pagano, Michael A., and Jocelyn M. Johnston. 2000. Life at the Bottom of the Fiscal Food Chain: Examining City and County Revenue Decisions. *Publius: The Journal of Federalism* 30(1): 159-170.

Peterson, George E. 1998. *Measuring Local Government Credit Risk and Improving Creditworthiness*. Washington, DC: World Bank.

Pettersson-Lidbom, Per. 2001. An Empirical Investigation of the Strategic Use of Debt. *The Journal of Political Economy* 109(3): 570-583.

Preston, Daniel. 2012. Citigroup Joins MSRB to Oppose Applying Dodd-Frank Law to Muni-Bond Market. *The Bloomberg News* (January 31).

Salamon, Lester M. 1989. *Beyond Privatization: The Tools of Government Action*. Washington, DC: The Urban Institute Press.

Saxton, Gregory D., Christopher W. Hoene, and Steven P. Erie. 2002. Fiscal Constraints and the Loss of Home Rule: The Long-Term Impacts of California's Post-Proposition 13 Fiscal Regime. *The American Review of Public Administration* 32(4): 423-454.

Schoenfeld, Stanley. Generating Revenues beyond Taxation. *Management Focus* 29(3):16-28.

Shade, Mark. 2011. Judge Dismisses Harrisburg, PA, Bankruptcy Filing. *Reuters* (November 23).

Sharp, Elaine B. 1986. The Politics and Economics of New City Debt. *American Political Science Review* 80(4): 1271-88.

Shedbegian, Ronald J. 1999. The Effect of Tax and Expenditure Limitations on the Revenue Structure of Local Government, 1962–87. *National Tax Journal* 52(3): 221–238.

Slemrod, Joel, and John Bakija. *Taxing Ourselves: A Citizen's Guide to the Debate over Taxes*. 4th ed. Cambridge, MA: MIT Press.

Sokolow, Alvin D. 2000. The Changing Property Tax in the West: State Centralization of Local Finances. *Public Budgeting and Finance* 20(1): 85–104.

Spindler, Charles J. 2003. The Lottery and Education: Robbing Peter to Pay Paul? *Public Budgeting and Finance* 15(3): 54-62.

Stallmann, Judith and Steven Deller. 2010. Impacts of Local and State Tax and Expenditure Limits on Economic Growth. *Applied Economics Letters* 17(7): 645-648.

State of Colorado. 2010.State Ballot Information Booklet: Colorado Amendment 61. Limits on State and Local Government Borrowing. http://www.leg.state.co.us/LCS/Initiative%20Referendum/0910InitRefr.nsf/89fb842d0401c52087256cbc00650696/96cfa1dcc71269548725775a0077cd6d/$FILE/Amendment%2061.pdf (accessed May 1, 2012).

Stephens, G. Ross, and Nelson Wikstrom. 2007. *American Intergovernmental Relations: a Fragmented Federal Polity*. New York, NY: Oxford University Press.

Stocker, Frederick D. 1976. Diversification of The Local Revenue System: Income And Sales Taxes, Used Charges, Federal Grants. *National Tax Journal* 29(3): 312-321.

Suyderhoud, Jack P. 1994. State-Local Revenue Diversification, Balance, and Fiscal Performance. *Public Finance Review* 22(2): 168-194.

Tasca, Coryne and Lisa Murphy. 2005. It's Not Selling Out! Why and How Cities Should Pursue Corporate Sponsorships. *Government Finance Review* 21(5). http://findarticles.com/p/articles/mi_hb6642/is_5_21/ai_n29215736/ (accessed May 1, 2012).

Temel, Judy Wesalo, and Bond Market Association. 2001. *The Fundamentals of Municipal Bonds*. 5tth ed. New York, NY: John Wiley and Sons.

Temple, Judy. 1994. The Debt/Tax Choice in the Financing of State and Local Capital Expenditures. *Journal of Regional Science* 34(4): 529-547.

Tiebout, Charles M. 1956. A Pure Theory of Local Expenditures. *Journal of Political Economy* 64(5): 416–424.

Toland, Bill. 2011. Natural Gas Fields Have Provided a Fount of Cash for Texas Cities. *Pittsburg-Post Gazette* (March 7).

U.S. Bureau of Economic Analysis. 2010. *Regional Economic Accounts: Gross Domestic Product (GDP) for States and Metropolitan Areas*. http://www.bea.gov/regional/index.htm (accessed May 1, 2012).

U.S. Census of Governments. 2002. *Compendium of Government Finances 2002*. Government Finances: 2002 GC02(4)-5. U.S. Government Printing Office: Washington, DC.

U.S. Census of Governments. 1992. *Federal, State, and Local Governments: Government Finance and Employment Classification Manual*. http://www.census.gov/govs/www/class.html (accessed March 15, 2012).

U.S. Census of Governments. 2006. *Federal, State, and Local Governments: Government Finance and Employment Classification Manual*. http://www.census.gov/govs/www/06classificationmanual/06_gfe_classmanual_toc.html (accessed March 15, 2012).

U.S. Census of Governments. 2010. 2010 Census Briefs: Population Distribution and Change: 2000 to 2010. http://www.census.gov/prod/cen2010/briefs/c2010br-01.pdf (accessed March 15, 2012).

Wagner, Richard E. 1976. Revenue Structure, Fiscal Illusion, and Budgetary Choice. *Public Choice* 25(1): 45-61.

Walker, David M. 2012. Debate: Restoring Fiscal Sanity—a US Case Study. *Public Money and Management* 32(1): 6-8.

Wallis, John J., and Barry R. Weingast. 2006. Dysfunctional or Optimal Institutions? State Debt Limitations, the Structure of State and Local Governments, and the Finance of American Infrastructure. In *Fiscal Challenges: An Interdisciplinary Approach to Budget Policy,* edited by Elizabeth Garrett, Elizabeth Graddy, and Howell E. Jackson, 331-365. Cambridge UK: Cambridge University Press.

Weiss, Alan J. 1980. New York's Tax and Debt Limits and Classified Property Tax Assessments: Time for a Constitutional Amendment? *Fordham Urban Law Journal* 9(3): 627-657.

White, Halbert. 1980. A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. *Econometrica* 48(4): 817-838.

White, Fred C., and Chia-Jen Chou. 1980. Diversification in Local Government Tax Structures. *Regional Science and Urban Economics* 10(2): 275-285.

Wilson, John Douglas, and David E. Wildasin. 2004. Capital tax competition: bane or boon. Journal of Public Economics 88(6): 1065-1091.

Wooldridge, Jeffrey M. 2002. *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.

Youngman, Joan, and Jane Malme. 2005. Stabilizing Property Taxes in Volatile Real Estate Markets *Land Lines* 17(3): 5-7.

Zampelli, Ernest M. 1986. Resource Fungibility, the Flypaper Effect, and the Expenditure Impact of Grants-In-Aid. *The Review of Economics and Statistics* 68(1): 33-40.

Zhao, Zhirong J., and Changhoon Jung. 2008. Does Earmarked Revenue Provide Property Tax Relief? Long-Term Budgetary Effects of Georgia's Local Option Sales Tax. *Public Budgeting and Finance* 28(4): 52-70.