DISENTANGLING DIFFUSION: AN ANALYSIS OF MUNICIPAL TAX RATE PATTERNS

by

Christopher F. Krueger

A dissertation submitted to the faculty of
The University of Utah
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

Department of Political Science

The University of Utah

May 2016

The University of Utah Graduate School

STATEMENT OF DISSERTATION APPROVAL

The dissertation of **Christopher F. Krueger**

has been approved by the following supervisory committee members:

		Date Approved
James J. Gosling	, Chair	**August 3, 2015**
Daniel Levin	, Member	**August 3, 2015**
Matthew J Burbank	, Member	**August 3, 2015**
Brent J Steele	, Member	**August 3, 2015**
Andre H Baksh	, Member	**August 3, 2015**

and by **Mark Button**, Chair/Dean of

the Department/College/School of **Political Science**

and by David B. Kieda, Dean of The Graduate School.

ABSTRACT

The geographic diffusion of policy is a well-documented phenomenon, but the mechanisms underlying diffusion are more obscure. This study describes and explains municipal property and sales tax rates. It examines the influence of diffusion in this rate-setting process. Existing literature describes two such mechanisms driving such diffusion: learning and competition, but leaves the question of the relative influence of these mechanisms in significant doubt.

An examination of municipal tax rates, financial and demographic data shows that, when setting their own sales and property tax rates, local governments weigh the rates of their neighbors more heavily than other factors. Evidence implies a stronger role for learning and less robust role for tax competition as explanations for municipal tax rate diffusion. Budgetary demands, as well as state-mandated formal rules, also influence local government rate-setting behavior.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

This paper explains the mechanism(s) behind the adoption of municipal local option sales tax (LOST) and municipal property tax rates. To a lesser extent, it predicts those rates. This study examines the influence of horizontal interactions among governments in a regional network as those municipalities choose their rates.

Significant scholarship has been dedicated to understanding this horizontal behavior. Although endogenous variables (e.g. residents' preferences) affect political entities' policy choices, scholarship identifies the crucial exogenous influence of peers within these horizontal networks. Governments copy their neighbors. Although several theories have been offered by scholars to explain this diffusion, two have emerged as the most salient: diffusion-through-learning and diffusion-through-competition. These somewhat competing/somewhat complementary theories have been aptly compared in several recent works.[1] This dissertation furthers the study and differentiation of these two mechanisms.

The learning model conceptualizes cities' behavior within peer-to-peer networks as a positive-sum game. One city emulates another's success in an effort to accrue some of the benefits of that success. For example, Dallas, Texas, copies its successful neighbor, Fort Worth, Texas, because Dallas expects to accrue some of the benefits enjoyed by Fort Worth without any necessary detriment to Fort Worth.

---

[1] See Baybeck, Berry and Siegel 2011; Boehmke and Witmer 2004; Burge and Piper 2012; da Silvia Costa and Carvalho 2013; Shipan and Volden 2008; Ting and Carpenter 2008; Volden, Brueckner, and Saavedra 2001.

In contrast, the competition model describes cities behaving as though they were participating in a zero-sum game. Governments copy each other in an effort to "steal" benefits away from their neighbors for themselves. In this case, Dallas is motivated to seize benefits from Fort Worth by copying Fort Worth's behavior. Dallas benefits at Fort Worth's expense.

This study examines municipal sales and property tax rates to test these competing explanations. It finds robust support for diffusion in general and fairly strong support for the learning mechanism. Some support for the competition is also indicated.

A brief overview of the competition-or-learning question

At its core, the diffusion-through-learning mechanism ("learning mechanism") conceptualizes cities as agents that copy neighbors' actions in a positive-sum setting. Jack Walker's (1969) early work on the learning mechanism has since been further developed by many scholars, notably by William and Frances Stokes Berry (2007), in more recent scholarship. According to this model, actions by one city do not necessarily take benefits from another. In this model, such policy mimicry may deliver increased benefits to residents, increasing the approval of city leaders by its residents and—perhaps—increase the long-term economic and cultural health of the city (Meseguer 2005; Shipan and Volden 2012; Volden 2005;).

According to this model, as governments copy their neighbors' behavior, geographic proximity increases the likelihood neighboring jurisdictions will adopt similar policies. This diffusion-through-learning has been variously identified as "mimicking," "copycat behavior," "yardstick competition," and "policy diffusion" in the political science literature (for additional discussion see Maggetti and Gilardi

2013).[2] Furthermore, a jurisdiction will have more influence on the policies of its immediate neighbors than on jurisdictions far away. The policies of Fort Worth, Texas have significant influence on the policies of Arlington (a contiguous neighbor), less influence on Dallas (30 miles), and significantly less influence on El Paso (about 600 miles). The learning model assumes that near neighbors' policies are more visible than distant neighbors' policies. This study, which considers tax rates as its focus, assumes that Fort Worth's tax rates are more visible to the leaders and residents of Dallas than they are to El Paso. Evidence presented by this study strongly supports this assumption.

The diffusion-through-competition model ("competition mechanism") grew from a wealth of research from the mid-twentieth century. Charles Tiebout's "A Pure Theory of Local Expenditures" (1956) suggests that governments' behavior can be likened to that of firms, while residents and resident businesses of jurisdictions can be compared to consumers. Like consumers purchasing higher quality goods at lower prices, Tiebout contends residents and businesses "shop around" for places to live and work, offering the best services at the comparably lowest tax rates. Dozens of studies have confirmed this "shopping with your feet" phenomenon (for reviews, see Dowding, John and Biggs 1995; Genschel and Schwarz 2011).

Inextricably linked to this competition for residents and businesses is the concept of tax competition (Hendrick, Wu and Jacob 2007; Wildasin 1988; Wilson 1999). If the sales tax rates of Dallas are substantially higher than those in nearby Fort Worth, Fort Worth might see increased sales as residents of Dallas flock to Fort Worth to make those purchases. Given the right set of rates and sales, Fort Worth might paradoxically generate *more* sales tax revenue than Dallas even though it has

---

[2] Each of these "sub-types" has adherents differentiating their theories from Berry and Berry's (2007). This dissertation will make considerable effort to disentangle some of these terms and their corresponding theories in chapter two. But in short, these four terms are (at the least) in the same general theoretical family, even if they are just shy of synonymous.

lower tax rates. The primary tests of this dissertation rest on the assumption that if competition is the primary force driving policy diffusion, municipal tax rates will show evidence of such competition. As a result, competing cities will attempt to poach revenue from their neighbors. Because cities compete more intensely with their near neighbors than their distant neighbors, cities should be more likely to poach revenue from their near neighbors than their distant ones. But the evidence generated and considered by this study concludes that revenue poaching is weak; diffusion seems to be primarily driven by the learning mechanism.

The goals and findings of this paper

The first question addressed by this dissertation is the degree to which cities copy each other across geographic space. Existing literature has examined this question so extensively as to expect this finding as a matter of course. Other, intrinsic explanations offer alternatives to the diffusion-through-learning and diffusion-through-competition models. Behavioral models, tax availability models, and budget constraints are among the most visible of these competitors. Extrinsic constraints imposed by superordinate governments may also play a role. But given the strong evidence from other studies describing the spread of policy throughout a geographic region, these other factors should play a less significant role. Diffusion should play the most significant role in determining tax rates. The evidence gathered in this study confirms this assumption.

The second question, contingent on the first, is whether diffusion can be best explained by the learning or competition mechanisms. This paper examines the extent to which cities copy their neighbors' sales tax rates, then compares that to the extent to which cities copy their neighbors' property tax rates. Because the competition model predicts sales tax rates will be more responsive to neighboring rates, stronger evidence of sales tax rate diffusion will imply a more powerful role for the competition mechanism. The evidence gathered by this study shows cities copy both tax rates with near-equal frequency, indicating learning is more likely to be the mechanism driving diffusion.

The third question is whether cities act to maximize revenue. If governments act as revenue maximizers, this would have profound implications for the nature of government. The predominant view in political science is that governments are not revenue maximizers (Zodrow and Mieszkowski 1986) or, at a minimum, do not prioritize revenue maximization. The evidence gathered in this study provides strong evidence confirming this predominant view.

The fourth question addressed by this study is whether cities, and by extension all governments, act rationally. This question has not been firmly settled in the literature (Dickson 2014; Downs 1957; Ostrom 1999). This essay examines evidence that cities could make revenue choices with little-to-no cost and substantial payoff. Do cities make these rational choices? The relevant evidence gathered and scrutinized by this investigation is less conclusive than others considered in this paper. Nevertheless, it appears as though governments act with little evidence of rational behavior, at least in the short term.

The fifth question of this paper is one of the vertical interactions of governments, specifically the effect of state government rules on municipal behavior. Do superordinate rules influence subordinate behavior within peer-to-peer networks? The existing literature on this point is less robust and conclusive (McKinnon and Nechyba 1997; Tannenwald 1991). With less existing scholarship on this subject, especially on state laws and their effect on local policy diffusion, conclusions are more difficult to predict. The evidence generated by this study suggests that state rules do affect the patterns of diffusion throughout networks, albeit weakly.

Finally, from a practical point of view, this dissertation will serve as a "political survival guide" for city administrators throughout the United States (and beyond) when they are faced with the prospect of implementing new taxes or raising existing rates. As of the writing of this paper, such information is largely unavailable or has been obfuscated in the current literature (Krane, Ebdon, and Bartle 2004). It will help city administrators and council members determine effective, competitive, and palatable rates. It will provide particular assistance to these leaders as they weigh the complex array of variables—most importantly the behavior of their neighbors—in raising rates or implementing new ones. Further, by determining which formal and informal state rules influence local rates more robustly, this paper offers some guidance to local government lobbyists/leagues as they advise their respective state legislatures to change sales and property tax laws. In short, this study suggests cities should largely conform to their neighbors' rates, and should lobby their state legislatures for more discretion.

Where this study fits in the literature

At least 800 articles have been published in the last 50 years on the subject of policy diffusion (Graham, Shipan and Volden 2013). Some basic questions, including the fundamental competition-or-learning question investigated by this dissertation, remain unanswered and disputed (Shipan and Volden 2012). This dissertation will join the hundreds of others searching for evidence of diffusion. It also finds evidence of diffusion as the product of learning rather than of competition, but such a brief summary unjustly simplifies the significant evidence gathered and analyzed by this study. There is some evidence of diffusion-through-competition, especially in a long-run scenario, and especially when contextual evidence is considered.

Methodologically, this paper offers an unusual tool to inquire into the topic of diffusion. Existing literature is profligate with studies of nominal variables and interstate data. Both the diffusion-through-learning and the diffusion-through-competition literature have made repeated calls for research using continuous[3] variables and on levels other than the state-to-state level (e.g., Berry and Baybeck 2005; Genchel and Schwarz 2011; Brueckner 2003). This study does both. In addition, the large size and numerical data offers additional descriptive and explanatory power over the categorical, smaller data sets used in previous studies. Finally, this investigation offers a vehicle for future study of these mechanisms by adding a new[4] tool to the relatively new sub-field of GIS-based statistical analysis (Berry and Baybeck 2005), should future scholars wish to emulate and/or refine its methods.

This dissertation consists of six chapters: This introduction is followed by Chapter 2: an overview of competing theoretical frameworks. A brief review of the existing municipal revenue landscape will be followed by a survey of alternate theories to explain and describe municipal rate-setting behavior. The third and fourth sections of Chapter 2 examine the primary theories driving tax rates under scrutiny: diffusion-through-competition and diffusion-through-learning. Chapter 3 is an overview of the methodology and data undertaken in this investigation; it also lays out the crucial hypotheses to be tested and lists the data gathered. Chapter 4 will present the results. Chapter 5 will conclude this dissertation, discussing the implications of these findings on the questions posited above and summarizing the findings.

---

[3] Continuous variables are those in which the values to be analyzed can take any value between the minimum and maximum.

[4] There have been several other studies that have used GIS (e.g., Berry and Baybeck 2005), but not in the specific way this study does.

CHAPTER 2

LITERATURE REVIEW

The municipal revenue landscape

Property taxes are older than the United States. Until the 1930s, property taxes were by far the largest single source of revenue for local governments (Fisher 1996). Declining property values and inability of homeowners to pay during the Great Depression led to a decreased reliance on the property tax. In the 1970s, a wave of reforms further reduced the salience of the property tax. These laws were made by state legislatures, referenda, and/or initiatives. California's Proposition 13 (1978) severely curtailed local government revenue by freezing tax rates and property values. A parallel wave of "Tax Expenditure Limits" passed several other states through popular or legislative means (ACIR 1995).

Several studies have described these vertical constraints within the context of property taxes. Such rules have been shown to impact the type and rates of these local taxes, both through their top-down restrictions as well as through their affects on the relationship of subordinate units within the peer-to-peer network (Bartle 2003; Bowler and Donovan 2004; Burge and Rogers 2011; Chicoine and Walzer 1986; Dye and McGuire 1997; Henderson 1994; Johnston, Pagano and Russo 2000). This study finds little evidence that such vertical rules significantly affect property tax diffusion patterns.

Local option sales taxes are a comparatively newer phenomenon. New York City was the first city to adopt the Local Option Sales Tax in 1934, in part as a reaction to declining property tax revenue during the Great Depression (ACIR 1989).

Many states now allow local governments to set their own sales tax rates, but these authorizations vary significantly from state to state. Some states allow sales taxes to be levied only at the county level (e.g. South Carolina, Ohio, and Nevada). Counties in these states do sometimes have to share revenue with cities within their borders. Some states mandate a set municipal sales tax rate for every city within the state (e.g. New Jersey and Virginia), creating a "LOST" without the "optional" component of the term. This study will be more limited in scope, focusing on the 22 states that allow at least some of their cities at least some discretion in setting general sales tax rates.[5] As of 2008, these states were: Alabama, Alaska, Arizona, Arkansas, California, Colorado, Idaho, Illinois, Iowa, Kansas, Louisiana, Minnesota, Missouri, New Mexico, North Dakota, Nebraska, Oklahoma, South Dakota, Tennessee, Texas, Utah, and Washington.

Although many states have imposed complex rules regarding the timing, rates, and means through which property is assessed and taxed, states' rules regarding sales taxes are at least as complex. These rules include rate ceilings, rate increase maximums, rate minimums, referendum requirements, revenue sharing, and sunset laws on rates. As with property tax, several studies suggest those limits will almost certainly affect the diffusion pattern of rates throughout these various states (Burge and Rogers 2011; Cornia, Grimshaw, Lewis and Barbour 1999; Luna, Bruce and Hawkins 2007; Nelson and Walker 2010; Zhao 2005). However, the literature on vertical constraints and their effects on LOST rates is not as robust as that covering property tax. Even these studies discuss the role of vertical restrictions as an afterthought—perhaps with the exception of Burge and Rogers

---

[5] Hawaii and Vermont are not included in this study. As of 2008 each of these states had exactly one city with a LOST, while the rest of the cities in the state had none. Inclusion of these states would produce no meaningful data.

Finally, states with county-only data are not included. First, because there is enough data with the city-only LOST states to produce meaningful results and second, because in many states the counties are so large (especially Western States like Nevada) as to make meaningful tax competition through cross-border shopping negligible.

(2011). This study will narrow this gap in the literature, demonstrating that vertical rules have little influence on diffusion patterns.

Revenue Sources

A review of financial trends provides a context for understanding the role of property and sales taxes in the greater municipal revenue landscape. Cities have several potential sources of revenue: sales taxes, property taxes, income tax, franchise taxes, user fees and intergovernmental transfers (e.g., federal, state, and local grants and payments). The basic trends for these different revenue lines are illustrated in Figure 2.1, which demonstrates the decline in intergovernmental transfers during recent years. Figure 2.1 shows the corresponding increase in local governments' taxes and fees (fees are included in "other revenue."). These trends are confirmed in articles from Bartle (2003), Bartle, Ebdon and Krane (2003) and Johnston, Pagano and Russo (2000).

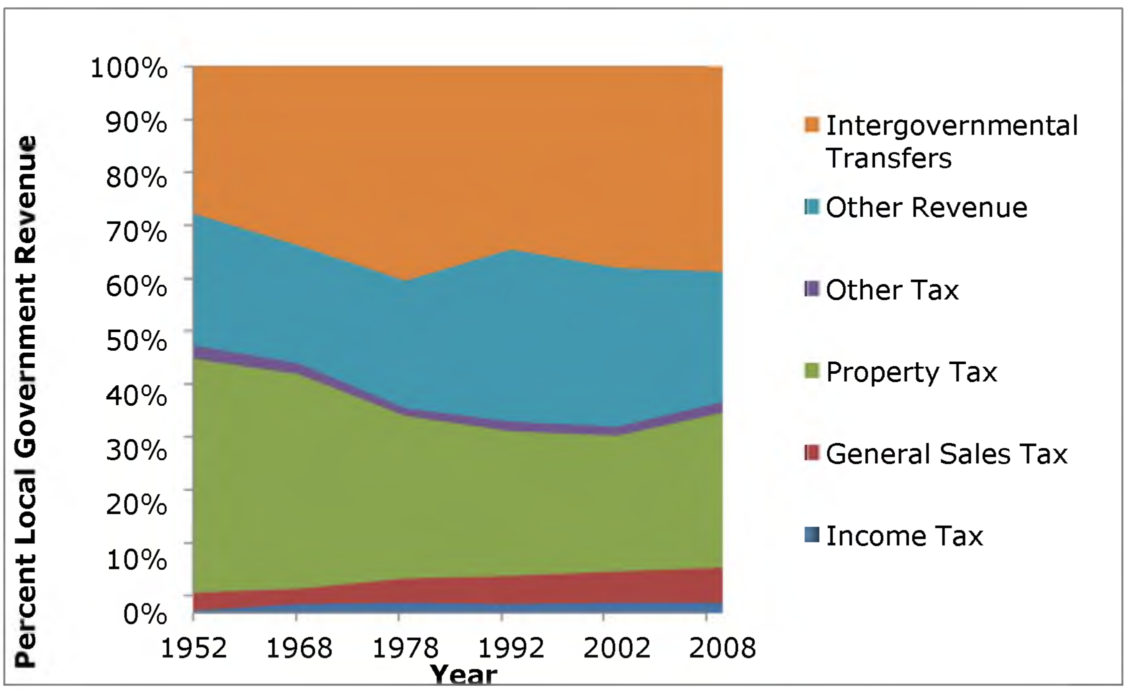


Figure 2.1: Local government by source, 1952-2008. From the U.S. Census Bureau's *Statistical Abstracts of the United States*. This figure represents all revenue sources for all states.

Looking more closely at the cities under examination in this paper, Figure 2.2 depicts the LOST-only revenue landscape from 2011. This figure includes the Census Bureau's results from the 2011 *Survey of Local Government Finances* and tallies the revenue amounts by category, but only for the 22 under the consideration of this paper. However, the *Survey* data in Figure 2.2 indicates a much larger portion of revenue coming from fees. Despite their differences, three trends are evident. First, cities have significantly increased dependence on fee-based revenue. Second, intergovernmental transfers constitute a smaller portion of the budget compared to 1970. Third, sales tax revenue and property tax are both important sources of revenue.

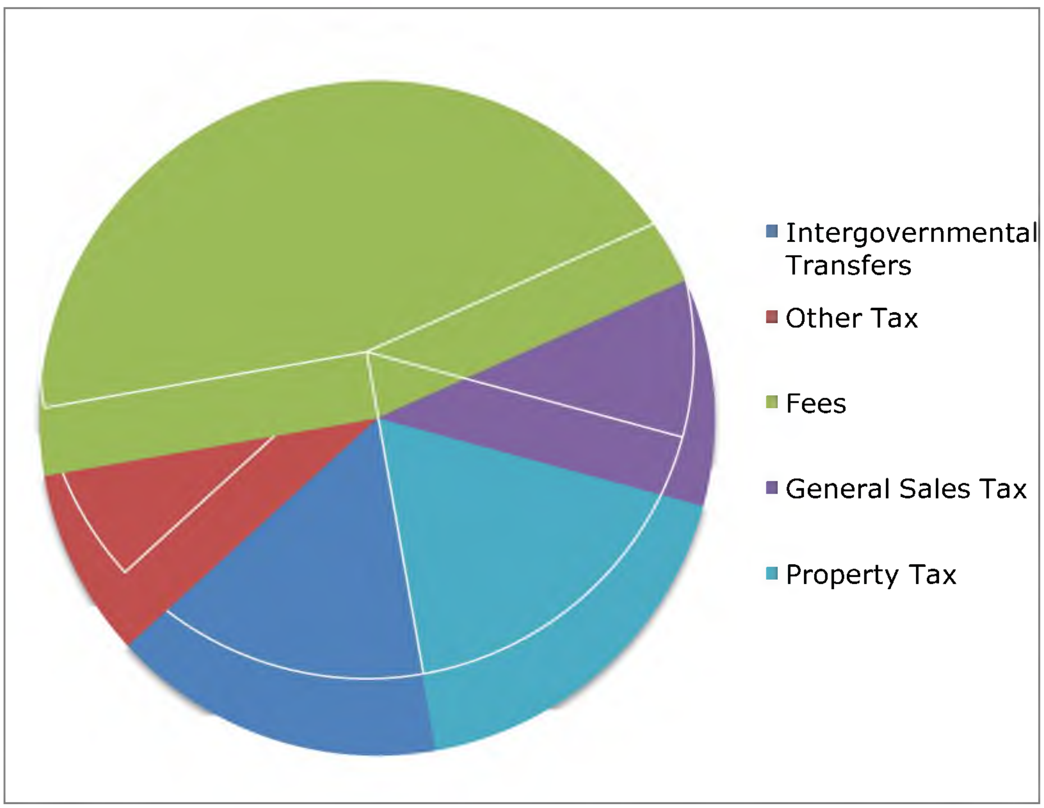


Figure 2.2: LOST-state local government revenue by source. This figure reflects the same data as Figure 2.1, but only for the study year 2011. The data is also limited to the 22 states studied in this dissertation. From Census Bureau's *Annual Survey of State and Local Government Finances, 2011*.

Again, these trends have been confirmed in several other studies, notably Bartle (2003), Bartle, Ebdon and Krane (2003) and Johnston, Pagano and Russo (2000). This paper focuses on tax rates and their corresponding revenues. Figures 2.3 and 2.4 clarify those specific sources of funding.

Figure 2.3, like Figure 2.1, illustrates trends over 1952-2008 and again includes data from county and special districts as well as cities. But unlike Figure 2.1, only the tax revenue is included in Figure 2.3. This makes the relationship between the various sources of taxes more clear, specifically local government's dependence on sales tax and property tax revenue, among other sources of taxes.

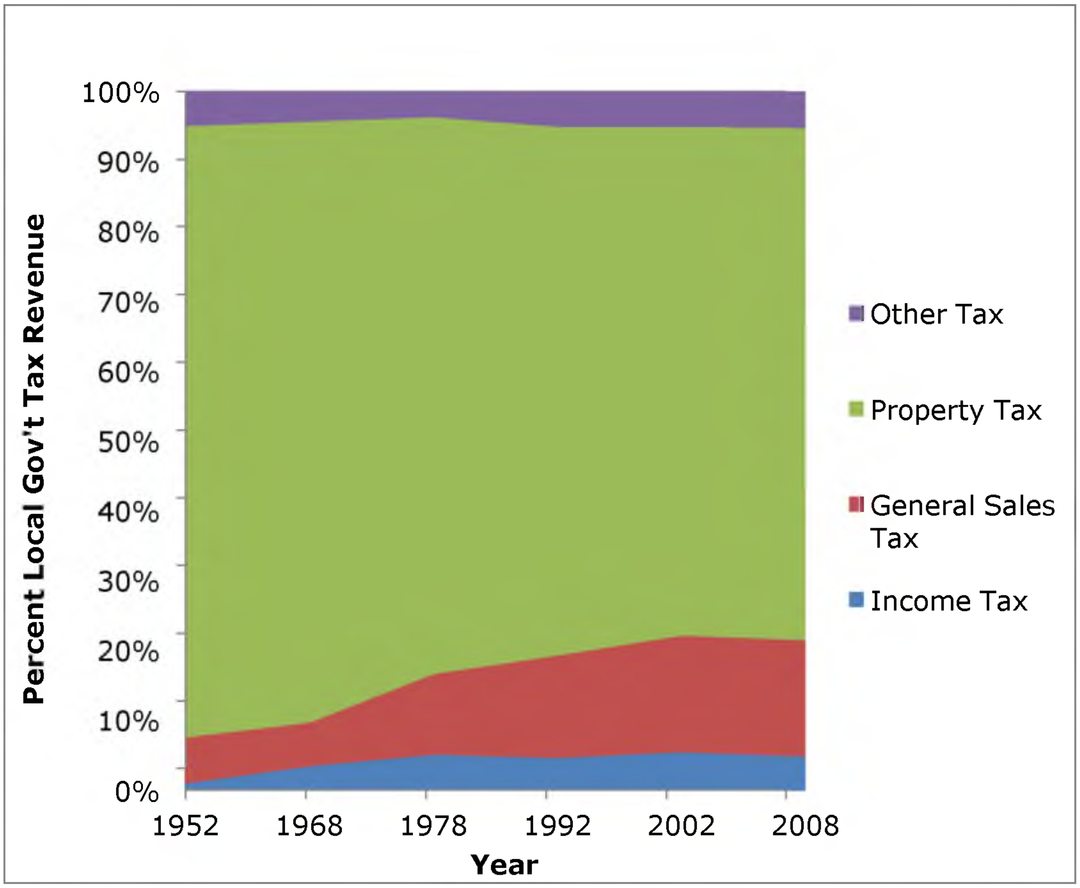


Figure 2.3: Local government tax revenue by source, selected years 1952-2008. This is the same data as in Figure 2.1, with only the tax revenue included. The figure also includes *only* the data from the 22 study states of this investigation. Compiled from various *Statistical Abstracts of the United States.*

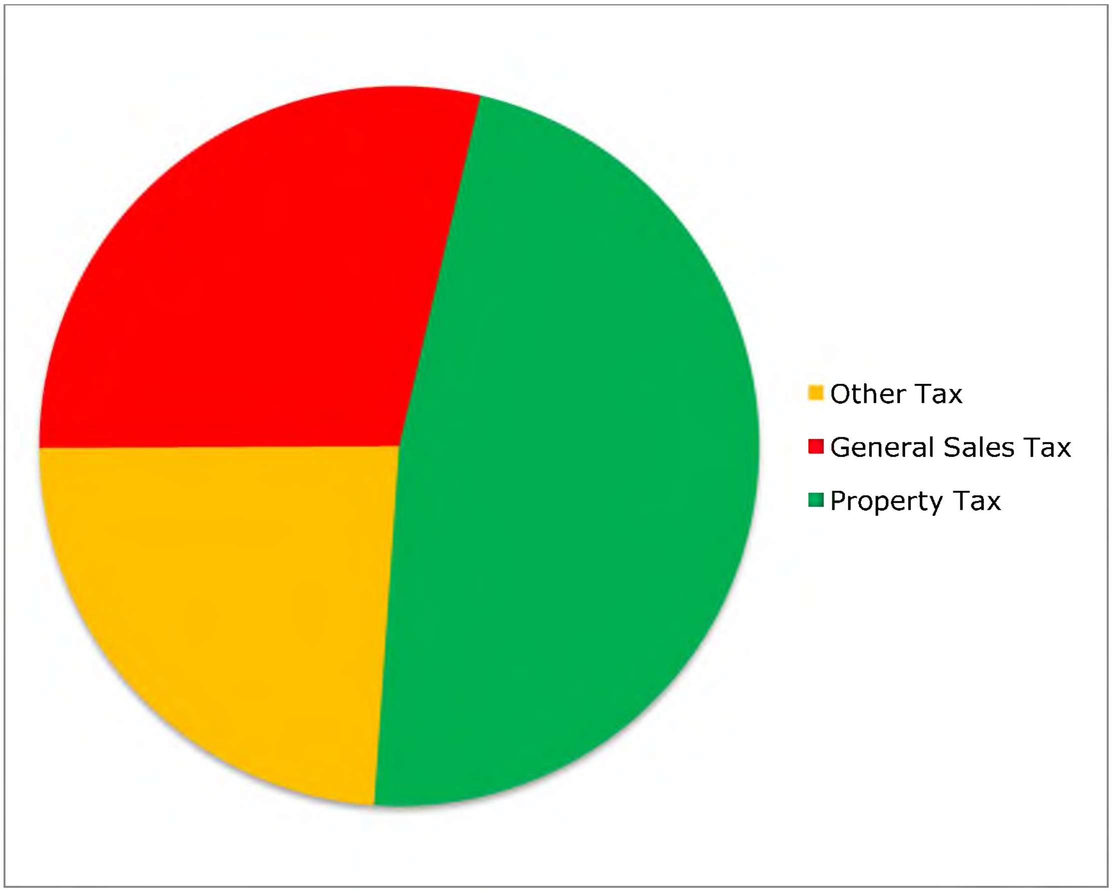


Figure 2.4: Municipal government revenue by tax, LOST states only, 2011 is a graphical depiction of the same data as in Figure 2.3, but with only tax revenue included. From U.S. Census Bureau's *Annual Survey of State and Local Government Finances, 2011.*

Figure 2.4 further narrows the scope of the data. Like Figure 2.2, it includes *only* the tax data from the *cities* in the 22 states under the microscope of this paper. Other forms of taxation (i.e., franchise tax, excise tax) remain fairly steady throughout the period, while the local government income tax grew quickly at first but then leveled out in the 1970s (see also Bartle 2003). Only the sales tax has grown significantly and fairly steadily to "make up" for a decline in property tax revenue. This chart demonstrates the significant share of municipal revenue commanded by sales and property tax. The importance of these taxes makes this topic worthy of investigation, as city managers make decisions about which taxes to raise, and to what extent to raise them.

Lacking parsimony: Same findings, multiple explanations

Complex political behavior begets complex explanations. As with any complex behavior, multiple forces are at work in the setting of municipal tax rates. There are three leading endogenous approaches to the study of municipal taxation competing with the "mechanisms of diffusion" theories. These will be surveyed before proceeding to a more detailed review of the competition and learning models. This study finds evidence of many mechanisms at work.

First, the behavior-driven model will be described, in which constituent preferences dictate the behavior (in this case, tax types and rates) of officials and therefore of cities. Second, the paper will turn to the tax availability model, which emphasizes the pragmatic nature of taxation; governments tax that which they can most easily and efficiently tax. Third, the budget obligations model will be considered. This theory stresses government's need to set tax rates congruent to its budget demands.

A fourth mechanism will be considered at the end of this section. The institutional mechanisms theory highlights the role of formal, vertical intergovernmental mechanisms as the primary force behind government action. This study will devote considerable effort to examining the role of such vertical mechanisms as predictors of tax rates.

The second and third sections of this chapter review the existing literature on the diffusion-through-learning model and the diffusion-through-competition model. Recent academic efforts have attempted to disaggregate and evaluate these sticky mechanisms. The terms have been and continue to be disputed and conflated in the literature. This paper will clarify these mechanisms in the face of convoluted, conjoined terminology. The final, fourth section of this chapter reviews the six studies most relevant to the goals and methods of this dissertation.

Endogenous theories

The Behavioral Model

The traditional behavioral model, most prominently articulated in Campbell, Converse, Stokes, and Miller's (1960) "The American Voter," emphasized the role that public opinion plays in shaping public policy. Dozens of other studies since then (e.g., Carmines and Stimson 1989; Dalton 2005 Jacobson 2004; Page and Shapiro 1983) provide compelling evidence that political leaders are poignantly aware of and responsive to public opinion. Studies of local opinion and taxation behavior confirm that at least some of the behavior of political leaders is dictated by opinion.

Therefore, public opinion should significantly influence tax-setting behavior. Less unpopular taxes should be substituted for those that are truly despised by the public (Krishna and Slemrod 2003). The general level of opposition to taxation, and towards the public sector in general, should dictate lower overall tax rates. Several studies recognize this contention, not only acknowledging the variables shaping public opinion, but also explicating the mechanisms through which public opinion influences the behavior of leaders (e.g., Ansolabehere and Snyder 2006; Bowler and Donovan 1995). Several other studies implicate those decisions in the context of tax rates (Ashworth and Heyndels 1997; DeHoog, Lowery and Lyons 1990; Henderson 1994; Hendrick, Wu and Jacob 2007; Stine 1998). Bryan Caplan (2001) goes so far as to test the interaction between property tax rates and voting, and concludes the virtual monopoly cities have over services virtually prohibits residents and resident firms from relocating. Such firms' and residents' only recourse is to vote for new city leaders in order to affect local tax rates.

But there is substantial evidence to equivocate the impact of a unidirectional "bottom-up" behavioral model. First, John Zaller's (1989) interaction model suggests political leaders' opinions are exchanged with those of the general public;

opinions evolve together. This might allow a mayor or city councilwoman to “sell” a type of tax or tax rate to an otherwise strongly opposed electorate, reducing the overall correlation between opinion and taxes. Second, “All politics is local.” Eriksen, Wright, and McIver (1989) demonstrated a tremendous regional variation among partisans. To assume that Republican voters in Salt Lake City, Utah will share identical opinions on property taxes as Republican voters in Murray, Utah, let alone Murray, Kentucky, stretches the assumption of ideological consistency too far. Third, the mundane nature of local taxation means that it often escapes the kind of visibility of other contentious issues (e.g. the location of adult novelty stores). Several scholars, notably Popkin (1994), suggest this allows leaders a greater degree of autonomy in making tax rate decisions (see also Krishna and Slemrod 2003). Fourth, a host of opinion-distorting mechanisms play out in the election cycle(s). City leaders disguise tax increases (Krishna and Slemrod 2003), raise less visible taxes, and/or raise taxes in off-election years or even as they are retiring from politics (Berry and Berry 1994; Bordignon, Cerniglia and Revelli 2003). Fifth, city leaders are often judged by factors not associated with policy choices, such as charisma and political connectedness (DeHoog, Lowery, and Lyons 1990). Sixth, interest groups play a disproportionate role in determining tax rates, distorting popular will in the setting of tax rates (Gill and Haurin 2001). These six factors contribute to the detachment of tax policy from public opinion.

The Tax Availability Model

Political theory also offers an expediency explanation for policymaking. Governments tax what is practical and efficacious to tax. Prior to about 1900, income tax would have been a practical impossibility. For most people, income was neither reported nor paid with enough documentation to enable vigorous, fair income tax collection. To demonstrate, practical enforcement of sales taxes is currently facing a huge challenge through Internet sales (Cornia, Sjoquist, and Walters; 2004; McLure 1999).

Another related tax availability issue is volatility. Sales taxes are much more sensitive to economic fluctuations than are property taxes. In an economic downturn, sales taxes are liable to see significant dips (Fisher 2009). In times of prosperity, though, sales tax revenue can be of great use to municipal leaders (Sjoquist, Walker and Wallace 2005). A surge in retail development may entice city leaders or voters to begin raising sales tax rates to capitalize on a previously untapped revenue stream (Dye and McGuire 1991; Henderson 1994).

A question of implementation is another important availability factor. Property tax collection requires a substantial number of bureaucrats to process and enforce such taxation. The more complex the tax structure, the more substantial the transaction cost associated with the cost. Smaller cities, or cities with tight budgets, may simply not have the resources to collect the tax in question (Slemrod and Yitzhaki 2002). In contrast, cities and counties with strong property values may take advantage of this high transaction cost and raise taxes surreptitiously (Stine 2005).

Some cities may not possess the tax base needed to effectively raise revenue through specific types of taxation (e.g. Blackley and DeBoer 1987). Cities with abysmally low property values, for instance, would find it difficult to raise significant revenue through property tax. Cities with a great deal of public sector property would also struggle to raise significant revenue through property taxes. Cities with few retail stores may find it difficult to raise revenue through sales tax (see Luna, Bruce and Hawkins 2007). These practical constraints will certainly affect the rates and type of taxes, and will also interact with tax competition issues.

Finally, the fuzzy nature of policymaking requires a brief discussion of the entanglement between the availability model and other mechanisms at work in the setting of municipal tax rates. Volden, Ting and Carpenter (2008) demonstrate that over time, cities learn which policies work best. Although this might seem like unequivocal diffusion-through-learning, their study discusses the way(s) in which jurisdictions craft policy based on internal successes or failures. Recall from above that leaders execute implementable policies. Seattle might initially adopt a policy a it learns from Tacoma, but over time Seattle learns from its own successes and failures as it modifies the policy to a point more effective and beneficial than Tacoma's was or became. The tax availability model fits this scenario well. Seattle might initially adopt a LOST because it perceives that nearby Tacoma had success with its LOST. But then, as Seattle learns from internal experimentation which revenues are most available, it changes its policy not because of outside pressure but (mostly) because of internal pressure. The sticky nature of these causal mechanisms makes it difficult to disentangle this endogenous learning from external learning. However, this paper's significant data and analysis makes significant progress in measuring and disentangling the two.

Budget Obligations

Budget obligations may drive cities' type and rate decisions. For instance, cities whose responsibilities include public education will have a significant fiscal obligation perhaps absent in cities in neighboring states, or even cities in the same state. Cities may or may not include fire departments, medical services, sewage, or mosquito abatement within their operational budget (for a survey, see Wallis 2000). Cities undertaking such additional service commitments are under pressure to raise more revenue than their neighbors without such obligations (Inman 1989). Epple and Schipper (1981) consider pensions as specific fiscal demands and find such pensions do affect budgetary decisions. Alm, McKee and Skidmore (1993) find strong evidence fiscal distress is a leading cause for states to adopt lotteries. Bartik

(1992) offers a review of the literature investigating the complex relationship between taxes as a means to raise revenue for creating jobs. As above, the obligations may entangle with voter preferences. Line item tax increases may be more likely to pass a voter referendum if such tax increases are dedicated beforehand to a specific spending item (Green 2006).

Not all the obligations are as clear; many fall along a continuum. Some of the more subtle revenue demands include different levels of service, such as more fire protection funding in cities with older homes, more police protection in cities with higher crime rates, or fewer schools per capita in cities with large number of private school attendees.

These three endogenous approaches are far from exclusive. A city with demanding citizens would generate budget obligations, which would then need to be met by increased taxation. For example, a positive feedback loop in which citizens demanded more libraries could lead to more legacy operating costs and capital debt. But those robust libraries and corresponding services would generate a clientele expecting more of those services. A similar scenario might develop in a city with an existing strong tax base. Citizens might expect their city to act differently because their property tax revenues were robust, and then call on city leaders to tap into those resources more aggressively.

These endogenous mechanisms also interact with the exogenous behavior of neighbors. For instance, both of the examples above are deeply linked to peer-to-peer influences. City residents would be more likely to demand more libraries and library services if a neighboring city had better services, and property tax revenue only seems untapped when compared to the revenue those taxes are generating in a neighboring city. Existing literature offers support for these interactions. Zodrow and Mieszkowski (1986) and Allers and Elhorst (2005) discuss the horizontal spillover effects of public spending within interjurisdictional settings. This can create interaction between endogenous and exogenous mechanisms. A popular example in the literature is law-enforcement spending. If Seattle, Washington were to dramatically increase its spending on police, some crime would invariably move to neighboring Tacoma, pressuring Tacoma to increase its spending as well (Lawton, Taylor and Luongo 2005). A city with a high crime rate might not feel pressured to fund police more vigorously if such a city's neighbors had even worse crime. In a related phenomenon, the negative consequences of one activity spill over into a neighboring jurisdiction, imposing costs on its neighbors (Allers and Elhorst 2005; Case, Rosen and Hines 1993; Sjoquist et al 2007). For instance, limited riverboat gambling in Davenport, Iowa, might increase crime in neighboring Bettendorf. Bettendorf collects none of the gambling revenue of Davenport, but does have to deal with the externalities, forcing Bettendorf to at least consider adopting riverboat gambling. These mechanisms lurk within the diffusion-through-learning and the diffusion-through-competition theories.

Institutional Constraints

A fourth endogenous factor involves vertical intergovernmental relationships. These legal constraints are not endogenous to the local governments the way voter preference, budget obligations, and tax availability are, but neither are these legal constraints dependent on the exogenous peer-to-peer horizontal network, the major focus of this paper. In a broad sense, the constraints are part of the legal framework of a city, and as such are correctly labeled "endogenous." Legal constraint is a powerful variable influencing municipal behavior (Bowman and Kearney 2012; , Zimmerman 2002; Zimmerman 2004) and can specifically affect rates as well. The limits on the rates are usually present, and many times such limits fall within a very narrow band of discretion. Many states set property tax or sales tax rate ceilings and/or floors on their subgovernments, significantly reducing their discretion to raise revenue and often forcing the use of and dependence on other mechanisms for revenue (e.g. Cutler, Elmendorf, and Zeckhauser 1999; Chapman 2003; Dye and McGuire 1997; Johnston, Pagano and Russo 2000; Mullins and Joyce 1996; Pagano and Johnston 2000; Sokolow 1998). Although such states will not be considered in this paper, many forbid any local option sales taxes at all, completely preventing diffusion of such rates in any form (Dye 2008). Vertical restraints affect the rate-setting behavior of cities within this intergovernmental setting, as well as the degree to which competition can even take place (Boyne 1996).

States also impose legal mechanisms facilitating or hindering taxation. If cities are required to obtain taxes through citizen referenda, it is more difficult to alter rates. Some states even require supermajorities of citizen referenda to increase taxes beyond a certain level. Several states allow local governments to raise rates, but then those rate hikes can be repealed by ballot initiative (for a review, see Sokolow 1998), and at least one study confirms local voters actively control the rates of their cities through those mechanisms (Biegeleisen and Sjoquist 1988). A few states place tight controls on the rate variations allowed. For instance, Georgia limits its LOST rates to either 1% or 0%. A few states require cities to share a portion of their property tax and/or sales tax revenue with other cities in the state. Both Utah (sales) and Texas (property) are among the states with such requirements.

My research addresses these limitations and constraints, and offers some quantification of the effects of these constraints. However, like the ideological issues above, to disentangle state controls from municipal cooperation is difficult. Theory suggests states may be brought in on behalf of cities to set rules (Allers and Elhorst 2005; Bednar, Eskridge, and Weingast 2001; McKinnon and Nechyba 1997) making it more difficult for cities to undercut one another.

Will state controls result in higher or lower rates? The limited literature suggests more restrictions will reduce local rates, but the evidence is far from conclusive (Brueckner and Saavedra 2001; Mullins and Joyce 1996; Sjoquist et al 2007). Will state controls result in more or less rate variation? Existing studies certainly indicate state controls do impact local systems (Boschken 1998; Bowman and Kearney 2012; Bruckner and Saavedra 2001; Burge and Piper 2012; Burge and Rogers 2011; Chicoine and Walzer 1986; Mullins and Joyce 1996), but the literature here is less robust than the literature examining the effect of federal restrictions on state behavior. This paper increases the knowledge and understanding of state restrictions on the variation, diffusion, and level of local government tax rates. These findings will have implications for the effects of all superordinate governmental rules on policy diffusion throughout their subordinate units.

Diffusion-through-learning

There is overwhelming evidence that governments copy each other, especially within peer-to-peer networks whose jurisdictions are in close geographic proximity. Two leading theories have been offered to explain this phenomenon: diffusion-through-learning and diffusion-through-competition. Academics have used both terms in multiple contexts over the past several decades of diffusion scholarship. It is therefore necessary to distinguish their meaning in this study.

Learning by Other Names

A commonly used word like "learning" comes with many possible connotations. As it is used in this paper, diffusion-through-learning is easily distinguished from an endogenous learning mechanism. One of the most prolific scholars of diffusion, Craig Volden, and his colleagues (Volden, Ting and Carpenter

2008) describe such an endogenous "decision theoretic" mechanism. The decision theoretic model describes governments learning from their own policy experiments, adopting policies based on their jurisdiction's internal preferences, successes and failures. This is an important use of the word "learning"; governments *do* learn from their own experiments. But since the primary goal of this paper is to evaluate the exogenous forces driving diffusion, it will focus almost entirely on the exogenous learning described in their "game-theoretic" model. [6] However, some the findings of this paper do have implications for this endogenous learning model, as addressed below.

Further, the concept of diffusion-through-learning has taken many names (see Maggetti and Gilardi (2013) for further discussion of the terminology problems). "Yardstick" is a notable competitor to "learning." The term "yardstick competition" has been applied to diffusion-through-learning. Some scholars differentiate "yardstick" from "learning" but they are close enough (if at all separate) to deserve treatment as synonymous terms throughout this paper.[7] This paper will use the term "learning" almost exclusively. The peer-to-peer observe-act-observe-react cycle more closely resembles a classroom setting where students compete against, but also work in cooperation with each other, more than it resembles an athletic competition.

---

[6] Volden, Ting and Carpenter also offer a peer-to-peer diffusion mechanism, labeled the "game-theoretic" diffusion model. Volden, Ting, and Carpenter's use of the "game theoretic" terminology is weak. Game theory by definition requires not only two or more players (Volden, Ting and Carpenter satisfy this part of the definition) but also the idea players are trying to maximize their utility based on the moves of the other player. Moves are necessarily interdependent. To qualify as "game theory," Tacoma's actions must affect Bellingham's and vice-versa. Finally, Volden, Ting, and Carpenter aggregate the two mechanisms of diffusion this paper attempts to disaggregate. Their exogenous "game theoretic" mechanism may take place in a positive *or* zero-sum environment, the principal means through which the two mechanisms are distinguished in this paper.

[7] The term "yardstick" is important to discuss at least briefly here because of the implications an actual yardstick has as a measuring tool. Just as sports teams measure success against competitors, when a government, or set of governments, is perceived to be successful with a policy (e.g., a lottery generates $200m for public education), neighboring governments and constituents will use a figurative "yardstick" to measure the success of their own policies. If such a lottery is perceived to be more successful than the current policy, leaders may adopt policy to "measure up" to their neighboring jurisdictions (see Besley and Case 1995).

Positive-sum Games and "Learning"

Conformity powerfully affects human behavior. The tendency to copy others' behavior can be so powerful as to lead a person to go against what he/she knows to be true (Asch 1956). Individuals learn by mimicking their peers, especially when they perceive successful individuals have adopted a behavior. In this respect, the diffusion-through-learning mechanism likens the spread of governmental policy to the spread of popular icons or tools. These icons and tools can spread purposefully or inadvertently throughout human populations.

Trends in government spread in similar patterns. One jurisdiction may adopt a policy because that policy is successful or is perceived as successful. Adoption may also occur despite the fact that the policy may not necessarily deserve to be adopted, but because the policy is popular (Meseguer 2005; Walker 1969). Similarly, policies may be rejected when a policy seems to fail even when the evidence used to evaluate the degree of success or failure is itself unclear (Volden 2010). Copying often stands in place of formal policy analysis. (Allers 2012; Allers and Elhorst 2005; Berry and Berry 1992; Besley and Case 1995; Ladd 1992; Maggetti and Gilardi 2013). Tacoma, Washington, might perceive neighbor Bellingham's franchise tax as successful. Whether the tax is truly successful or not, Tacoma may rush to adopt it, even without conducting a careful analysis of the applicable similarities and differences with Bellingham.

Hoover is a small city in the Birmingham, Alabama metro area. Imagine a scenario in which all the cities in the metro area adopt a particular successful policy, but Hoover adopts the policy last (i.e. the "loser of the race" if it were a sports competition). According to the learning mechanism, Hoover will not necessarily lose anything. Even if Hoover lost the race to adopt the policy in question, Hoover's loss doesn't benefit the other cities in the network. If other cities do benefit from

Hoover's reluctance, a diffusion-through-competition mechanism is applicable.

Finally, the "learning" terminology is preferable to other terms ("yardstick") because—unlike measuring the success of an athlete in the long jump—the success of a policy is often subjective. Some policies are not easily measured and others defy measurement completely (Allers 2012). Cities and their residents measure municipal success in both tangible and intangible means. San Diego and its neighbors, Chula Vista and Encinitas must balance public spending between golf courses and art museums. A yardstick is too narrow a term to use in judging the quality of golf courses and art museums between the cities.

Very real semantic difficulties are embedded in "diffusion-through-learning." Even with these caveats, a consistent use of "diffusion-through-learning" throughout the remainder of this paper facilitates review, discussion, testing and analysis. However, due to the importance and relevance of this discussion to the goals of this paper, these terminology problems will be revisited in the semantics subsection at the beginning of the diffusion-through-competition section.

Purposeful Learning and Blind Copying

The goals section of this paper included the question of governments as rational actors. Another semantic problem of "learning" is that of rational intent (Shipan and Volden 2008). Can true learning be said to occur if the copying is occurring without any rational intent? Human conformity can be based on an informed decision, or it may be relatively blind. If Mike adopts Tom's behavior because Mike perceives such a behavior benefits Tom, Mike is making a rationally informed decision to conform. This situation is more likely when the effect of the specific behavior has a direct path to a measureable outcome. (e.g., Tom has a comfortable retirement and contributed aggressively to his IRA when he was young.) But if Mike blindly copies Tom's behavior because Tom is successful—or because Tom is a friend—then the decision to conform has been made blindly. This is more likely to occur when the behavior does not have a direct causal path with an outcome or the outcome is not easily measured (e.g., Tom has a comfortable retirement and regularly has his teeth whitened.) In this second case, Mike is simply using a shortcut to save time making decisions, and mimicking a behavior of a person he trusts. This second behavior might not be completely irrational, but it is nevertheless far from purely rational.

The blind/informed nature of diffusion-through-learning falls along a similar continuum (Maggetti and Gilardi 2013; Shipan and Volden 2008). In part, this is due to a lack of perfect information, which forces governments to make imperfectly informed decisions. When information is easily available, cities are more likely to adopt a neighbor's policy with informed intent. Encinitas, California, can easily see property values escalating rapidly around neighbor Chula Vista's newly built public golf course. Encinitas sees the Chula Vista golf course pays for itself from user fees. Chula Vista officials report high levels of satisfaction among their residents. Given all these Chula Vista positives, and some undeveloped land in Encinitas available for a reasonable cost, Encinitas will build the course.

Other times, information is not as easily visible. The impact of zoning decisions is notoriously difficult to evaluate (Pogodzinski and Sass 1991). For instance, zoning an area high or low-density residential may result in different patterns of growth and development. Chula Vista observes one area of high-density housing in San Diego that attracts high-end, wealthy residents and another that does not. Still, San Diego is perceived as a successful city and has a plentitude of high-density neighborhoods. If Chula Vista has none, it will feel pressure to adopt a similar policy. Chula Vista hasn't acted completely irrationally in this situation, but it is far less rational than the carefully considered golf course situation above.

Some decisions must be made even more blindly. At the extreme end of the blind copying example, Chula Vista will copy one or more of Encinitas' behaviors for no other reason than because Encinitas is perceived to be successful, and if Chula Vista wants to be successful it feels compelled to follow suit. The value of services delivered by a municipal arts council may not be completely impossible to measure, but it lies near the end of the unquantifiable end of the spectrum. Encinitas is perceived to be a city with status and wealth. Encinitas has an art council. Chula Vista wishes to emulate Encinitas in all things. Chula Vista creates an art council.

Although it is a secondary goal, this paper will distinguish between these two forms of learning and offer evidence as to which of the two appears to be more influential within the learning model. The nature of the massive, numerical data in this study facilitates this analysis. In short, this paper finds more evidence of blind copying than of intentional learning. However, given that this goal is secondary to the overall goal of weighing competition and learning, "learning" as it is used in this paper will usually cover both blind copying and intentional copying.[8]

Patterns

Diffusion often describes adoption patterns similar to a sigmoid (s-curve) mathematical curve or exponential curve (Figures 2.5 and 2.6). Such curves are found often in nature, in the adoption of a beneficial adaptation throughout a species (Boyd 1988). Human behavior is profligate with examples of this sigmoid adoption curve. From technological adoption to popular culture, pioneers will lead the way by experimenting. Adoption by others will be slow at first. The adoption rate then accelerates until the majority owns the technology or has seen the movie (Gladwell 2000). Then, the adoption rate slows as a few holdouts resist change.

---

[8] On the occasions when this paper does distinguish between blind copying and informed copying, it will be clearly stated. Otherwise, "learning" will refer to any behavior along the continuum.

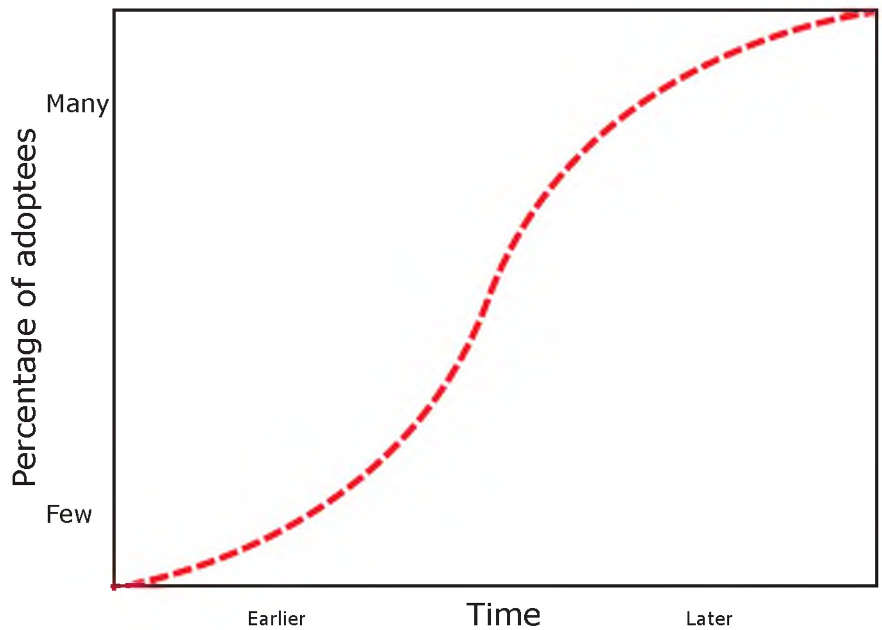


Figure 2.5: A sigmoid policy adoption cure (from Pemberton 1936 and Gray 1973).

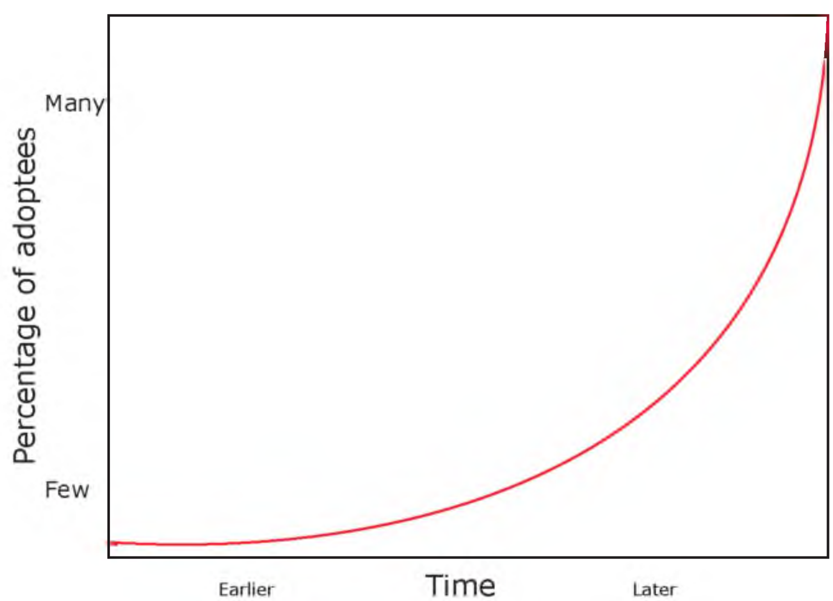


Figure 2.6: An exponential policy adoption-rate curve. According to this model, a positive feedback loop dominates the diffusion pattern until every member in the community has adopted the policy.

Existing literature demonstrates that tax policy follows such a curve (e.g., Henrich 2001 and Zhao 2005). Burge and Piper (2012) demonstrate that the spread of LOSTs follows this s-curve. They infer from this pattern that learning has played a significant role in spreading the adoption of such a policy. This study demonstrates strong support for this sigmoid pattern of adoption. The findings in Chapter 4 and indicate broad support for the general form this sigmoid curve takes. Chapter 5 will return to discuss the implications of this phenomenon.

Academic study of the spread of innovations throughout a community has been profligate. The study of diffusion-through-learning holds this sigmoid pattern up as a demonstration of that mechanism at work. However, such a pattern does not indicate exclusivity for the learning mechanism.

In contrast, adoption sometimes *fails* to spread according to the S-curve pattern (e.g., Henrich 2001). Such scholarship has suggested several alternative patterns of diffusion (see also Aoki, Lehmann, and Feldman 2011). One alternate pattern in both biological and cultural systems can be described by an exponential curve, as in Figure 2.6. In this case, policy is so successful that no member dare resist adoption. This pattern supposedly indicates a more rational policy-adoption process (Henrich 2001). This curve has also been more closely associated with a competition model (e.g., Brueckner and Saavedra 2001). However, the evidence gathered by this study does not confirm the exponential curve, reducing support for both rational learning and for competition.

Variables

These two patterns, exponential and (even more ubiquitous) the S-curve, dominate the literature. There are several theoretical mechanisms offered to explain the rate and shape of the adoption curve.

Gatignon and Robinson (1985) provide a relatively early, competent review of such mechanisms. Of the many factors identified in their review, several are particularly relevant to the adoption of tax rates. First, the status of the early adopters, for instance, generally speeds adoption by the rest of the community and tends to create an adoption pattern resembling the "S-curve." Thus, a large, wealthy city increasing or changing its tax rates should be more persuasive than a small, poorer city. Second, a clear, unimodal distribution of the group's attitudes into supporting and resisting roles encourages the S-curve pattern. Thus, within a group of communities, a clear division between those favoring property tax and those favoring sales tax as sources of revenue should create the sigmoid pattern. Third, increasing ambiguousness of the results of an adoption generally increases the chance of an S-curve pattern. If the costs and benefits of adopting, raising and lowering rates are clear, the pattern will be more likely to conform to the exponential curve.

In a recent review article, Shipan and Volden (2012) offer an update to Jack Walker's (1969) diffusion study. In their review of hundreds of diffusion articles, they develop "seven lessons" from the research that prove helpful not only to future scholars but also to practitioners of public policy. First, echoing Walker's work from 40+ years before, Shipan and Volden say diffusion is not only about geography. If Dallas, Texas, shares economic, cultural, and/or ideological similarities with Melbourne, Australia, Dallas will be more likely to copy the actions of Melbourne. Second, again echoing Walker, jurisdictions really do compete against each other: for tax revenue, against negative spillovers, and even for intangible "prestige." This theoretical competition crosses over into the diffusion-through-competition mechanism and will be revisited in the next section. Third, governments learn from each other. They don't just copy each other haphazardly, they observe their neighbors' policies to see which are successful and then intelligently choose from the menu of policies that seem to work best. Fourth, governments do *sometimes* copy each other haphazardly if those behaviors are widely spread throughout the system because those behaviors are associated with success. This can take the form of coercion, leading to a "race to the bottom" to be addressed in detail in the next section. Fifth, again reiterating Walker's (and many others') scholarship, endogenous political structures (e.g., Walker's close electoral margins or jurisdictional wealth) play a significant role in how rapidly a policy will diffuse. Sixth, Shipan and Volden echo many of the variables discussed in Gatignon and Robinson (1985). The policies themselves can have a dramatic effect on the speed and penetration of adoption. The more complex, compatible, measureable, and trialable a policy is, the faster it will diffuse. Finally, Shipan and Volden identify the role decentralization plays in diffusion. Without at least some degree of autonomy given to subgovernments to make policy, there would not be any diffusion to speak of; the experimental power of (for instance) federalism will count for naught.

In the most up-to-date scholarship exploring the variables affecting and describing the diffusion-through-learning model, Butler and Volden (2013) follow up the Shipan and Volden (2012) work by reporting the results of a survey of city leaders. The survey finds leaders are indeed eager to learn from their neighbors, are more eager to learn from success than failure, are more likely to copy larger cities rather than smaller cities, and are more likely to seek out and learn from ideologically like-minded cities over other factors. This latest effort confirms the earlier work of Grossback, Nicholson-Crotty, and Peterson (2004).

Although testing and explaining these variables is only a peripheral goal of this paper, the findings of this paper indirectly inform them, and thus add to the relevant literature. More importantly for the purposes of this dissertation, these adoption curves and associated variables assist in disaggregating the diffusion-through-learning mechanism from the diffusion-through-competition mechanism and will therefore be reconsidered in the methods, results, and discussion. Finally, these variables also add to the overall complexity of the tax rate diffusion milieu. This study concludes that such variables help to the complex manner in which the diffusion-through-learning and diffusion-through-competition mechanisms interact with endogenous factors.

Diffusion-through-competition

Returning to the primary question posed by this study: How much of a role does learning play in tax adoption and rate setting, especially compared to the competition mechanism? The diffusion-through-learning mechanism is difficult to disaggregate from the learning-through-competition mechanism.

The Semantics of "Competition"

To meet its goals, it is essential for this paper to clarify the language of these mechanisms. Otherwise, any effort to differentiate between the two with data will be moot. The existing literature on the relevant terminology is robust, if often incongruous. Particularly relevant among all the disjointed literature discussing the terminology in question are studies from Kenyon (1997), Boyne (1996), Meseguer (2005) and Salmon (2013).[9] But for all their complex interactions and overlapping semantics, one connotation most effectively distinguishes between the terms. In the learning model, the success of one jurisdiction does not necessarily take resources away from a neighbor, creating a positive-sum game. In contrast, the competition model requires the loss of one jurisdiction in order for another to benefit, although a

[9]I have attempted to synthesize these discussions in such a way as to make my key terms more discrete than they might otherwise be treated by these other studies. Consequently, the semantic distinctions in this study do not regurgitate any single study among this group, although my terminology comes closest to Salmon (2013). As noted below, among the studies under close scrutiny, the terminology in this paper is closest to that of Burge and Piper (2012). But Burge and Piper (2012) is an empirical study, unlike the several listed here, and as such its discussion of semantics is less robust.

pure zero-sum game is not necessarily required.

If Encinitas builds a public golf course, neighbor Chula Vista might follow suit. Within a pure version of the learning model, Encinitas can't *lose* anything when Chula Vista copies it. Encinitas increases its status by building a beautiful public course. Chula Vista's status increases when it copies that behavior. There is no "finite" amount of status for which the two cities compete against each other. This is a positive-sum game.

The competition model portrays things quite differently. According to this mechanism, there is a finite amount of the resource in question. One fairly common example of the competition mechanism is municipal recruitment of industry. Consider a scenario where Huntsville, Alabama and Jackson, Mississippi are among the final choices for a new BMW factory in North America. There is only one factory. Both cities want it desperately. One city will win the factory; the other loses a corresponding amount of revenue, income, status, etc. This is a zero-sum game.

A secondary, but important, additional connotation to the term "competition" assumes players act strategically. Within a network, jurisdictions make moves based on what each believes will maximize their utility. Furthermore, every player's actions affect every other player.[10] Finally, every actor tries its best to predict the moves of the other player(s) in order to "beat" the other players to a limited supply of resources.

To illustrate the strategic nature of these moves and counter-moves, reconsider the industrial recruitment scenario, introducing a third city, Chattanooga, Tennessee into the bid for the plant. To lure the BMW plant to their cities, all three offer tax incentives to the corporation. Huntsville is the largest. It has the deepest

---

[10] Although game theory often insists (Dixit and Skeath 1999) players act strategically, the simplest games in this study do not. If a city lowers its tax rate to poach revenue from its neighbor, but does *not* consider what the neighbor's countermove might be, it would still be a "competitive move" if not a "strategic" one.

pockets. Jackson is the next wealthiest. Jackson could perhaps afford to get into a bidding war with Chattanooga but—game theory predicts—it will not, since Jackson knows Huntsville will beat any deal they offer; it will not even try. But Jackson may be able to offer other incentives (e.g., cheaper land, lower cost of living) that might attract BMW. While each city is predicting and moving against each other, players also try to predict and respond to BMW's moves. Although it is a secondary goal of this paper, this study finds little evidence of such moves and counter-moves, increasing the certainty with which this paper concludes a more powerful (but not unequivocal) role for the learning mechanism.

These strategic considerations will create additional complexities in any system through which policy diffuses. As Chattanooga, Jackson and Huntsville compete for the BMW plant, they try to guess what incentives the other players might offer and respond with what they believe BMW will consider a better offer. Such strategic moves require the players to attempt to predict the moves of their rivals. For instance, the calculation, "If I adopt strategy X, my opponent will *probably* adopt strategy Y, resulting in a net benefit/loss to me," is strategic. Or even, "I *expect* my opponent will use strategy Y against me; thus I will signal a willingness to adopt X, even if X will cost me, in order to deter my opponent from adopting Y." If Huntsville were fairly certain its competitors were unable/unwilling to increase tax incentive above a certain point, it might choose to signal a willingness to raise incentives above that point.

On final implication of the strategic nature of the diffusion-through-competition mechanism is its effect on the role of motives. The diffusion-through-learning mechanism depicts a scenario in which players ignore the effect(s) of their actions on peers within the network and vice-versa. The competition mechanism says that not only do players act to steal benefits from one another, but also that each player perceives the others as agents trying to take their benefits. The learning/competition semantic dichotomy is as dependent on the *motives* and *perceptions* of the players as it is on the actual choices. This paper's tests depend on these motives as the tests pry apart the two mechanisms.

A Continuum

The zero-sum game is not as cleanly detached from the learning mechanism as economists and political scientists would like (Bordignon, Cerniglia, and Revelli 2004). The learning/competition question is not truly binary. However intangible, and however small, Encinitas still loses some status to Chula Vista when Chula Vista builds a beautiful public golf course. Why? There is a finite amount of demand for golf courses in the greater San Diego area. Encinitas loses some of that demand to Chula Vista when the latter builds a top-notch course. Even though this scenario is far less competitive than the zero-sum game depicted in the BMW scenario, Chula Vista still benefits due to Encinitas' loss.

Beneath the surface of many learning scenarios lurk competitive and strategic motives. Imagine what at first might seem like a simple diffusion-through-learning scenario: Los Angeles wants to recruit a professional football team to emulate the perceived success and popularity of San Francisco. This might appear superficially like a pure example of learning. But consider: Los Angeles builds a city-funded stadium at a cost of hundreds of millions of dollars. Now the Chicago Bears threaten to move to Los Angeles for a "free" stadium with the potential to generate more revenue. Chicago must build a new stadium or rebuild Soldier Field at taxpayer expense. This touches off an arms race in which city after city must follow suit. Cities run faster and faster to stay in the same place, building bigger and better stadiums, which cost the cities more without attracting any additional revenue or prestige. Acting strategically, the other cities might put political pressure on Los

Angeles, discouraging them from pursuing an NFL team.

Aspects of competition penetrate further into this superficial "learning" scenario. Even if the NFL expands and creates a new team for Los Angeles, every other member team loses a little revenue. Before the expansion, football fans in the Los Angeles area might travel to San Diego to watch the Chargers, buy jerseys from the 49ers, or pay for a cable TV channel guaranteeing delivery of all the Raiders games throughout the season. All the teams see some loss. Even if the overall revenue generated by the NFL goes up after the expansion, each team might lose $2 million in revenue (for a total $52m loss) while the new LA team might net $60m per year. Nevertheless, acting strategically, other cities might improve their stadiums to prevent Los Angeles from even considering entering into an arms race.

Therefore, it may be difficult, or even impossible to recount or even imagine a scenario operating completely within the learning or competition regimens posited here. Nevertheless, this paper asserts these two conflated mechanisms manifest themselves differently enough to warrant investigation, both for theoretical and practical reasons. Is Los Angeles mostly acting strategically to poach an NFL team from Chicago, or is it acting without strategic consideration? Chicago and the NFL need to know to what degree they need to watch Los Angeles' moves. Encinitas city leaders (and political scientists) should know if Chula Vista is building a golf course with the hope of stealing the love of golfers or simply to raise property values within their city.

Tax Competition

Among scholars, there seems to be little doubt tax competition exists (for a review see Genschel and Schwarz 2011), although the degree of such competition is debated. This dissertation assumes the most salient causal mechanism in setting tax rates is the policies of neighbors, taking the form of competition or learning. This subsection further details the tenants of the competition mechanism and its applicability to basic questions of tax competition and revenue maximization.

Tax competition is complex, not simply because there are more variables, but also because there are usually many more than two players. But tax competition can be reduced to a simplified game in which players make moves against one another based on predicted outcomes and predicted opponents' responses. Figure 2.7 depicts the most important variables involved in tax competition.

Figure 2.7 demonstrates how each causal mechanism impacts the system in multiple ways. Raising sales tax rates will increase revenue, but will also decrease spending in the home city as residents cross-border shop (Luna 2004; Luna, Bruce and Hawkins 2007; Nelson 2002; Walsh and Jones 1988).

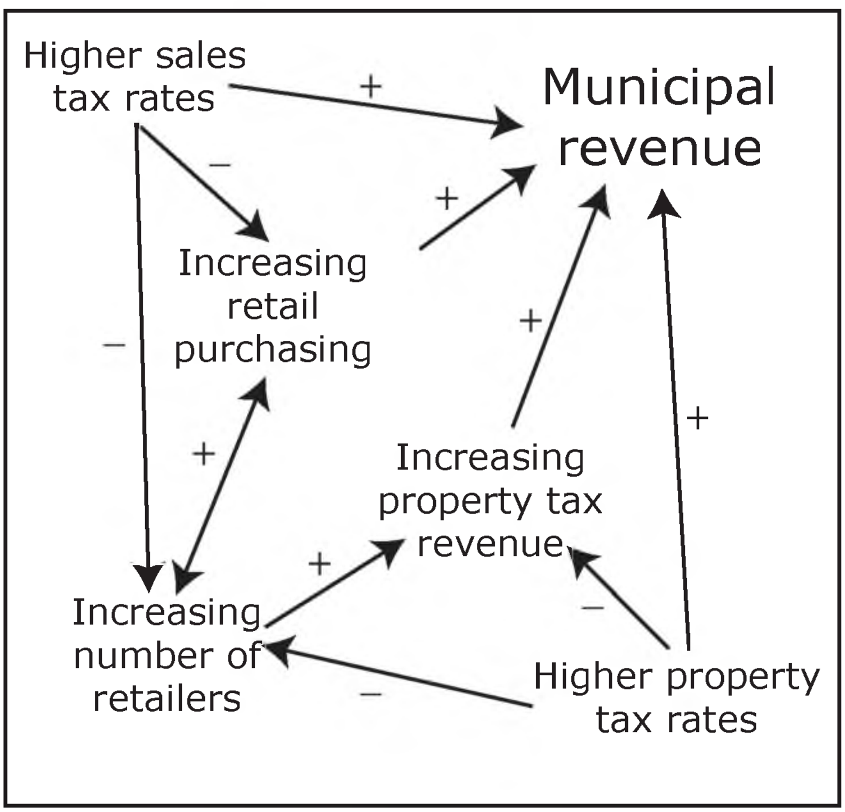


Figure 2.7: Simplified municipal revenue determinants. This figure depicts the interacting forces at work as cities try to maximize their revenues. The interaction of rates is more complex than a simple positive feedback loop.

Higher sales tax rates will also reduce the likelihood of new retailers coming into the city, since such retailers believe their sales will be higher in cities with lower rates (Edmiston and Turnbull 2003; Fisher 1980; Lewis and Barbour 1999; Torralba 2004). Higher property taxes affect residential behavior as well. Residents move into communities to avoid paying higher taxes while benefitting from the amenities of a neighboring higher-rate city (Wildasin 1989).

Evidence of tax competition abounds. Cornia, Grimshaw, Nelson, and Walters (2010), Luna (2004), Zhao (2005), and Devereux, Lockwood, Redoano (2007) all found strong evidence of such behavior in their study on competitive sales taxes. Scholarship also indicates property tax competition is widespread (Brueckner and Saavedra 2001; Heyndels and Vuchelen 1998; Wu and Hendrick 2009). However, the general conclusion of these works also indicates that property taxes are less mobile than sales taxes because transaction costs are generally lower in cross-border shopping than in relocation of a firm or resident (Caplan 2001; Chapman 2003; Coates 1993; Hendrick, Wu and Jacob 2007; Krmenec 1991; Ladd 1992; Powell 2004; Wilson 1996;). Even so, the literature on this question is not unanimous (e.g., Goodspeed 1998; Lewis and Barbour 1999; Lyytikäinen 2012), mostly owing to the significant confounding variables and feedback loops inherent in the property-sales tax feedback loop (see Figure 2.7).

City leaders are familiar with these mechanisms and their consequences (Bartle 2003; Cornia, Grimshaw, Nelson, and Walters 2010; Luna 2004; Luna, Bruce and Hawkins 2007; Sjoquist, Smith, Walker, and Wallace 2007). As such, city leaders watch the moves of their neighbors, and are therefore able to calculate the impacts of their neighbors' moves on their city and its revenue. Figure 2.7 illuminates these mechanisms; higher sales tax rate decreases retail purchasing by driving up cross-border shopping in neighboring cities. Higher property tax rates may drive retailers away, encouraging a retailer to relocate from their home city to a neighboring one.

Such relocation would be likely only if the property tax savings outweighed a potential decline in sales. Perhaps the neighboring city with lower tax rates did not have competitive infrastructure. Perhaps the home city is known for its concentration of high-end retail. But perhaps realtors see the neighboring city as a rising market, one that will quickly gentrify. A retailer, firm or resident might risk moving into such a neighborhood. Cities also compete in myriad ways besides taxes—as evidenced (saliently) in the BMW and (less so) golf course examples. Imagine a revised Figure 2.7 that included a fairly comprehensive overview of these factors. A figure complex to the point of confusion, even uselessness, would result. This wider competition has been considered in the literature (Baldwin, Forslid, and Martin 2005; Kenyon and Kincaid 1991) but because of the sheer complexity is usually handled through qualitative study. Even the broad scope of this study focuses on narrow cross sections of public policy. The wider competition will nonetheless be revisited later in this paper.

A Two-Player Game

Probably the best-known scenario in game theory, the prisoner's dilemma, posits a situation in which two players must decide to cooperate with or defect against the other player. Traditionally, this is portrayed as two suspected criminals (A & B) who would collectively benefit if they cooperated with one another and refused to testify against the accomplice. The worst outcome for A is when he refuses to testify but B defects, landing A with a severe penalty and B with a minor slap on the wrist.

This scenario is entirely applicable to the tax competition model, both in terms of property and sales taxes. With respect to LOSTs, the mechanisms of such a scenario are illustrated in Table 2.1, but the same matrix could be applicable to LPTRs.

To simplify, imagine this tax competition free from many of the confounding variables that will be introduced later. In this oversimplified scenario, there are two neighboring cities, both relatively isolated from others. Further, imagine each can set its LOST rate either high (e.g., 8%) or low (e.g., 3%). La Verkin and Hurricane, Utah, will serve in the following explanation, even if in reality their situation is not this simple. Turning to Table 2.1, if La Verkin sets a high LOST rate, Hurricane will seize this opportunity to set its rate low. In this scenario, Hurricane defects against La Verkin, and poaches retail activity by attracting cross-border shopping and increasing the number of retailers locating in Hurricane. As a result, La Verkin nets a weak $1m in revenue and Hurricane takes in a much-higher $4m.

These figures (especially the differences between and within each cell) almost certainly exaggerate a real situation. In other words, adopting lower tax rate leads to increased revenue for your city, but only if you have neighbors with high rates to steal shoppers from *and* only if your city has a high enough rate to capitalize on such cross-border shopping. Since both La Verkin and Hurricane should know this, game theory predicts (Nash 1951; Oates 1972) both cities will set low rates so that neither can steal shoppers or retailers from the other, and each will wind up with a modest, but not terrible, $2m.

Table 2.1: A prisoners' dilemma payoff matrix for intermunicipal tax competition. Adapted from Dixit and Skeath (1999). The rates for each city are set outside the matrix, while the revenue generated by each of the four scenarios is listed in each of the four interior cells.

		La Verkin	
		Low sales tax rates	High sales tax rates
Hurricane	Low sales tax rates	**$2m, $2m**	**$4m, $1m**
	High sales tax rates	**$1m, $4m**	**$3m, $3m**

There is substantial evidence—more theoretical than empirical—to show governments do race to the bottom in this way (Asplund, Friberg, and Wilander 2007; Genschel 2002; Oates 1972; Oates and Schwab 1988; Wilson 1999; Zodrow and Mieszkowski 1986).

However, there is also substantial evidence demonstrating governments *do not* engage in a race to the bottom (e.g. Basinger and Hallerberg 2004; Baskaran and Lopes da Fonesca 2013; Chirinko and Wilson 2009; Genchel and Schawrz 2011; Mendoza and Tesar 2005). If players cooperate, they can potentially reach the best scenario, the Pareto optimum, which occurs when Hurricane cooperates with La Verkin. In this case, both cities set their rates relatively high (the high, high outcome). Hurricane and La Verkin must resist temptation to lower rates in this scenario, since this would instigate the race to the bottom, temporarily netting the defecting city more revenue and more political popularity for its leaders, but then inviting retaliatory lowering of rates from their neighbor. Instead, if both cities keep rates high, they both benefit from higher revenue. This is the best mutual scenario; collectively, La Verkin and Hurricane net $6m in sales taxes. This investigation elucidates these patterns of behavior.

More Players, Continuous Rates, Equilibria

The simplified scenario above must now be made more complex to illustrate a truer rendition of the mechanisms involved. First, rates are usually fluid. Most states with LOSTs and LPTRs allow their cities to change rates in smaller increments. Second, most cities have more than one neighbor. Figure 2.8 allows for more continuous rate changes, depicting a continuous response scenario to a fixed metro-area rate. This fixed metro rate could come from a single neighboring city, or from a dozen neighbors each with identical rates. Although this figure also oversimplifies matters, it illustrates the prisoner’s dilemma in a more realistic environment.

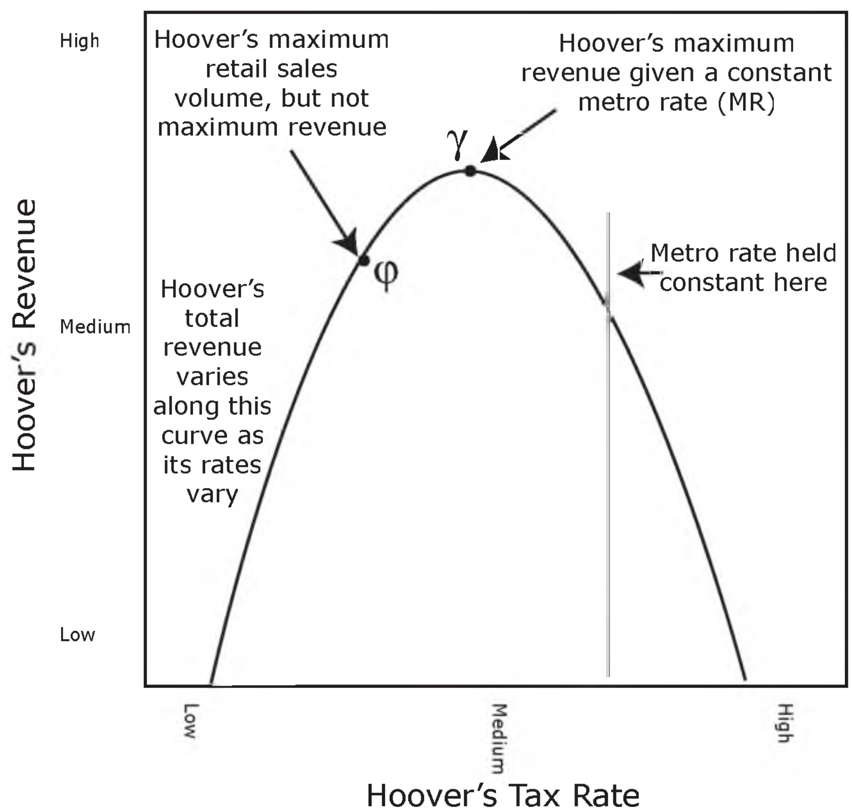


Figure 2.8: Hoover's revenue-per-rate versus a constant metro-area tax rate. Adapted from Morrow (1994). Hoover's best response to a fixed metro-area rate falls along the curve. γ is the rate at which revenue is maximized. Rate φ might produce in slightly higher rates than rate γ, but with lower overall revenue.

Suppose Hoover, Alabama is considering whether to raise or lower its rates. Hoover surveys the tax environment surrounding it and notes the average LOST rate of its neighboring cities is relatively high, perhaps 4%. If the metro rate is *above* the Nash equilibrium, Hoover's best response is to set rates a little lower than the average metro rate. This will increase sales and retail development. In turn, Hoover will see a significant net increase in revenue, even though its rates are lower.

If the average metro rate changed, Hoover's best response curve would change with it, and Hoover would be forced to change its rate accordingly. And although Figure 2.8 is devoted to sales tax rates and revenue, the same figure could be used to illustrate the property tax rates and revenues. Residents will move into areas with lower LPTRs to avoid higher taxes (Dowding, John, and Biggs 1996). And, given a subsequent boost in property values, Hoover would see a net gain in revenue even though its rates were lower. Given a fixed metro rate, Hoover's best response is again at point γ.

But Figure 2.8 doesn't allow Hoover's neighbors to react to Hoover's changes. Adding another layer of complexity, Figure 2.9 is a depiction of how two cities might interact along a dual continuum of rates rather than the dichotomy in Table 2.1. This two-city interactive response curve shows only the "best responses" of each city's tax rates to its single neighbor's tax rates.

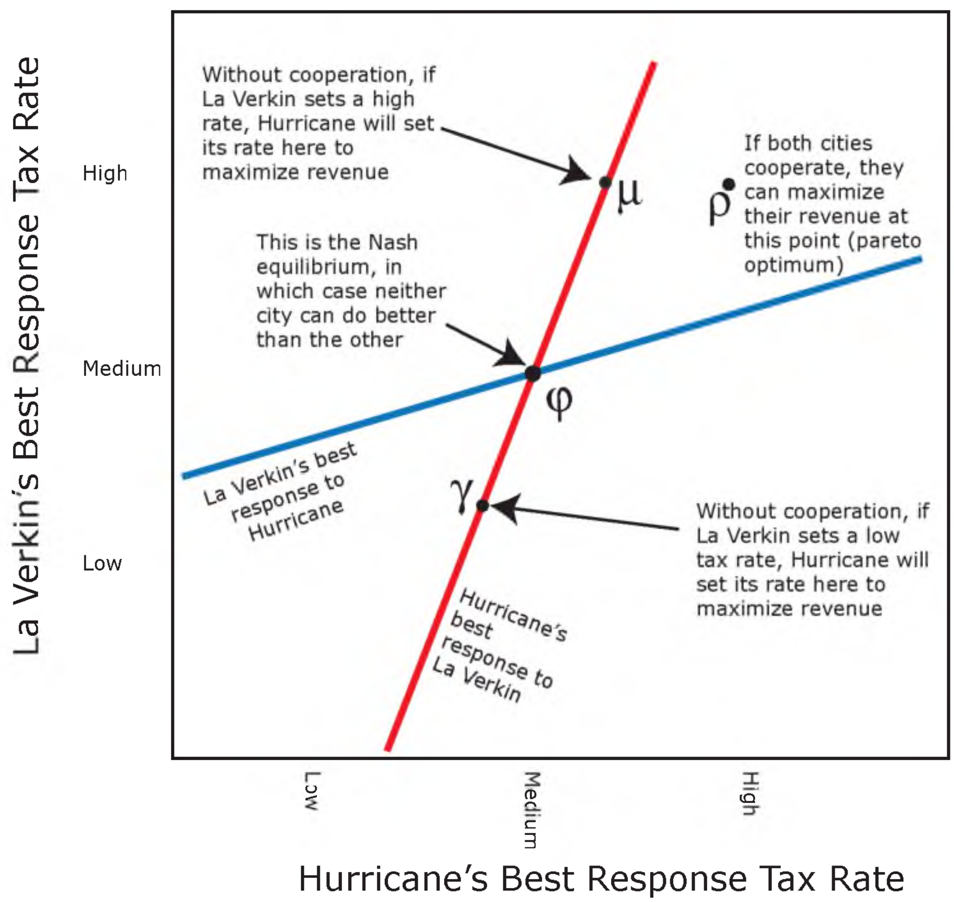


Figure 2.9: A simple, two-jurisdiction best response graph. Here, two players can adjust their rates to one another along continuous rates, rather than one city adjusting its rates to a fixed competitive rate as in Figure 2.4. (Adapted from Dixit & Skeath 1999).

La Verkin and Hurricane, Utah, are adjoining communities somewhat isolated from other cities. With only two players, Hurricane and La Verkin only need to consider the moves of a single neighbor as they set their rates. Each can adjust its rates along a continuum. Hurricane's best responses fall along the red curve, and La Verkin's fall along the blue curve.

As La Verkin raises its rates above the Nash point φ, so will Hurricane, though not by quite as much. To illustrate, if La Verkin sets a high rate, Hurricane will undercut that rate by just a bit, at point μ. Hurricane's slightly lower taxes-per-sale will be offset by more sales. If La Verkin sets its rates far below the Nash equilibrium, Hurricane will set its rates slightly higher (at point γ), with slightly lower sales than La Verkin, but its slightly higher tax rate will generate more overall revenue per capita. Both cities end up losing revenue in this second scenario.

As in the simple model, Nash (1951) predicts La Verkin and Hurricane will move and counter-move against each other as each tries to maximize its own revenue given its opponents' moves. As each seeks to maximize revenue, theory predicts both cities should move towards Nash equilibrium, point φ in Figure 2.9 (Oates 1972). But, as in the simple model, this race to the bottom, more aptly called the "race to the Nash equilibrium," is not the best-case scenario for both cities. Much as in the prisoner's dilemma, both cities could do better if they cooperate and reach point ρ. However, both have a strong incentive to defect (cheat) as well, undercutting their neighbor's rate to poach revenue through cross-border shopping and attracting more retail firms. Thus, cities face a collective action problem as they try to set rates above the Nash Equilibrium (Friedman 1971; Ostrom 1998).

If cities cooperate, and don't undercut each other, they can reach a "win, win" scenario as illustrated in Table 2.1, where both La Verkin and Hurricane set high rates. This point is illustrated in Figure 2.9 by point p. But to reach this point, cities must not defect. Both cities must resist the urge to lower their rates, since doing so will reduce their collective benefits and instigate a race towards the Nash Equilibrium, as discussed in the previous two subsections.

Most municipalities in the United States reside in areas with multiple jurisdictions, but adding more players to Figure 2.9 would make the figure unreadable. Figure 2.10 solves that problem by clustering multiple players into cooperators and defectors. This is still an oversimplification, because it lumps players into defectors (derisively, “cheaters”) or cooperators, when in fact cities fall along a continuum, as in Figure 2.9.

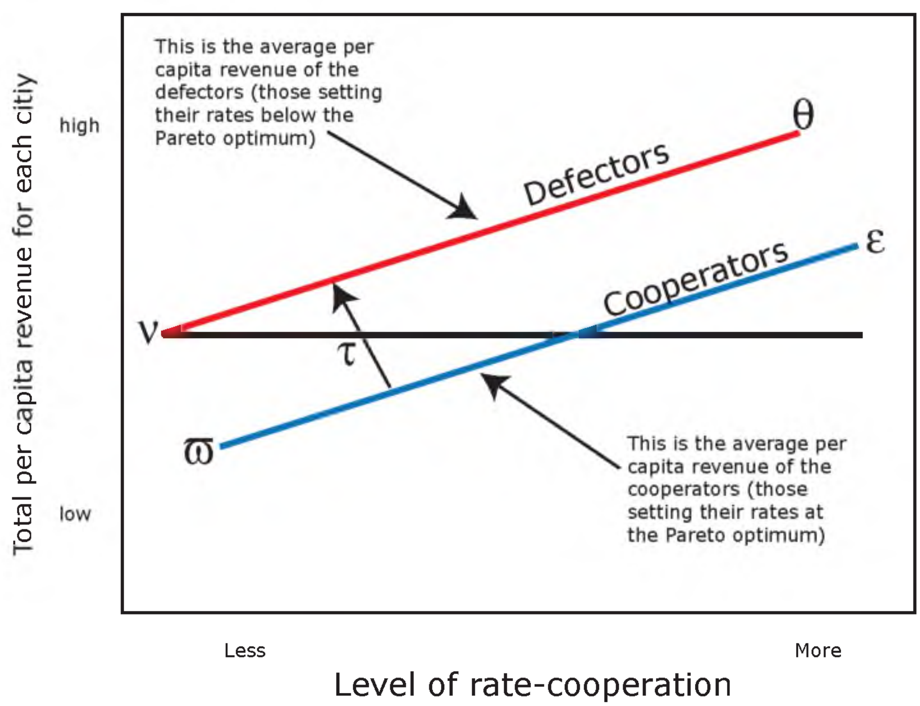


Figure 2.10: An n-player, defector-cooperator incentive model. This figure puts *all* the cooperators along the “cooperators” line and all the cheaters along the “defectors” curve. Note as more cities in the metro area cooperate, the overall benefit for all the cooperators goes up, but so does the incentive to cheat (τ). The best scenario for any one city would be to be the only cheater, point θ. (Adapted from Ostrom 1998). The Nash equilibrium in this figure is at point ν.

In Figure 2.10, the total per capita sales tax revenue generated is represented on the y-axis, and the amount of cooperation on the x-axis. The two lines, "cooperators" and "defectors", represent the revenue of the cooperating and noncooperating players, respectively.

The black line is the break-even point; any revenue above the line beats expected revenue generated from the Nash Equilibrium. ε is the point reached by all players if *everyone* cooperates. θ is the point reached by the one player who does not cooperate in a large-*N* setting. τ represents the incentive for any one player to defect. In this example, the payoffs from defectors remain relatively constant. The number of cooperating players is the only factor affecting the payoffs of the defectors(s) and cooperator(s). Existing empirical and experimental literature demonstrates cooperation is harder to maintain with more players (Isaac and Walker 1988; Kremenec 1991, Lewis and Barbour 1999). Thus, more cities in an area should create more tax competition.

Nevertheless, it is in the collective best interest of all cities for everyone to cooperate. Not only is more revenue generated, but cooperation reduces political costs as well. There are several theoretical and empirically tested mechanisms encouraging cooperation (Baskaran and Lopes da Fonesca 2013; Heckathorn and Maser 1990; Ostrom 1998; Palfrey and Rosenthal 1994). Some of these mechanisms are formal (e.g., a built-in system of "punishment" for defectors) and others informal (e.g., a long history of working together).

This theoretical discussion will aid in answering the primary goal of this paper: Does policy diffuse through learning or competition? Examining tax rate distribution patterns and rate-to-revenue correlations elucidates the degree to which cities cooperate and compete. This investigation finds that cities are neither cooperating nor racing to the bottom, at least not in any directly measureable sense, once again indicating a stronger role for learning than for cooperation.

Learning or competition: Recent literature

The following six recent works are particularly relevant to this dissertation. These studies, among hundreds of others, are the ripest and the most germane to the goals and methods of this paper. They have not only provided considerable theoretical and empirical background for this dissertation, but have also provided considerable guidance on the methodology and semantics of the subject. This study continues their work by examining the municipal property and sales tax rate-setting behavior.

Shipan and Volden (2008)

Shipan and Volden's (2008) paper on the diffusion of smoking policies is the single most relevant scholarly work to this dissertation.[11] In some ways, other papers under close scrutiny more closely resemble the goals of this paper. But Shipan and Volden make the most concerted effort to disaggregate the diffusion-through-learning and the diffusion-through-competition mechanisms. They find evidence of competition and learning, but struggle to differentiate the degree to which cities learn or compete as policy diffuses throughout a region.

Shipan and Volden posit four mechanisms of diffusion, all of which have been discussed in the preceding pages. The first and second are easily recognizable, they are nearly identical to the diffusion-through-learning and diffusion-through-competition models. Their third, the imitation hypothesis, is similar to blind copying as described in the "purposeful learning and blind copying" subsection of this chapter. Shipan and Volden recognize the difficulties in distinguishing between the

---

[11] The Shipan and Volden (2008) paper was extremely helpful in rescuing this dissertation, which began as: "Do cities compete on tax rates or do they cooperate?" After preliminary data made it plainly clear they do not cooperate, I investigated several other avenues of inquiry. Shipan and Volden (2008) was particularly helpful in setting me in this new direction.

two forms of copying with empirical tests. Even though it is not the primary goal of this paper, the data and analysis presented in this paper will also pry apart some of the differences between these blind copying and purposeful learning mechanisms.

Shipan and Volden's fourth mechanism, the coercion hypothesis, is substantially related to the goal of identification and analysis of the vertical intergovernmental restrictions limiting subordinate government's rate-setting discretion. If the California state government restricted municipalities' discretion in buying, building, and maintaining golf courses, such an action would significantly affect the ways in which golf course diffuse through the greater San Diego metropolitan area. As indicated earlier, this paper finds little evidence of state policy affecting patterns of tax rate diffusion.

As for methodology, Shipan and Volden assemble tests for each of their hypotheses. For instance, they conduct a "competition" test. For every city without an antismoking policy, they find all the cities within 10 miles that also haven't adopted an antismoking policy, then they weight this number by population. If smaller towns do not adopt smoking restrictions in their restaurants because their larger neighbors have not either, Shipan and Volden suggest this should be an indication the smaller city is afraid to adopt for fear of losing restaurant business to the larger city.

Shipan and Volden's primary goal is to disentangle and weigh the strength of these various diffusion methods, mirroring the primary goals of this paper. However, their methods have some weaknesses. Even though their tests are essentially valid, there are too many lurking variables to make all their tests truly convincing. For instance, in the case of the competition test above (their most important test) there is significant overlap with the principles behind other mechanisms, like imitation and learning. Simply because a small city waits for a large neighbor to act does not necessarily mean the small city fears competition. It may simply be emulating the policies of its larger neighbor. In addition, because their tests do not offer an "either-or" decision rule between the diffusion-through-competition and diffusion-through-learning models, the fact that stronger correlations exist for their learning tests does not solidly undermine their competition model. Shipan and Volden admit their tests are muddled and call for further tests using different methods. Their methodological shortcomings will be revisited in the methods section of this paper.

Baybeck, Berry and Sigel (2011)

In 2011, Brady Baybeck, William Berry, and David Siegel (BBS) published a work highly relevant to this dissertation. Their article is mostly an exploration of the diffusion-through-competition mechanisms, with very little effort dedicated to differentiating between learning and competition. For this reason, the BBS work is not quite as relevant to this dissertation as the Shipan and Volden paper. In their article, BBS describe and explain the mechanisms behind revenue competition through a spatial analysis of lottery adoptions. While BBS make it clear they respect the methods and goals of Shipan and Volden (2008), they claim the diffusion-through-competition model is woefully under-researched. As such, they make a concerted effort to disaggregate and measure the mechanisms behind such competition: defensive competition (adopting a policy to stop revenue flowing to another state), offensive competition (adopting a policy to poach revenue from nonadopters) and anticipatory competition (adopting a policy to pre-empt a competing state from poach revenue from you). Almost as an afterthought—since they do not include the mechanism in their model—the BBS study offers only minimal attempts to measure the power of the learning component of lottery diffusion.

Although there are several reasons to bring BBS under close examination, methodology is the single most important of these. Of the six studies under close scrutiny, BBS' methodology is the most relevant to the core hypotheses and tests of this dissertation. Their core tests are also the most relevant to my research. BBS use GIS to give each nonadopting state a score on three measures, each testing one of their three forms of diffusion-through-competition. The tests hinge on residents cross-border shopping for lottery tickets. Such cross-border shopping is the key instrument in this study's attempt to differentiate learning and competition.

BBS' methods are directly relevant to the goals and methods of this study, whose core hypotheses assumes property tax rates are less dependent on neighbors' property tax rates than sales tax rates are dependent on neighbors' sales tax rates, because sales taxes are more mobile than property taxes. Like BBS, this paper asserts that jurisdictions (is this case, cities) act defensively to try and prevent cross-border shopping *out of* their jurisdiction and to encourage cross-border shopping *into* their jurisdiction. This study's inferential data tests and the mechanisms they imply are quite similar to those of BBS.

BBS' data and analysis demonstrate strong support for diffusion-through-competition. However, BBS go even further, claiming inferential support for governments acting strategically, as in the case of the competition for the BMW plant. In their study, BBS find states do not adopt the lottery because such states do not want to trigger reciprocal adoptions from neighbors who have not yet adopted. BBS contest this demonstrates governments are behaving strategically.[12] Their argument has merit, but is far from convincing. The same result may arise from offensive competition from other states.[13] The tests in this paper are less

---

[12] Will Chula Vista copy Encinitas' golf course? Maybe not, say BBS, since that will trigger Encinitas to build even more courses, diminishing the overall returns both cities make on the courses. I would be more convinced of the validity of BBS' tests if the cost of lottery adoption (say, a massive investment in infrastructure) was high, but the lottery adoption "price" is relatively low.

[13] This is complicated. If neither Illinois nor Wisconsin have lotteries, but Iowa does, then BBS

focused on distinguishing the role strategic moves play in rate diffusion, but implications from the results of this paper indicate (weakly) that cities do not act strategically.

Finally, BBS discuss the long-run economic consequences of such lottery competition and by extension any kind of revenue-based competition. This significantly informs the race-to-the-bottom scenario. Adopting policies earning economic rent in the short term (poaching revenue from neighbors via the lottery) should eventually lead to all states adopting the lottery. The result: Utah is one of only five states in the lower 48 without a lottery. Now, very few states get a free ride (Idaho on Utah, Louisiana on Alabama, etc.). The implication for this dissertation is all cities should push towards the Nash point. But they don't, further dispelling the competition mechanism as the most powerful force driving tax rate diffusion.

Burge and Piper (2012)

Burge and Piper (2012) offer another highly relevant work on the "sources of diffusion" question. They examine Oklahoma municipal and county LOST adoptions and rate changes. Like the other articles under close scrutiny in this paper, their study attempts to disaggregate the causes of policy diffusion. Furthermore, Burge and Piper examine several endogenous factors as well as the diffusion mechanisms, devoting a greater percentage of their effort to that cause than this paper does. But of particular relevance to this investigation, their research explores the mechanisms behind LOST diffusion as well as the interaction between property and sales tax rates and revenue. For instance, they offer a lengthy discussion of the revenue trade-offs

---

say Illinois will not adopt because they do not want to start a lottery war with Wisconsin. But it could show up as a negative correlation because Wisconsin acts first to poach Chicago's lottery ticket-buying consumers. This shows up as a *negative* correlation for Illinois because it reduces the *comparative* speed with which Wisconsin adopts the lottery.

between raising and lowering tax rates, tax exporting via cross-border shopping, and voter attitudes towards such rates. An additionally relevant component of their research pays considerable attention to vertical relationships as well. However, Burge and Piper pay only superficial attention to distinguishing between diffusion-through-learning and diffusion-through-competition. They have no direct tests to disaggregate the two.

Like Baybeck, Berry and Siegel (2011), Burge and Piper use a modified Event History Analysis to examine LOST rate changes over time. Their learning[14] tests rely on a very similar strategy to the tests used by BBS and others. The adoption of LOSTs by the neighbors of Tulsa significantly increases the chances of Tulsa adopting a LOST itself. As expected, they find a robust relationship. However, like BBS' tests, this simple test alone does not constitute a means to disaggregate between the diffusion-through-competition and diffusion-through-learning. The adoption of a policy simply because a neighbor did may result from a competition over revenue. But it may also simply be a measure of a neighbor wanting to copy another's success, or even perceived success. Burge and Piper do not dispute the weakness of this test to differentiate the two mechanisms.

Burge and Piper do attempt to pry apart the learning and competition mechanisms with two other tests. One of these tests demonstrates that cities with large retail activity are more likely to adopt LOSTS. Burge and Piper assert that such behavior indicates tax competition. Tulsa, a city with a large existing retail center, may attempt to tax export to neighboring cities by taxing other cities' residents who

---

[14] Burge and Piper (2012) use the term "yardstick" to describe their learning model. As above, there are multiple uses of the term in the literature. In fact, they lump yardstick competition/conformity/learning together but use "yardstick" as an umbrella term. However, at times, they discuss "policy diffusion" as a separate entity from the "yardstick" mechanism (see Besley and Case 1995; Bordignon, Cerniglia, and Revelli 2004). Burge and Piper also use the economic term "spillover" more liberally than is warranted. For more information, see the discussion of semantics in the "learning by other names" and "semantics of competition" subsections of this paper as well as the sources listed in those subsections.

cross-border shop in the city with the large retail base. This is competition in the sense that Tulsa is poaching potential revenue from other cities in the metro area.

Although some tax competition is indicated by this data, because such action could also be a measure of the endogenous "tax availability" mechanism, this first test cannot fit behaviors discretely into the competition[15] mechanism as defined by this paper.

The second Burger and Piper competition test asks whether cities are raising rates in response to neighbors' raising and lowering rates. Their data analysis indicates cities are not raising rates to mirror each other. Coupled with their other endogenous and exogenous tests, Burge and Piper find evidence that diffusion-through-learning, vertical intergovernmental interaction, and endogenous factors act as agents to spread the policy. Such learning may include both intentional learning and the blind copying behavior described earlier.

In short, Burge and Piper conclude there is weak support for the diffusion-through-competition mechanism. They offer little conclusive data and analysis to differentiate the mechanisms of diffusion as described in this dissertation. Like BBS and Shipan and Volden, they call for more study and more effort to accomplish this.

Boehmke and Witmer 2004

Generally, this "in-depth" section has focused on articles published with in the last five years, but the Boehmke and Witmer (2004) study is one of two earlier articles relevant enough to include in this section. It is difficult to imagine a more appropriate title to this dissertation than, "Disentangling Diffusion: The Effects of

---

[15] Burge and Piper do not discuss the revenue curve (see Figures 2.8 and 2.9). Instead, they simply discuss the tax-exporting nature of tax competition. This is overly simplistic. The model proposed in this study assumes cities want to maximize revenue while minimizing cost. If a higher tax rate leads to more revenue, ceteris paribus, then the city will raise its rates, at least up to the Nash point, where theoretically its revenue will begin to be poached by neighboring cities. This leads—again—into a semantics problem as the diffusion-through-competition model visualized in this paper includes some of what Burge and Piper include in their definition of "yardstick."

Social Learning and Economic Competition on State Policy Innovation and Expansion." In this study, they devise several tests to do just that.

More than any other article under close scrutiny, Boehmke and Witmer choose and use terminology most closely mirroring the language of this paper. Diffusion-through-competition (which they simply call "economic competition") refers to the need for a given state, *G*, to adopt a policy to poach revenue from neighbors *or* prevent poaching from *G.* Diffusion-through-learning (which they call "social learning diffusion") refers to the comparative value judgments states make as they copy each other in the hopes of adopting good policy. In this case, "Are the benefits of Indian Casinos (potential revenue) worth the disadvantages (negative spillovers)?" By watching the success of other neighboring states that have adopted, state *G* might decide that the trade-offs are worth adopting the policy. Boehmke and Witmer also make a strong case for the need to further clarify and explain the need to differentiate between diffusion-through-learning and diffusion-through-competition, both for practical reasons and for furthering the discipline. They correctly claim that the literature prior to 2004 lacked a robust treatment of the diffusion-through-competition mechanism and instead focused almost solely on the diffusion-through-learning mechanism.

Boehmke and Witmer's subject matter is also relevant to this study: the adoption of Indian gaming compacts throughout the United States. Accelerating since 1988, states have allowed the expansion of Indian-owned casinos. Boehmke and Witmer measure the number of compacts and the degree of gaming offered by the casinos through an Event History Analysis. This allows examination of adoption of policies that potentially diffuse via competition and/or learning.

Boehmke and Witmer's tests are far from decisive. They conduct two tests on the gaming data. Their first test is of *innovation,* when a state adopts Indian gaming for the first time, and to what degree that innovation is based on the behavior of that state's neighbors. Their second test is of *expansion,* in which they measure the growth of existing Indian gaming within a state and measure to what degree that expansion is related to neighbors' Indian gaming. They assume that the expansion of Indian gaming is a measure of "competition," but not of "learning." That is, states expand (increase the number and variety of) Indian gaming ventures in an effort to pre-empt other neighboring states from stealing revenue *only* due to economic competition pressure. But they claim the innovation (the initial adoption of Indian gaming) is due to *both* "learning" and "competition."

Boehmke and Witmer's assumptions have merit, but are flawed enough to significantly undermine their conclusions. Learning can influence both innovation and expansion. Returning to the golf course example, Chula Vista considers copying Encinitas' blue ribbon course. In this innovation stage, Chula Vista simultaneously learns from and competes against Encinitas. They try to copy the perceived success of Encinitas while competing against it (for the "finite" interest in golf in the greater San Diego area) at the same time. Then, in Boehmke and Witmer's expansion stage, the competition mechanism becomes the sole driver as Chula Vista adds features to their existing course.

Competition seems like a more plausible causal mechanism behind *expansion*, but consider expansion applied to a "learning" positive-sum environment. It is equally possible that Chula Vista is simply continuing to "learn" from Encinitas as it adds features to its blue ribbon course. Even in the BMW example, Jackson might perceive Huntsville benefits from setting up an industrial park, then copy that action with the belief that Jackson will benefit even if it doesn't win the BMW factory.

Brueckner and Saavedra (2001)

Jan Brueckner and Luz Saavedra (2001) offer the earliest study under close scrutiny in the competition-versus-learning literature. Despite its age, this germane study, "Do Local Governments Engage in Strategic Tax Competition," was one of the first to use a spatial analysis correlation to test property tax rates of the municipalities in the Boston metropolitan area. Like this paper, theirs is an effort to describe and explain the landscape of local government rate setting. They find strong evidence that tax competition motivates rate-setting behavior.

Brueckner and Saavedra deserve an in-depth look for several reasons. First, this paper was not the first to use spatial correlations, but of the early works in the field, their methodology closely resembles that of this paper. In particular, they compare the behavior of multiple types of rates under multiple conditions, drawing conclusions from the differences in the strengths of these correlations. The core data and tests of this paper are related to and derived from spatial correlations. Second, they offer a robust discussion of voter preferences vis-à-vis strategic rate setting. Brueckner and Saavedra suggest that some residents will tolerate—even welcome—higher tax rates to meet those preferences. This significant treatment of preferences is a worthy discussion of the behavioral model. Third, their study includes a serious discussion on the interaction between property values, tax rates, and behavioral preferences. Firms and residents shopping for property will, ceteris paribus, discount the land located in a higher-rate location (see Figure 2.7). But public goods offered by higher-rate jurisdictions might offset such losses caused by the higher economic rents of such jurisdictions. Property values are therefore based on a complex chain of interacting variables. Fourth, Brueckner and Saavedra offer a strong discussion of the role of vertical rate restrictions. Akin to Proposition 13 in California, citizens of Massachusetts passed Proposition 2½ in 1980, severely limiting cities and towns' ability to raise revenue through the local property tax. Brueckner and Saavedra examine the behavior of cities and towns after its passage, and find that the level of tax competition declined. More than any other study under close scrutiny, Brueckner and Saavedra produce empirical evidence that state law affects tax competition, illustrating the need to consider the impact of state restrictions as a secondary goal of this paper.

Brueckner and Saavedra's paper differs most significantly from this investigation in one way. They lack serious interest in and discussion of the learning model (which they call "mimicking"). Their paper does consider factors other than tax competition (e.g. the behavioral model as above), but omits nearly all discussion of the core question of this study. They conclude that competition drives copying behavior, but do not satisfactorily address the possibility that learning could drive diffusion. This is a problem, because as was shown in other studies (Bordignon, Cerniglia, and Revelli 2004; Lyytikäinen 2012), a simple spatial correlation cannot, by itself, eliminate the possibility of diffusion-through-learning as the primary mechanism motivating rate-setting behavior.

However, despite their lack of discussion of the diffusion-through-learning mechanism they do include several tests that support the competition model more thoroughly than the learning model. For instance, they show that business tax rates have a stronger spatial correlation than residential property tax rates. They are correct in their claim that this difference supports the competition model. It is reasonable to conclude that firms are more willing to move locations to capture better tax rates. Residents are more likely to stay in an area for reasons other than tax rates.

But even if their premise is basically sound, it too easily dismisses the learning factors at work. Businesses choose locations based on factors other than tax rates and residents do choose homes based on tax rates, undermining the significance of this test as a decisive one. A second test shows that after the passage of Proposition 2½, the spatial correlations of residential tax rates declined to almost zero. Proposition 2½ imposed restrictive rate limits on Boston-area municipalities. This led cities to reduce their rates between 1980 and 1990 to the effective rate ceiling, a ceiling far below the Nash equilibrium. Virtually all cities in the area were leveled to this ceiling, eliminating any variation and thus competition. This test implies support for the competition model. If learning were driving rate-setting behavior, a ceiling cap on rates might have resulted in a new s-curve (see Figure 2.5) rather than cities' rates clustering at the upper limit allowed by law. In comparison with this admittedly strong study, this study more specifically addresses the competition-or-learning question and offers more robust tests.

Da Silva Costa and Carvalho (2013)

This section of in-depth reviews concludes with a paper from José da Silva Costa and Armindo Carvalho (2013), "Yardstick Competition among Portuguese Municipalities: The Case of Urban Property Tax." As with the other papers in this section, da Silvia Costa and Carvalho wade into the sticky discussion of diffusion-through-learning and diffusion-through-competition by attempting to disentangle tax competition from other mechanisms affecting rate-setting behavior. In particular, da Silvia Costa and Carvalho discuss "yardstick competition" at some length and contrast it with what they call "strategic competition." Voters use a metaphorical "yardstick" to measure the performance of their city leaders, but they primarily make those measurements in comparison to other cities, in this case residents compare their property tax rates to neighboring cities' property tax rates. If residents perceive that their rates do not compare favorably to their neighbors' rates, they are more likely to vote their leaders out of office. While this might sound like competition, recall the fundamental principle differentiating diffusion-through-learning and diffusion-through-competition in the semantics sections: is the city setting rates to be successful (including looking good to its residents), or because it wants to poach revenue at their neighbors' expense? Recognizing that the two mechanisms are never completely inseparable, the former is the diffusion-through-learning mechanism and the latter is diffusion-through-competition. Even though da Costa Silva and Carvalho use the term "competition," the mechanism they describe is, at its core, nonetheless a learning mechanism. Only if the adoption of a rate by city X would lead to a revenue increase, at city Y's expense, would the term "competition"[16] be applicable. Therefore, as da Costa Silva and Carvalho distinguish between what they call strategic tax competition and yardstick competition, they are really offering a mechanism to differentiate between diffusion-through-learning and diffusion-through-competition.

Methodologically, their paper offers an interesting means of investigation. Like many of the papers under close scrutiny in this paper, da Costa Silva and Carvalho use a panel study and track tax changes over time. And, like Brueckner and Saavedra (2001), da Silva Costa and Carvalho posit that *less* rate homogeneity (among certain cities) indicates *more* competition and *less* learning.

More creatively, da Costa Silva and Carvalho use ideology and partisanship in testing the learning/competition mechanisms. Like nearly all the works considered by this paper, da Costa Silva and Carvalho discuss political preferences as an endogenous variable. For instance, they discuss the likelihood that cities with strong financial resources (e.g., an industrial center with high-paying jobs) will be less

---

[16] Like many of the papers under close scrutiny in this paper, and many others mentioned more briefly, this scenario skirts the gray line between the two mechanisms. Da Costa Silva and Carvalho discuss the possibility that voters might be driven so far as to move to the neighboring (lower tax rate) city if voting the tax-raising city council members out of office alone does not result in enough satisfaction. This, in turn, may lead to an increase in property values for the lower-rate neighbor (see Figure 2.7). In the long run, then, the learning mechanism might transition into a competition mechanism.

willing to move towards a Nash equilibrium. They also note the role that information cost plays in determining people's willingness to "shop with their feet" and/or "vote with their feet" by moving out of a particular jurisdiction. Furthermore, political affiliation and city council composition play a significant role in setting tax rates. A left-leaning city council is more willing, for instance, to raise taxes to pay for social programs. This is not a significant departure from previous studies. But using the ideological composition of the city councils is actually at the core of their assumptions and tests to distinguish between the learning and competition mechanisms.

Their inventive test and corresponding hypothesis is this: narrowly-divided city councils have *less* discretion in setting tax rates and are more dependent on the tax rates of their neighbors. To demonstrate, the Dallas city council is narrowly divided between Democrats and Republicans. Its voters regularly flip control of the city from Democrats to Republicans and vice versa. A councilman in Dallas would have to worry a lot more about his rate-setting votes than his counterpart in neighboring Fort Worth, whose city council is solidly Republican. The Fort Worth councilman knows that his votes are relatively safe. Given that premise, da Costa Silva and Carvalho posit that if the tax rates of city with narrower partisan divisions among its leadership (closer to parity) move over time toward the regional average, then city leaders' behavior is being shaped by yardstick competition (the diffusion-through-learning mechanism). In other words, the Dallas city councilman, fearing for his job, moves towards Fort Worth's rates so that Dallas voters do not judge Dallas taxes "unreasonable" and vote the precarious city councilmen and women out of office. "Safe" Fort Worth city leaders, in contrast, face less danger from their voters. They have relative impunity to set rates as they wish, and they wish to set rates low enough to poach revenue from their neighbors. Thus, if large-majority city councils move towards the regional average, they are motivated by strategic competition (the diffusion-through-competition mechanism).

If these assumptions were acceptable, their conclusion of a more robust role for the learning mechanism would be valid. But their assumptions assume too much. Such questions of the strength of council majorities must play but a minor role in the diffusion of rates. To demonstrate, Dallas residents will not punish city leaders if their tax rates are low-to-average for the region. Dallas residents will only punish leaders if Dallas rates are noticeably above the rates of the surrounding municipalities, as evidenced by the several studies demonstrating the frequency of city leaders seeking political cover in their neighbors' tax increases (e.g., Berry and Berry 1992). They also may be competing for businesses by lowering their rates to the regional average, and thus be engaging in regional competition for firms. Fort Worth leaders may also be interested in appealing to voters as well. Therefore, they may be converging on regional averages due to Yardstick Competition. Their test has some merit. Dallas leaders will be *more likely* to be motivated by the learning mechanism, and the Fort Worth council will be *more likely* to be motivated by tax competition, but these mechanisms can hardly be called exclusive.

Summary

These in-depth reviews could go on much longer, but they become repetitious very quickly. There are many more studies that explore tax competition (some via sales taxes, some through property taxes) without examining the role competition plays in diffusion. These are mostly studies that reflect the economic cost and rent-earning potential of poaching cross-border shoppers or residents/businesses that move into a community to take advantage of/despite that community's tax rate.

A cavalcade of studies examines the role of either learning or competition alone, and most of these are at the state level (for a very general review see Shipan and Volden 2012). After reviewing hundreds of tangentially related studies, and more than thirty that were directly related to the diffusion question, I find these six studies to be the most relevant. Yet even among these, several issues are unresolved. Table 2.2 summarizes these six papers.

But, as helpful as these relevant studies are, each fails to fulfill all the goals of this paper. What is missing is a clear test to distinguish the two mechanisms. Several studies cited in this literature review—even some beyond these six—have a learning-or-competition test. As discussed above, there are significant inherent weaknesses even among the three studies with either-or tests (Boemke and Witmer 2004; Bruckner and Saavedra 2001; and da Costa Silva and Carvalho 2013).

Table 2.2: Summary of the six core studies

Study	Central goal to differentiate learning from competition	Includes either-or learning-competition test	Comparison of multiple taxing regimens	Focus on local jurisdictions	Examination of vertical controls	Includes spatial (GIS) analysis
Boehmke and Witmer (2004)	Yes	Yes	No	No	No	Yes
Shipan and Volden (2008)	Yes	No	No	Yes	Yes	Yes
Brueckner and Saavedra (2001)	No	Yes	Yes	Yes	Yes	Yes
Burge and Piper (2012)	Yes	No	Yes	Yes	Yes	Yes
da Costa Silva and Carvalho (2013)	Yes	Yes	No	Yes	No	Yes
Baybeck, Barry and Siegel (2011)	No	No	No	No	No	Yes
This paper	Yes	Yes	Yes	Yes	Yes	Yes

To be fair, calling the tests offered by those three "either-or" is an overstatement. Even this paper's stronger test to disaggregate the two is hardly perfect. Despite weaknesses in the validity of my tests, the study remains a worthwhile endeavor. Several studies, including a few meta-studies (e.g., Goodspeed 1998; Maggetti and Gilardi 2013; Shipan and Volden 2012, Lyytikäinen 2012), recognize the lack of definitive studies in this area of scholarship, and call for new tools to measure the mechanisms of tax rate diffusion *and* their effects.

This investigation uses many of the methodological tools and theoretical tenants of previous works, especially of the six detailed above. Nonetheless, the methods used in this study have never been used in a published paper before. The core either-or test, to be discussed below, shows particular originality. These tests are valid and reliable. Finally, none of these six studies offers a mechanism to test the effect of vertical governmental constraints on these diffusion mechanisms. This study will address all these weaknesses in the existing literature.

CHAPTER 3

METHODS

The primary goal of this paper is to disentangle, describe, and explain the influence of the diffusion-through-learning and diffusion-through-competition mechanisms at work in an intermunicipal setting. There are six deductive hypotheses and corresponding tests to examine this learning-or-competition question. These tests and others offer investigation of other issues discussed above: endogenous factors, the question of rational behavior, the effect of vertical controls and the question of intentional/blind copying.

The nature of spatial analysis

The central tests of this study use modified spatial analyses in conjunction with ordinary least squares regressions. Spatial autocorrelations have been used frequently in recent literature. Although common in the social and environmental sciences (Janelle and Goodchild 2011), the tool has been used extensively in the natural sciences—especially biology—and public health as well (Cromley and McLafferty 2012). A brief review of spatial analysis begins this section. The depth of this overview will assist in justifying the slight divergence from the reliable, well-used standard methodological tool.

Spatial analysis (specifically spatial autocorrelation) examines the relationship between two or more actors in a system, measuring the strength and effects of the proximity between those actors. Is a variable distributed in geographic clusters or randomly through space? Dozens of studies cited in the chapter above, including all six under close scrutiny, use this powerful tool. Although it resembles a standard OLS test in many ways, spatial correlation also includes a notable addition: a geographic distance modifier is factored into each calculation. The result: the behavior of a city's nearest neighbors will weigh more heavily in the statistical test (for an overview see Okabe 2010). Spatial correlations are modified OLS regressions, except that a distance modifier between two data points is added to the calculation. A variable strongly distributed in geographic clusters (e.g., real estate values) would show a much stronger spatial correlation than data with fewer tendencies to cluster (e.g., gender ratios). The most common statistical tool used in this kind of study is a Moran I test, which generates a Z-score that can be read as the strength of a spatial modifier. Any value above zero indicates a positive correlation between proximity and the variable in question. For this study, two proximate cities with similar or identical tax rates would increase the score. Contiguous cities with dramatic differences in rates would lower the score.

The fictitious Figure 3.1(a) thus represents a near-perfect spatial correlation; Figure 3.1(b) a near-zero spatial correlation. The acknowledged endogenous variables at work generate an empirical reality far from the perfect spatial correlation depicted in Figure 3.1(a). However, given the vast literature supporting diffusion mechanisms, it is unsurprising that the data does more closely resemble Figure 3.1(a) than Figure 3.1(b). Again, although diffusion plays a powerful role in shaping tax rates, it is from the only mechanism at work. Thus, a situation in between Figures 3.1(a) and 3.1(b) is more likely to be found in the empirical data. Figure 3.2 is a true picture of this complex situation. This is Alabama's municipal sales tax rate, shaded by rate. Even though it is far from a perfect correlation, Alabama's municipal sales tax rate correlation is quite strong, much more like Figures 3.1(a) than 3.1(b), but still far from a perfect spatial correlation.

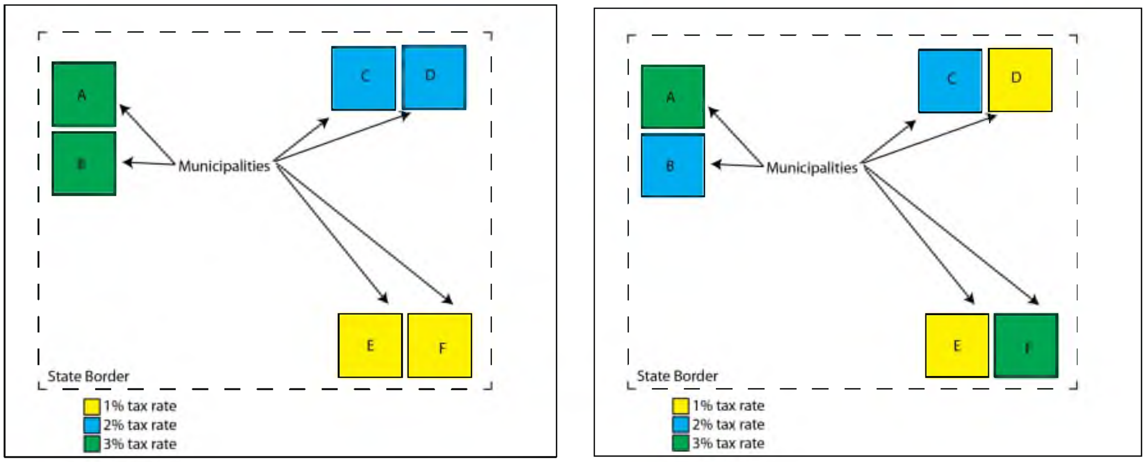


Figure 3.1(a) Hypothetical states with near-perfect (a) and near-zero (b) tax rate spatial correlations. In this figure, six municipalities exist in geographic space. In 3.1(a), proximate cities have identical rates. 3.1(b) depicts a fictional state with a near-zero tax rate spatial correlation. Proximate cities have different rates.

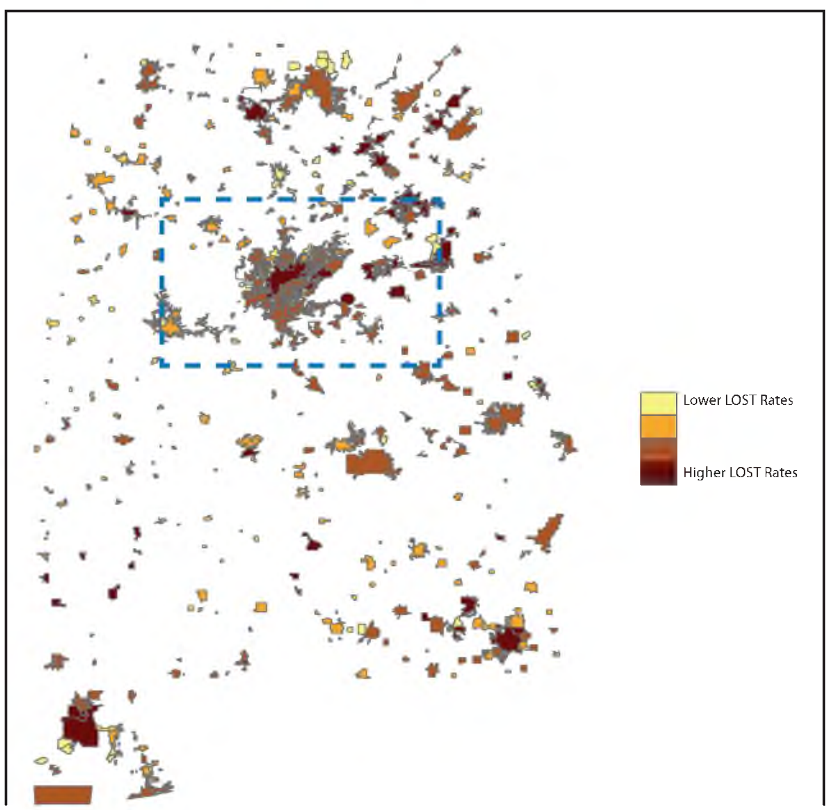


Figure 3.2: A chloropleth map of Alabama local sales tax rates: Municipalities only. Lower LOST rates are shaded lighter, darker shaded municipalities are shaded lighter. The dashed blue line surrounds the approximate area enlarged in Figures 3.3 and 3.4, the Birmingham metro area).

Figure 3.3 is a map of the Birmingham, Alabama metropolitan area, shaded by sales tax rates. At this scale, the LOST patterns are evident. Birmingham and its surrounding communities tend to have similar (higher) rates. Arcmap generated a Moran I Z-score of 6.94, p<.001 for Alabama sales tax rates, an extremely strong spatial correlation score. Cities farther away from Birmingham, like Tuscaloosa, tend to have rates more likely to correspond to rates geographically closer to their own. Figure 3.4 shows the municipal property tax rates for the same area. The strength of the spatial correlation for local property taxes is much weaker (Z-score 1.27, P = .2), as evidenced by the significant increase in variation in the Birmingham metro area. The powerful ability of spatial correlations to describe geographic trends will be instrumental in testing and differentiating the diffusion-through-learning and diffusion-through-competition mechanisms.

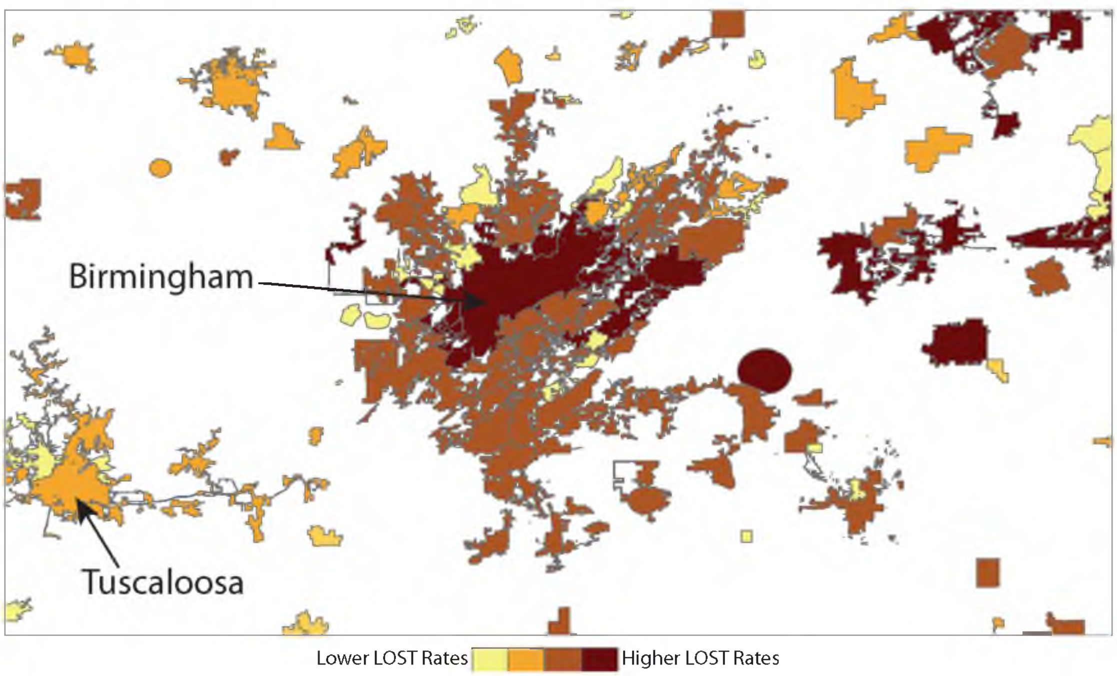


Figure 3.3: Municipal sales tax rates map: Birmingham, AL metro area. The map covers about 70 miles from East to West and 50 from North to South. Higher rates are shaded darker, lower rates are shaded higher. Grey lines dividing the shapes are the municipal boundaries. Rates tend to cluster by geographic location, but not without significant exceptions to that general trend.

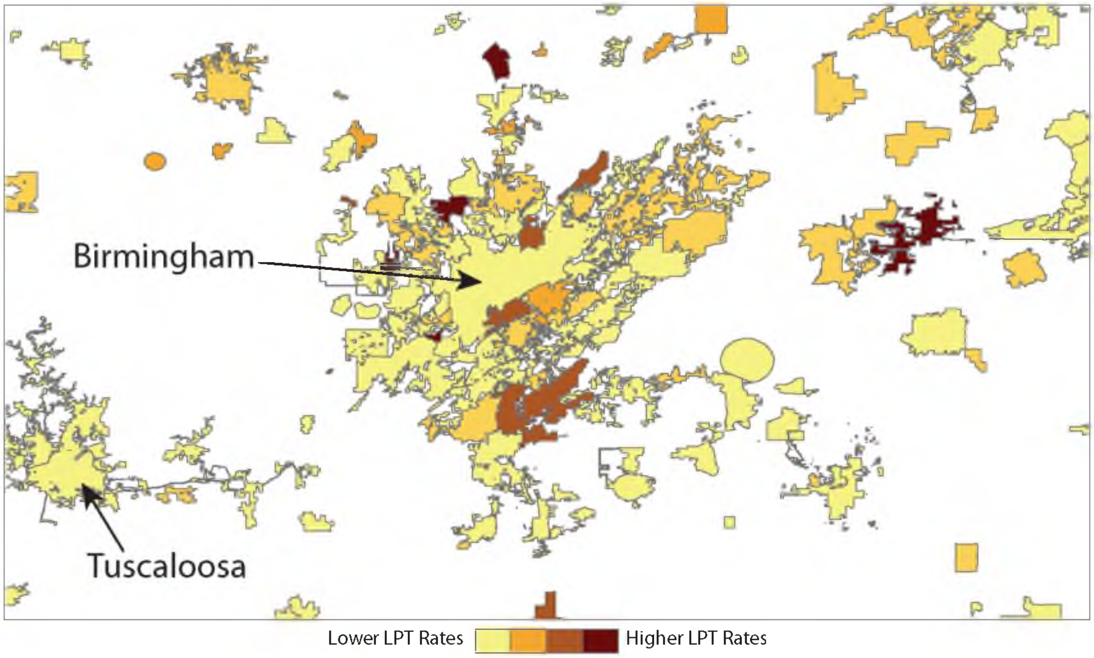


Figure 3.4: Municipal property tax rates map: Birmingham, AL metro area. The tendency for rates to cluster geographically is much lower in the property tax clustering.

This study will use a slightly modified test. While it would be possible to repeat these two Moran tests for each of the 22 states under the study for this class, the single Moran test does not distinguish between near-neighbor spatial relationships and distant-neighbor relationships. Such a distinction is crucial to the primary tests offered by this study. This choice is justified below.

Variables

Information on the data sets collected for this dissertation are described in Appendix F. Data compilation will mostly consist of gathering data from the various sources and creating spreadsheets containing all the data for every city (i.e., population, tax rate, average income, percentage of city budget paid to other government entities).

As above in the "nature spatial correlation" section, the standard Moran I test will be significantly modified in this study. Although the basic concept is the same, there is an important difference. The tests conducted in this study rely on the ability to distinguish between the clustering (or lack of clustering) of tax rates in close proximity (0-10 miles) and contrasting them with clustering patterns within further-distant proximity (10-50 miles). These ≥6[17] variables, plus the financial and demographic data, generated a complete list of ≥25 variables (see Appendix F) for each municipality used in the primary tests of this study.

The resulting data set is substantial. There are several thousand cities across the 22 states within the scope of this study, and at least 25 variables for each city. The ~500,000 data point set is robust, and one of the many reasons why this analysis has, prima facie, more statistical power than any study conducted on spatial diffusion to date. A state-by-state OLS regression was run on the entire data set.

<u>Primary Hypotheses</u>

As discussed in chapter two, no study claims exclusivity of a causal mechanism. However, this study assumes that diffusion will play a comparatively powerful role in ratemaking. To investigate this first claim, the first of the three core tests and corresponding hypotheses is:

H1: The strongest predictor of any city's sales and property tax rates will be an average of its neighbors' respective sales and property tax rates.

The endogenous mechanisms—ideology, obligations, and tax availability—are discounted by this first test. The behavioral model would be supported by a strong correlation between voter preferences and tax rates. A high correlation between property values and property tax rates would support the availability model. If the outgoing intergovernmental transfers correlate strongly with tax rates and/or population, the obligations model would be supported. The institutional

[17] The minimum number of bordering states for any of my 22 study states is 0. For instance, Alabama borders four states, generating an additional four variables for each of Alabama's 461 cities (0 = not within 10 miles of the border with the border state, 1 = the city is within 10 miles of the border with the neighboring state). The minimum number of bordering states is zero (Alaska) and the maximum number is eight (Tennessee).

investigations are explored through the "additional tests" subsection later in this chapter.

These other mechanisms cannot be entirely dismissed from this test, but it follows deductively from a positive H1 that diffusion is a more powerful causal mechanism than demographics, tax availability, or financial constraints. If rates cluster strongly within local areas, but vary significantly across broader geographic space, it is difficult to believe cities are not copying their neighbors' actions. The Birmingham metro area has an average sales tax rate tightly clustered around 2.5%, while the Mobile (AL) area has a higher rate (2.9%). Once endogenous factors are largely dismissed through the H1 test, the likeliest explanation left is diffusion.

Although H1 serves as a compelling test of diffusion, differentiating between diffusion-through-competition and diffusion-through-learning is more difficult.[18] The test to discriminate between learning and competition requires more complex tests that rest on a string of assumptions.

First, recall that Tiebout (1956) and many others assert more mobile taxes foster more competition.[19] Therefore, sales taxes are more susceptible to tax competition than property taxes because sales taxes are more mobile. Thus, given the tendency of cities to copy and compete with each other, *if* diffusion-through-learning behavior is the primary motivation behind similar tax rates, *then* property tax rates will be *as strongly* or *nearly as strongly* correlated by geographic proximity as sales taxes, perhaps more so. In other words, property tax rate clustering will be nearly or very nearly as strong sales tax rate clustering. But if sales tax clustering is much stronger than property tax clustering, then competition must play a strong role

---

[18] To review, H1 only confirms diffusion. H1 does nothing to disentangle diffusion-through-learning from diffusion-through-competition.

[19] For a review of the theory and the robust empirical data, refer to the section on diffusion-through-competition and the six "close scrutiny" studies in the literature review. These studies offer compelling evidence in support of the contention that sales taxes are more mobile and, thus, more susceptible to the diffusion-through-competition mechanism.

in tax rate diffusion.

H2: Although there will be a significant correlation between cities' property tax rates and those of their neighbors, such correlations will not be nearly as strong as those of/between sales tax rates.

To clarify, if Hoover, Alabama sets its rates primarily through diffusion-through-learning behavior, then the degree to which it copies its neighbors' sales tax rates should be similar to the degree to which it adopt its neighbors' property tax rates. If Hoover's copying behavior is motivated primarily by the learning mechanisms, it should copy its neighbors' property tax and sales tax rates with equal proclivity. However, if Hoover sets its sales tax rate close to its neighbors' rates, but does not copy its neighbors' property taxes as closely, then it follows that competition, and not learning, is likely to be the primary mechanism driving the behavior. Alabama's near-neighbor sales tax correlation is .449 and the near-neighbor property tax correlation is .144.[20] Even if the specific weight of the two diffusion mechanisms cannot be precisely determined, the competition mechanism has a powerful role.

The second part of the two-tiered either-or test, and third of the primary hypotheses is also complex. It makes two critical assumptions. First, sales taxes are again more likely to succumb to diffusion-through-competition pressure than property taxes. Second, consumers are less likely to drive long distances to make anything but the largest purchases to avoid paying higher sales taxes. Thus

H3: The difference in correlational strength between near-neighbors' sales tax rates and the more distant neighbors sales tax rates will be greater than the correlational strength from the clustering of near-neighbors property tax rates and the distant neighbors' property tax rates.

A standard term for the "differences in correlational strength between near and distant neighbors" is not forthcoming in the literature. To simplify this clumsy

---

[20] These are actual correlation coefficients from the Alabama data tables. Both are significant at the $p < .01$ level. See Appendix A for more details.

verbiage, the difference between near-neighbor correlations and distant-neighbor correlations will be called "roll off," borrowing the term from behavioral politics that very remotely resembles the tests in this study.

To elaborate on the test and semantics, Alabama has a composite near-neighbor (<10 miles) sales tax correlation rate of r =.50, while the more distant (10-50 miles) sales tax correlation rate is r = .16.[21] This yields a .34 roll off. At the same time, Alabama's near-neighbor property tax correlation is .14, and the distant-neighbor property tax correlation is .02.[22] This nets a .12 roll off, making the sales tax roll off more significant than the property tax roll off. Sales tax correlations are more sensitive to geography. These results indicate a powerful role for the competition mechanism, at least for Alabama.

These two unique[23] tests have strong construct validity. If diffusion-through-learning *were* as powerful a factor as diffusion-through-competition in shaping the very strong clustering (see H1), then the property tax correlation roll offs should be as strong or nearly as strong as the sales tax roll offs. True, diffusion-through-learning *does* predict there will be a drop off between the predictive power of near neighbors' behavior and that of more distant behavior, but if the diffusion-through-learning were as powerful as (or even more powerful than) the competition model, then we should expect the property tax roll off from near to distant neighbors to be as significant (or even more significant) than the sales tax roll off.

Since this is a new test, revisiting the hypothetical golf course and BMW plant will clarify and boost the validity of these two tests. Because the BMW example more clearly creates winners and losers, Jackson and Huntsville are more likely to

---

[21] For the full list of rates see the Appendix A Tables. Both the sales tax rates listed here are significant at the p<.01 level.

[22] The near-neighbor correlation is significant at the p <.01 level, but the distant-rate correlation is not significant.

[23] Of the hundreds of articles I have reviewed for this paper, not one has used a test identical to this. However, it is likely some study in public health, environmental science, or another of the academic areas using GIS has conducted a test at least remotely similar to mine.

copy each other's behavior than are Encinitas and Chula Vista as they compete for golfers and corresponding increases in property values. Similarly, because sales taxes are more mobile than property taxes, Hoover should feel more pressure to copy (and undercut) Birmingham's sales taxes rates than it would to copy/undercut Birmingham's property tax rates. Hoover will have a much harder time stealing revenue from neighboring Vestavia if Hoover were to lower its property tax rates, because property taxes are not subject to as much competitive pressure.

There is less competition difference among near neighbors' property tax rates than among more distant neighbors. Property tax rates play a small role in persuading/dissuading a family to move into/out of a particular city. Thus, a family will not be much more likely to consider property tax rates within a 10 mile radius of a particular location than they are to consider such rates within a 20 mile radius as they make a home buying decision.[24] Retailers are also much more likely to consider other factors than property tax rates as they choose locations, even if they weight property taxes more heavily than residents.

Secondary hypotheses

H1, H2, and H3 explain and predict the role of competition and learning in shaping tax rate diffusion patterns. But with so much data, other tests are available. The fourth, fifth, and sixth tests are less persuasive in differentiating between the two mechanisms, but even with their more limited power they still contribute to the effort. These additional tests also inform the secondary goals of this paper, such as rational behavior and revenue maximization.

---

[24] Such factors can only sway decisions at the barest of margins. Property tax rates must come in below an array of other factors: price of home, location, size of homes, quality of schools, ethnic composition, and ideological preferences. Only if two communities had nearly identical characteristics, would a homebuyer make a decision based on a property tax rate difference. See the "long-run competition" in the discussion section for more.

Skewed Distributions

Even though rates are subject to some level of area-wide conformity, cities adopt different rates. The fourth statistical test investigates the patterns of rate distribution. Skewed distributions will reveal whether cities are moving to a Nash equilibrium, a Pareto optimum, or neither.

Recall from the discussion on conformity in the literature review section above, human behaviors often gravitate towards standard normal curves, even if most distributions are at least partly skewed (Micceri 1989). Very few cities either completely abhor or assiduously relish golf courses. Most cities' preferences fall somewhere in the middle, as shown in Figure 3.5. Is it possible to tell whether a race to the bottom is occurring? Examination of rate-distribution skews indicates, at least weakly, whether a race to the bottom is present.

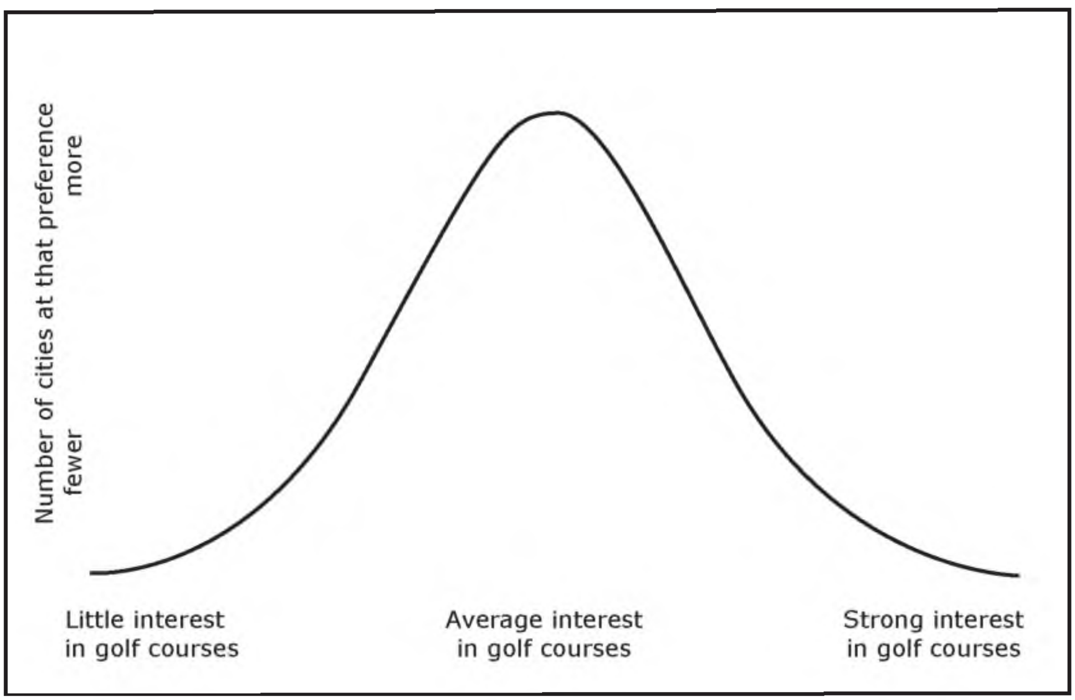


Figure 3.5: A standard normal distribution of golf course preferences. This scenario includes no exogenous (diffusion) influence. Along the black line, a few cities prefer almost no courses, a few prefer many, but most cities fall somewhere in the middle.

Baybeck, Berry and Siegel (2011) conduct a somewhat similar test and corresponding analysis. They make a related effort to use skewed distributions in their data. But test four diverges considerably from their methods. Consequently, a more robust discussion of the theoretical assumptions and empirical premises on which test four is based is required.

As in the case of golf courses, without exogenous *competitive* pressure, cities will fall back towards tax rates they prefer.[25] In the BMW case, each city pressures the others to push their incentive packages up to the point at which a city actually loses money over the deal. Because property taxes, like golf courses, are less competitive, such rates should not be as positively skewed. The expected skews from test four are depicted in Figure 3.6.

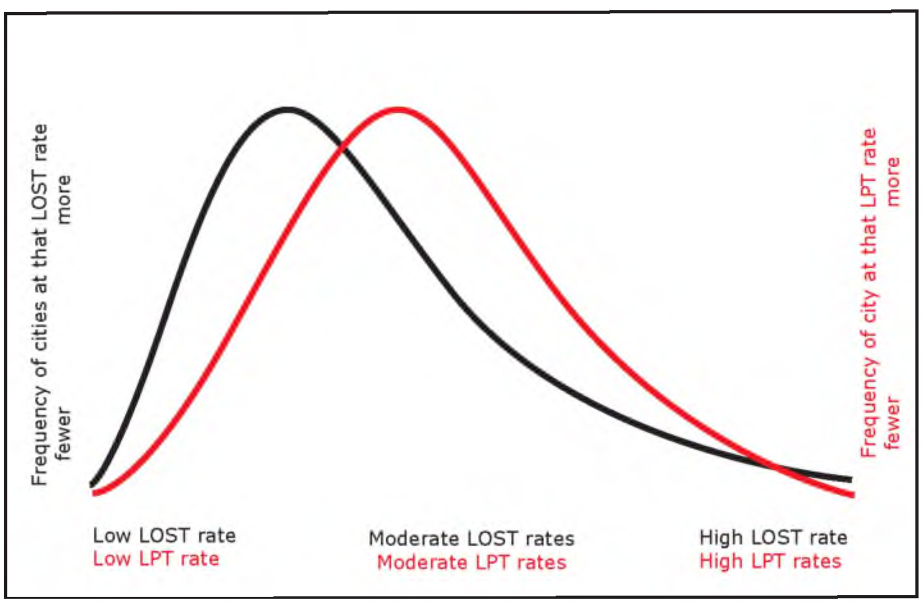


Figure 3.6: Positively skewed distributions of tax rates. Like Figure 3.5, this is a representation of rate frequencies. But this figure adds the influence of competing cities' rates, shifting the tails to the right. The model predicts that both curves should be positively skewed, but the sales tax rate should be more positively skewed.

---

[25] To say a city "prefers" a tax rate is loaded with endogenous pressures in addition to voter preferences (or even the preferences of city leaders). Nevertheless, cities in more isolated environments (e.g., small towns in remote parts of Southern Utah) are more insulated from neighbors' behavior and thus be better able to set their rates more strictly according to these endogenous factors.

The precise wording of test four thus follows as:

H4: Rate distribution curve for local sales tax rates will be more positively skewed than the rate distribution curves for local property tax rates.

The H4 test consists of a t-test on the difference between the median and mean tax rates for each state. If the mean is statistically significantly higher than the median, a positive skew (the black curve in Figure 3.6) is indicated. The direction and degrees of the rate skews were calculated. States exhibited a positive skew for both, neither or one of the two distributions. States that exhibit a stronger positive skew for sales tax than for property tax support a stronger role for the competition mechanism. States that exhibit equally powerful positive skews, or even a more positively skewed curve for property taxes, indicate a strong role for the learning mechanism. Thus, in addition to providing another marker for overall evidence of the competition mechanism, this metric will also assist in differentiating those states in which the competition is more powerful.

Furthermore, H4 has powerful implications for the secondary questions posed in this study. Normal or negatively skewed distributions indicate that cities are racing to the bottom in neither situation. Most states' results fell into this category. This finding suggests cities are not revenue maximizers, and also undermines the assumption of cities as rational actors.

More Cities, More Competition

H5 and H6 involve a final, two-part deductive test. They are also built on a central premise: whether property or sales tax rates are more likely to respond to an increased number of jurisdictions in an area.

As indicated above in the literature review chapter, the well-documented phenomenon of less-cooperation-with-more-players (Dixit and Skeath 1999; Morrow 1994; Ostrom 1998) strongly suggests more players create more competition. Jackson can easily monitor the behavior of Chattanooga and Huntsville, but it would have great difficulty monitoring the behavior of 50 cities competing for the BMW plant. In the 50-player example, Jackson will be more likely to race up to the absolute limit of incentives it can afford to offer BMW. With only two competitors, Jackson can watch their behavior and match their offers at the margins without necessarily offering the maximum incentive package. Similarly, with more players in the game, cities are more likely to race to the lowest possible tax rate, as exhibited in Figure 3.6.

The fifth and sixth deductive tests in this study are designed to use the more-players-equals-more-competition tendency to tease apart the competition and learning mechanisms. As before, rate clustering alone does not necessarily eliminate either the learning or the competition mechanism.[26]

However, by adding an additional premise, a more robust differentiation between diffusion-through-learning and diffusion-through competition can emerge. If the more competitive sales tax rates cluster more tightly together *and* at lower levels when there are more players in the immediate geographic region, then the diffusion-through-competition mechanism must be playing a strong role. Thus it follows

H5: A greater number of jurisdictions in a metropolitan area will result in lower average tax rates, particularly sales tax rates, when compared to other regions in the state with fewer cities in an immediate area.

And

H6: A greater number of jurisdictions in a metropolitan area will result in lower deviation of those rates within that area, particularly with respect to sales tax rates.

To execute these tests, several correlation scores for each of the 22 study states were generated. First, the correlation between LOST rates and the number of

---

[26] Recall the discussion in the "studies under close scruntiny" section. Brueckner and Saavedra (2001) claim more rate conformity means more competition. But Bordignon, Cerniglia, and Revelli (2004) and Lyytikäinen (2012) are correct in in noting that rate conformity simply shows higher rates cluster more strongly than lower rates. Conforming rates merely indicate diffusion, and do little to differentiate between the learning and competition models.

neighbors in the metro area should show a statistically significant negative correlation. More cities correlate with lower rates; such a stronger correlation will strongly implicate a powerful role for competition.

However, if the number of neighbors does not negatively correlate with LOST rates, the second part of H5 predicts at least a lower positive correlation between the number of neighbors and the average LOST rate of a metro area than the correlation between the number of neighbors and the local property tax rate. Even if the race doesn't "bottom out" in the BMW plant competition, a large number of players will still drive up the incentive packages more vigorously than a large number of players would drive up golf course investment.

Finally, H6 examines the standard deviations of the LOST rates within each metro area. A linear regression was run between the deviation rate of an area and the number of neighbors. More jurisdictions should lead to more tightly clustered rates. This duplicates the fundamental assumptions behind the several studies (e.g., Brueckner and Saavedra 2001) that presented evidence of conforming rates mentioned in the literature chapter. However, by itself such a finding does not necessarily differentiate between the learning and diffusion mechanisms.

Thus, the methodological backbone of this test is—much like those tests surrounding H2-H5—a comparison of the sales and property tax rate differences in these correlations. Alone, more tightly clustered rates with more neighbors do not differentiate between mechanisms. But if the competition mechanism plays a role in rate-setting, the more competitive sales taxes are more likely to show a stronger relation between more tightly clustered rates and the number of neighbors than from property taxes. Cities in the Birmingham area are more likely to succumb to group sales tax rate-setting pressure and (thus) exhibit less overall rate deviation than the same metro area has for property taxes.

Additional tests

The H1-H6 tests develop a proxy variable for each state's level of competition, learning, or neither. States were scored on each of these six metrics. A state with strong indicators of competition, less robust learning indictors, and weak roles for endogenous variables, was scored as such.

The data indicate some states exhibiting strong evidence of diffusion-through-competition (through tests H1-H6) in general. But other states do not. Even within Alabama, among the states exhibiting the strongest evidence of competitive behavior, some regions clearly demonstrate strong support for all H1-H6. But other regions do not. These remaining tests cast a wide inductive net to capture some of the features pushing a state or region within a state. These additional tests also help describe a more complex picture of the diffusion landscape.

Vertical Controls

The competition category scores were run against the states' municipal rules as nominal variables. These speculative tests will be strengthened by the size of the data. There are 22 states, each with ≥30 potential restrictions imposed on their municipalities' ratemaking discretion. This provides a significant sample size with which to judge the effect of vertical controls on the competition-or-learning question.

What rules matter? Informal discussion with city managers and officers of various municipal leagues generated a short list of the more common restrictions, posed here in the form of questions (see Appendix D for a copy of the survey). In short, these restrictions measure the degree to which states impede the discretion with which cities set their rates. See below and Appendix E for more details on the exact nature of the vertical controls.

H2-H6 tests reveal competition played a strong role in rate diffusion in Alabama. Arkansas showed little support for such competition. Dummy variables generated from these tax rate rules were run against the overall competition scores. This generated a picture of factors increasing/hindering cooperation by looking at the whole data set. Generally, vertical controls should influence the competition-or-learning behavior of municipalities, as studies like Brueckner and Saavedra (2001) confirm.

The "vertical controls" section may be the most practical part of this dissertation. City leaders must take positions on state-issued vertical controls over tax rates. Many leaders crave discretion, but if the data reveal more discretion creating a faster race to the bottom, will city managers want such discretion after all? Many city leaders might accept, or even lobby for, rules encouraging movement towards a Pareto optimum.

Revenue Maximizers

Returning to the competition models outlined in the diffusion-through-competition section of the literature review, if cities perceived themselves to be in a zero-sum game, then as they approached *what they believed to be* the Nash equilibrium, their rates would show less deviation (see Figure 2.9 and Figure 2.10) since Nash equilibria are at the bottom of these curves.

To test the existence of a Pareto or Nash equilibrium, and in the process infer indicators of competition or noncompetition, tax rates and revenues were compared. H4 required the compilation of a list of all the municipal rates for each state, then tested the mean rate against the median rate of each. As a caveat of H4, a positive, significant skew could indicate cities in the state are "racing to the bottom" as they set their rates. A strong, significant negative skew should provide some evidence that cities are pushing up against their rate maximums, but perhaps not to the Pareto optimum. This test will also help decipher the degree to which cities' primary goal is revenue-maximization.

This test is simple. For each state, a regression curve fitting tax revenue to rates was calculated. If the correlation is significant, one of three curves for each rate-revenue distribution for each state should emerge. These possible distributions are depicted in Figure 3.7.

If cities are setting rates at-or-below the Nash equilibrium, the resulting curve should resemble the "up" scenario. Higher rates will produce more revenue because the rates are not high enough to significantly offset shopping or house-buying behavior. This would indicate either cities are behaving irrationally or cities are responding to other factors (e.g. voter preferences) or perhaps both, rather than setting rates at a point to maximize revenue. If cities are racing to the bottom, there should be a negative correlation between LOST rates (and, less so, property tax rates) and revenue. This would result in the rate-revenue curve being sloped downward. That is, cities with *lower* LOST rates in a metro area should raise, on average, more money in revenue. This would indicate cities are behaving at least somewhat rationally when it comes to maximizing revenue. States exhibiting the third, "Inverted U" distribution will provide the strongest evidence of revenue-maximizing behavior. Cities at the top of the curve would be at-or-near the Nash equilibrium.

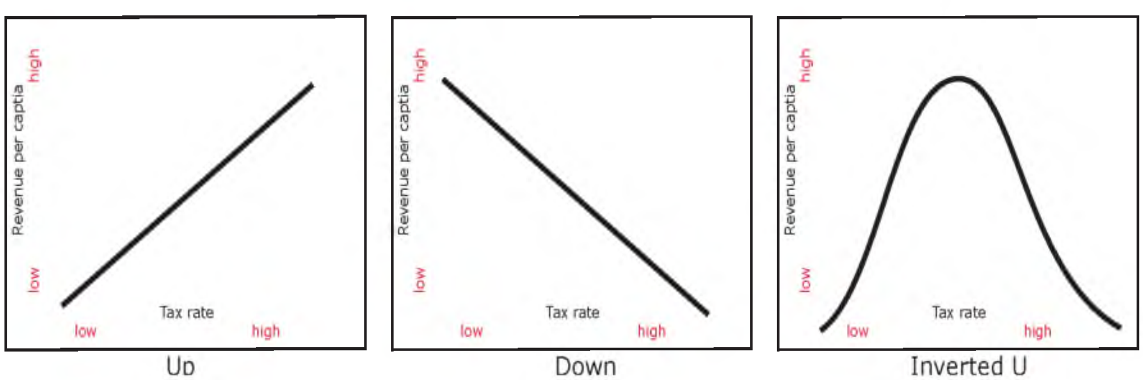


Figure 3.7: Possible rate-revenue distribution curves.

Interaction of Variables

One of the goals of this paper is to describe the patterns of policy diffusion; such patterns can also imply explanations for the various mechanisms driving this diffusion. To that end, I cast a wide net over this mountain of data, both over the data points and the descriptive statistics generated by this study. Recall from H1-H6 that ≥48 OLS tests were run on each state. Each of the 24 variables was then tested against the property tax rate of each city and again against the sales tax rate of each city (these are necessary for my H1-H6 tests). The resulting 1,056 correlation coefficients (52 correlations per state x 22 states) were then run through a factor analysis matrix.

A factor analysis is designed to identify latent relationships between variables in a data set. A factor analysis will therefore reveal which, if any, of the variables in the data set have predictive power over the rest of the set, and to what degree the predictive power of those core variables describes the behavior of the entire model. For instance, a factor analysis on voter turnout would find that wealth, education and age all cluster together. The three together would represent clusters; statisticians refer to such clusters as components. In this study, the strengths of the various correlations will be tested to see whether any of those correlations have such relationships linking them together, and in what ways. Such a finding in the data here could reveal whether some of the variables—as they tie to predicting tax rates—are themselves clustered. The results were helpful, but far from decisive. Several unanticipated factors emerged as predictors of the rest of the variables under consideration, informing many of the ideas put forth in earlier sections of this paper.

Other Factors

Among the many mechanisms affecting diffusion in previous literature is the role of a leading city. This massive data set should be able to uncover evidence surrounding the role of the "lead city" in a metro area. A dominant city like Chicago may be able to push up or set leading rates for the cities in the Chicago metro area. Among others, Shipan and Volden (2008) found some evidence larger cities were the trendsetters and those cities are more willing to experiment with policy than small communities.

The question of rates to proximity with other state borders was also tested. Significant correlation between cities near the borders of their states, especially when those neighboring states have much higher or lower average LOST rates. Cities in Washington bordering Oregon, for instance, need to keep their LOST rates as low as possible to compete with Oregon's total lack of general sales tax. Similarly, Washington cities along the border with Oregon can raise their property tax rates higher than the average Washington city, since Oregon's high property tax rates will make living in Washington but shopping in Oregon an appealing option.

CHAPTER 4

RESULTS

The amount of data generated by this paper is daunting. To facilitate communication and comprehension, this chapter is divided into four sections. The first section covers the structure of the basic OLS tables for each state, though most of those tables have been placed in appendices; a close scrutiny of two states is included and the overall data are summarized. The second section presents the results related to the H1, H2, and H3 tests. The third section presents the H4, H5 and H6 data. The final section presents several other results, including the state control data.

The state tables

The H1 test compared cities' tax rates against their financial, demographic, and spatial data. The resulting OLS regression tables for each of the 22 states are included in Appendix A. These tables show a wide range of behaviors. Most states meet the general diffusion tests well or very well. Several states exhibit clear evidence of the competition-or-learning tests. Others show little or no resolution of the competition-or-learning question. A few states show little evidence of diffusion at all. Two state results, Utah and New Mexico, represent extreme examples as they relate to the first three hypotheses.

Utah

Utah is one of seven states showing the strongest evidence of diffusion. But Utah is even more demonstrative of the diffusion-through-competition. Utah's data are presented in Table 4.1. While the state of California conforms best to the diffusion model, there are some distracting data in the California table that weaken the validity of California's results. Thus, among the seven states showing a high degree of spatial conformity, Utah's data indicates evidence of the competition question, and generally addresses the competition-or-learning question well. The competition-or-learning question will be revisited shortly as the state-by-state results are summarized. These results will also be revisited in the discussion chapter of this dissertation.

Table 4.1: Utah results. Pearson scores for all Utah cities' local sales tax rates (left column) and property tax rates (right column). This study assumes high r-values from the near-neighbor average correlation scores (in bold).

r	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	-.075
Municipal Property Tax Rate	-.075	1
Near-Neighbor average LOST rate	.477	-.009
Distant-Neighbor average LOST rate	.412	.027
Near-Neighbor average property tax rate	.019	.242
Distant-Neighbor average property tax rate	.103	.133
Number of neighbors within 10 miles	.009	-.073
Population as a percentage of the metro area	.232	.213
Average home value	.205	-.116
Average household income	.123	-.116
Intergovernmental revenue in per capita	.134	-.055
Property tax revenue per capita	.267	.136
Sales tax revenue per capita	.363	-.041
Revenue from fees per capita	.133	.010
Other tax revenue per capita	.396	-.047
Capital outlay payments per capita	.200	.024
Outgoing IGR payments per capita	.059	-.111
Maintenance & operations payments per capita	.255	.041
Municipal population	.104	.261
Percentage of rural population (density)	-.170	-.178
Percent voting for Obama in 2008	.210	.127
Standard deviation of LOST rates <10 miles	.035	.018
Standard deviation of LPT rates <10 miles	.305	.016

H1 hypothesized that the strongest predictor of any city's sales tax rates will be an average of its neighbors' rates. Utah offers compelling support for H1. In Utah's case, the best predictor of a city's sales tax rate *is* the average of its near-neighbors' rates (.477). The average neighbors' property tax rate is the second best predictor of Utah cities' property tax rates (.242). The influence of property tax rates on neighbors' rates is thus comparatively strong, but not quite as strong as the influence of near-neighbors' sales tax rates on those rates.

H2 predicts that the influence of the average near-neighbor sales tax on the home sales tax rate will be stronger than the influence of the average near-neighbor property tax rate is on the home property tax rate. H2 is strongly supported by the Utah data. Sales tax rates are therefore more dependent on neighbors' behavior than are property tax rates, at least in Utah's case. This significant difference supports a role for competition as a mechanism diffusing tax rates, particularly since the more competitive sales taxes are more likely to respond to neighboring pressure.

H3 predicts that the "roll off" between near-neighbors' influence and distant-neighbors' influence on sales tax rates will be more pronounced than the corresponding roll off for property taxes. The sales tax roll off is only .065, and the property tax roll off is .111. Proportionally, the property tax roll off was even more pronounced. This weakens support for the competition mechanism.

New Mexico

New Mexico is one of the best examples of a nonconforming state. It is the least-conforming state of the 22-state set, showing New Mexico's results are given in Table 4.2. In short, New Mexico fails each of the three core hypotheses. Breaking the expectation of H1, both New Mexico's near-neighbor sales and property tax rate correlations are nonexistent. Neither neighbors' property tax nor neighbors' sales tax rates seem to have much influence over the setting of corresponding rates.

Table 4.2: New Mexico results. Assuming diffusion has a robust influence on tax rates, the bold scores should be much higher.

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	.258
Municipal Property Tax Rate	.258	1
Near-Neighbor average LOST rate	.085	.152
Distant-Neighbor average LOST rate	.140	.102
Near-Neighbor average property tax rate	.178	.130
Distant-Neighbor average property tax rate	.099	.191
Number of neighbors within 10 miles	-.026	-.222
Population as a percentage of the metro area	.024	.274
Average home value	.180	-.178
Average household income	.077	-.138
Intergovernmental revenue in per capita	.007	-.013
Property tax revenue per capita	.198	.117
Sales tax revenue per capita	.119	-.053
Revenue from fees per capita	.177	.015
Other tax revenue per capita	.063	-.072
Capital outlay payments per capita	-.050	-.005
Outgoing IGR payments per capita	-.073	.043
Maintenance & operations payments per capita	.127	.002
Municipal population	-.017	.020
Percentage of rural population (density)	-.321	-.061
Percent voting for Obama in 2008	.153	-.140
Standard deviation of LOST rates <10 miles	.170	-.143
Standard deviation of LPT rates <10 miles	.448	.557

New Mexico is one of only three states (Nebraska and Alaska are the others) that fail both neighbors' influence tests. To elaborate, the near-neighbor sales tax rate correlations are lower than the near-neighbor property tax rate correlations, significantly discounting H2 for New Mexico. H3 predicts the near-to-distant roll off scores for the sales tax will be greater than the roll off for the near-to-distant property tax rates. In fact, the roll off for both scores is negative, contradicting expectations made in the methods section of this paper across the board. New Mexico, H4, H5, and H6 will be revisited in the discussion.

A summary of the evidence for diffusion

Figure 4.1 is the compilation of all the states and their scored rankings for both the root-to-near-neighbors local property tax rates and root-to-near-neighbors LOST rates. The figure ranks the 20 independent variables for each state from most robust to least significant then places each state on the strength of the diffusion evidence. States closer to the origin display stronger evidence of diffusion.

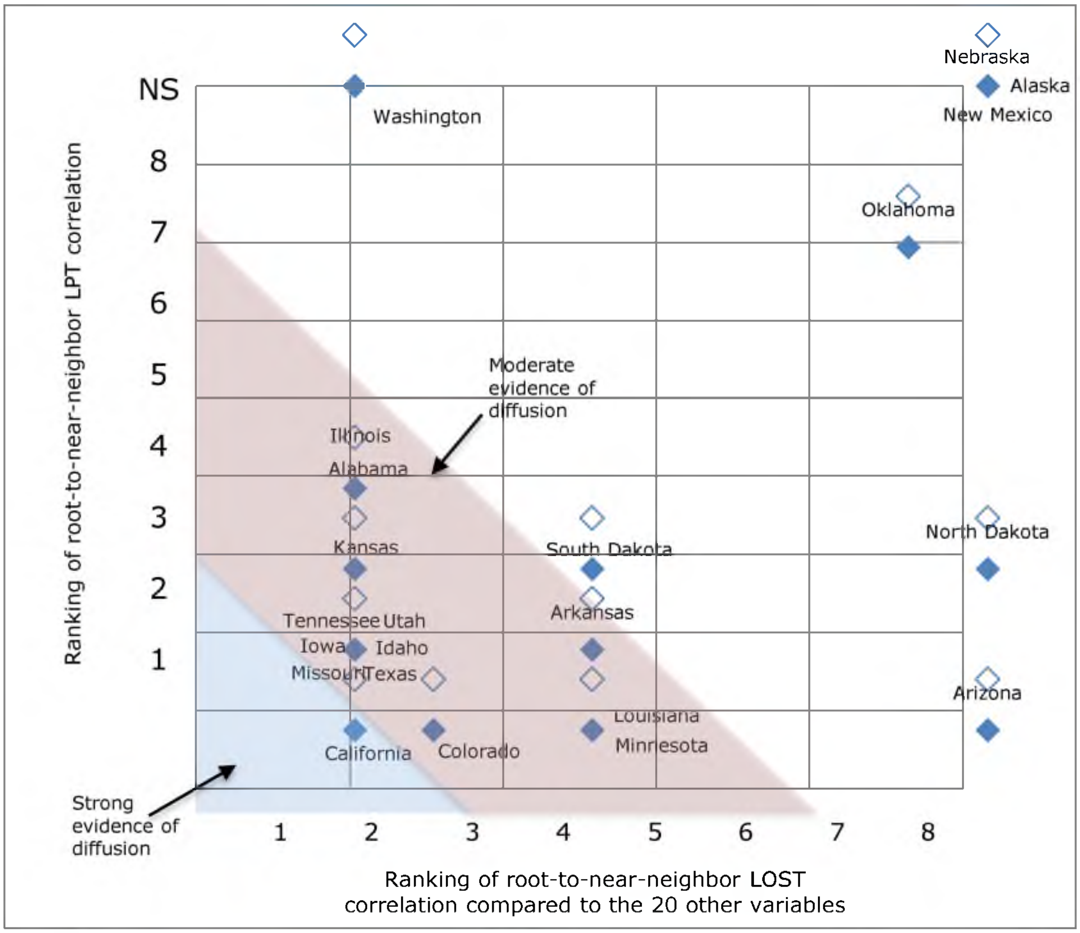


Figure 4.1: LOST and LPT root-to-near-neighbor correlation rankings, by state. This demonstrates the rank score of the the strength of the root-to-near-neighbors LOST rates on the x-axis (compared to the other variables in the test) and shows the near-neighbor property tax rate correlation rank on the y-axis. In the blue-shaded area are the states categorized as high conforming, showing strong evidence of diffusion. The pink-shaded area contains the low-conforming states, showing moderate diffusion. The unshaded area contains states that show little-to-no evidence of diffusion.

To elaborate, the most powerful predictor of California's municipal sales tax rates is the near-neighbors' sales tax rates, and the tax rates of its cities' municipal property tax rates are best predicted by the rates of those cities' near-neighbors.

In contrast, Arizona's municipal property taxes are strongly predicted by its near-neighbors' property tax rates, but Arizona cities' municipal sales taxes are not at all predicted by cities' near-neighbors' sales taxes. Arizona therefore exhibits evidence of diffusion acting on its property taxes but not on its sales taxes. Washington is in the opposite situation. Municipal sales taxes are best predicted by the near-neighbor rates, but not its property taxes. Nebraska—like New Mexico—offers no evidence of diffusion of either set of rates. Neither its municipal property nor municipal sales tax rates are linked to the rates of neighboring municipalities.

To further describe influence of neighbors in rate setting, the correlation scores for all 20 + 20 variables[27] across the 22 states were averaged and are presented in Table 4.3. The root LOST-to-near-neighbor score for Alabama is .449, for Utah .477, for New Mexico .085, and so on. The average correlation score for all 22 study states was thus calculated, as were all the averages of all the correlation scores. The top eight predictors of sales and property tax (averaged correlation coefficients) are listed in Table 4.3 along with their 22-state average score; the complete list of all variable correlation averages is in Appendix C, Table C2.

The results are compelling. The most powerful causal variable for states' LOST rates is the near-neighbors' average rate. The most powerful variable predicting a city's sales rates is the average near-neighbors' rate. In addition, neighbors' property tax rates are the best predictor of a city's rates. These results vigorously confirm that near-neighbors' behavior is the most influential variable of any tested by this study, satisfying H1 and supporting diffusion.

---

[27] The predictive power of neighbors' LOST rates on the LPT rate and vice-versa were not included, and were not significant, regardless.

Table 4.3: Average correlation scores for the top five independent variables. This table lists the five highest average correlation scores for each independent variable as it relates to the dependent variable.

LOST rate average correlation		LPT rate average	
LOST rate of near neighbors (<10 miles)	.363	LPT rate of near neighbors (<10 miles)	.281
Sales Tax revenue per capita	.335	Rate of distant neighbors	.235
Rate of distant neighbors	.233	Property tax revenue per capita	.218
Operations costs per capita	.173	Population as % of metro area	.131
Average home value	.171	Population	.115
Percent voting for Obama in 2008	.168	Main & opera payments per capita	.105
Other tax revenue per capita	.167	Revenue from fees per capita	.079
Property tax revenue per capita	.152	Municipal Sales Tax Rate	.064

However, there are several outliers confounding the primary findings. Alaska and New Mexico are more easily explained given the vast distances between municipalities in these Western states. But Washington and Nebraska are more difficult to dismiss.

Competition-learning tests: Primary hypotheses

Some evidence for the competition mechanism was demonstrated through the collective data in Table 4.3. The results of the tests associated with H2 and H3 are presented in Table 4.4. Higher summary scores indicate stronger evidence of the competition mechanism, and of the diffusion mechanism more generally. The H1 diffusion test results in the first column reflect a dummy variable closely matching the results in Figure 4.1; a higher score (2) indicates strong evidence of diffusion for both tax rates. A middle score (1) indicates weaker support for diffusion, and a zero indicates no support for diffusion as a mechanism for shaping tax policy. States with near-neighbor LOST correlations *and* near-neighbor LPT correlations ranked among the most powerful four variables for those states receiving a score of two.

Table 4.4: The primary competition-learning tests. This table summarizes the results of the near-neighbor tax rate tests associated with H1, H2, and H3 in the methods section above. Higher scores, especially in the second and third columns, indicate more evidence of competition than those of lower-scoring states.

	H1 Test	H2 Test	H3 Test
Alabama	2	2	1
Alaska	0	0	0
Arkansas	2	0	-1
Arizona	1	0	1
California	2	2	1
Colorado	2	0	0
Idaho	2	0	1
Illinois	2	2	1
Iowa	2	2	1
Kansas	2	2	1
Louisiana	2	0	-1
Minnesota	2	0	1
Missouri	2	0	1
Nebraska	0	0	0
New Mexico	0	0	0
North Dakota	1	0	0
Oklahoma	0	0	-1
South Dakota	2	0	0
Tennessee	2	0	1
Texas	2	1	1
Utah	2	1	-1
Washington	1	2	1
TOTALS	19/22 fair to strong diffusion	8/22 fair to strong competition	10/22 strong competition

States with only one of these two variables in the top four are ranked with a one. States without either of these variables in their top four are scored as zero. Table 4.4 generally shows strong support for diffusion, with the vast majority of states (15/22) scoring twos.

Calculation of the H2 and H3 scores is a little more subjective. Recall the H2 test compares the strength of the near-neighbor LOST correlations to the near-neighbor LPT correlations. To compute the H2 score, the near-neighbor LOST correlation is compared to the near-neighbor LPT correlation (the respective purple and pink cells in Tables 4.1 and 4.2). If the near-neighbor LOST correlation is more than twice the strength of the near-neighbor LPT correlation, the state receives a two on the H2 test score. If the near-neighbor LOST correlation is less than twice the strength of—but still greater than—the near-neighbor LPT correlation, the state scores a one. If the near-neighbor LOST correlation is less than the near-neighbor LPT correlation, the state scores a zero on this H2 metric.

As for the last column in Table 4.4, recall that the H3 test compares the roll off between the near and distant neighbor LOST correlations to the roll off between the near and distant neighbor LPT correlations. In Utah's case (see Table 4.1) the near-to-distant sales tax rate correlation roll off is .065 and the property tax roll off is .111. To translate this into more workable data, dummy variable scores were again generated. States with a positive roll off (where the LOST roll off is greater than the LPT roll off) scored a one, and states with a negative roll off (where the LPT roll off is greater than the LOST roll off, like Utah) with a negative one. States with a negative LOST roll off (the near-neighbor correlation is *less* than the distant-neighbor correlation) automatically score a zero, regardless of whether the roll off is higher or lower than the LPT roll off.

Secondary Tests

Recall that I do not consider secondary hypotheses to be as powerful as the primary tests. The chain of validity between the tests and the results is much less direct.

Rate Distribution Curves and Skew Tests (H4)

To further explore the question of whether cities are racing to the top, bottom or neither, the rate distribution curves for each of the 22 study states are compiled and listed in Appendix B. As depicted in Figure 3.6, H4 predicted the rate distribution skews on LOST and LPT rates would both be positive. But H4 also predicted that the LOST rates would be *more positively skewed.* However, it was slightly more common for the rate skews to be positive but reversed. In other words, the property tax rate distributions were more positively skewed than the sales tax skews (12 of 19 states with statistically significant differences). To illustrate this slightly-more-typical "reversed" state, histograms of Alabama's sales tax and property taxes are included in Figure 4.2.

Both the graphs in Figure 4.2 are positively skewed. Regarding LOST rates, Alabama cities cluster their rates at the bottom of the range, with a few cities stretching their rates up higher towards the upper limit of what state law allows. A t-test on the mean-median difference revealed the mean was 12.5% higher than the median for these LOST rates. A 12.5% difference is not extreme, but is indicative of a trend repeated (and statistically significant) in a slight majority of the study states showing significant statistical results (10/19). The property tax skew is significantly more pronounced, showing a 66% positive skew. These skews cannot be explained through simple, rational, revenue-maximizing competition.

In contrast, several states (7/19) demonstrated the expected trend: LOST rate distributions are more positively skewed than LPT rate distributions. Louisiana exhibits the most pronounced of these expected skews. Its rate histograms follow in Figure 4.3. Notice the skews are not as pronounced as those in the more typical Alabama case (Figure 4.2). Also noteworthy: the rates of the property taxes in Louisiana's case are negatively skewed, which may suggest something other than a race to the bottom is at work. This will be revisited in the discussion chapter.

Appendix B illustrates the frequency of the trends of both positive skews and of skew differences. The results are summarized in Table 4.5. Utah's mean LOST rate was 4.7% higher than its median LOST rate, while Utah's LPT rate skew was 8%. Like the majority (but not overwhelming majority) of states, Utah's LPT rate distribution skew was larger than its LOST rate distribution skew. Negative numbers indicate negative skews; the median was higher than the mean in those cases.

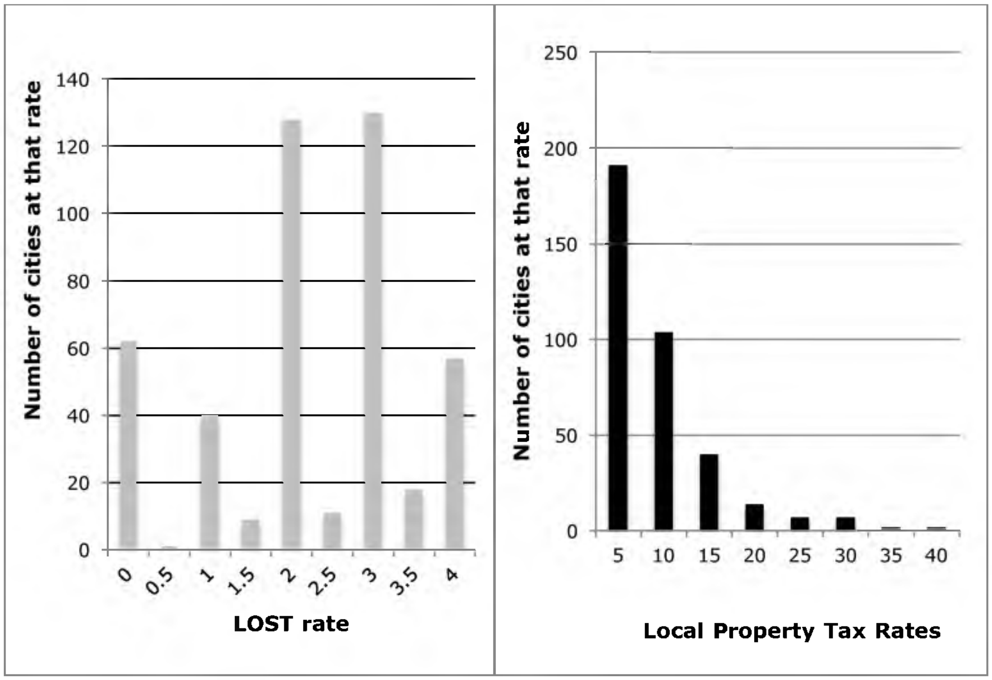


Figure 4.2: Histograms of Alabama's municipal sales and property tax rates

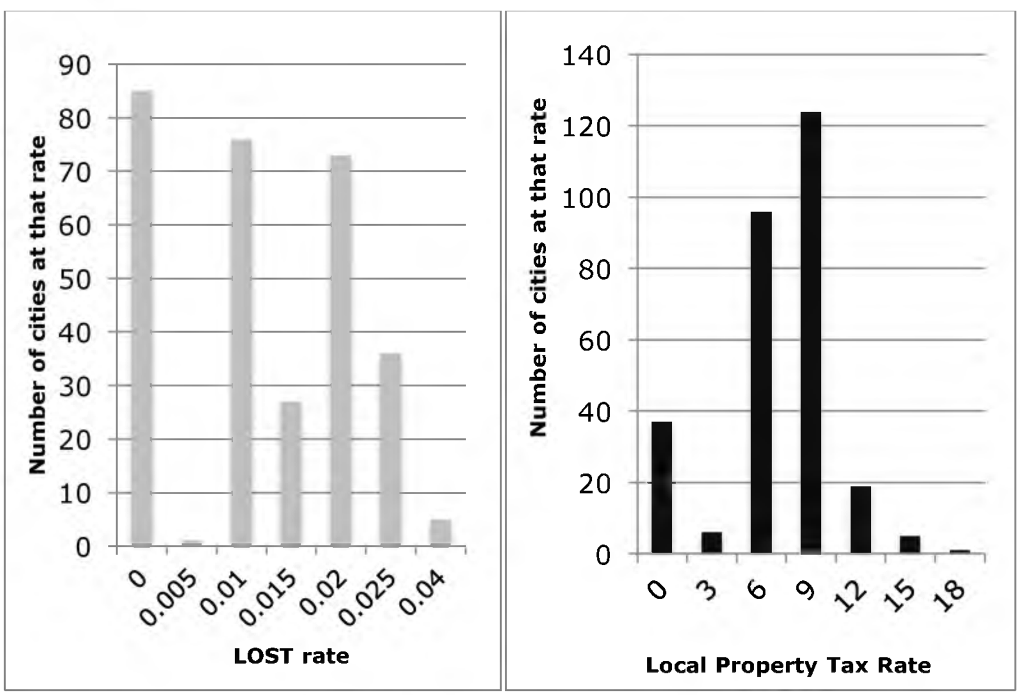


Figure 4.3: Histograms of Louisiana's municipal sales and property tax rates

Table 4.5 Rate skews by state. This table summarizes the skewed nature of the rate distributions for each of the states in the study. "U+" indicates an undefined positive skew (the median rate was zero and the mean was a number higher than zero).

	LOST	LPT	LOST skew beats LPT skew?
Alabama	12.5%	66%	REVERSE
Alaska	-2.4%	14.4%	REVERSE
Arkansas	-14.2%	-22.2%	YES
Arizona	5.3%	196%	REVERSE
California	1.3%	15.6%	REVERSE
Colorado	-26.2%	23.2%	REVERSE
Idaho	U+	12.7%	YES
Illinois	10%	174.3%	REVERSE
Iowa	-22.5%	12.1%	REVERSE
Kansas	3.5%	3.3%	NO DIFFERENCE
Louisiana	20%	-5.1%	YES
Minnesota	U+	16%	YES
Missouri	0.2%	7.8%	REVERSE
Nebraska	U+	5.7%	YES
New Mexico	0%	1.2%	NO DIFFERENCE
North Dakota	U+	0.3%	YES
Oklahoma	-11.1%	0%	REVERSE
South Dakota	-67%	14.5%	REVERSE
Tennessee	-0.5%	11.1%	REVERSE
Texas	-5.6%	1.2%	REVERSE
Utah	4.7%	8%	NS
Washington	10.7%	3.8%	YES
Proportion of positive skews	14/22 positive skews	20/22 positive skews	7/22 LOST skews > LPT skews

Although Figures 4.2 and 4.3, along with Table 4.5, demonstrate little overall evidence for the competition mechanism, these results are helpful; they do provide additional support for the overall competition-learning score generated at the end of this section. They also support the overall idea of diffusion, since the "normal" distribution expected in a nondiffusion environment (Figure 3.5) is nearly entirely absent. The overwhelming majority of states show large, significant rate distribution skews. Rate distributions will be thoroughly examined in the discussion chapter; these and the rate-to-revenue results generate some of the most intriguing implications of this entire dissertation. Appendix B gives muddled results, but the data is still helpful in determining which states have greater or lesser degrees of competition or learning driving diffusion.

The Impact of More Players

H5 and H6 are the final tests that try to pry apart the competition and diffusion mechanisms. First, H5 suggests that if competition plays a strong role in rate-setting, more neighbors will have a greater effect on LOST rates than on LPT rates, driving those LOST rates down more aggressively than they drive down property tax rates. If competition were truly driving tax rates more than learning, the sales-tax-rate-to-number-of-neighbors should generate a negative correlation. Table 4.6 lists and compares the correlation coefficients of the LOST-to-number-of-neighbors to the LPT-to-number-of neighbors.

As expected, this data does nothing to discount diffusion. In fact, the vast majority of states tend to have significant correlations between the number of neighbors and tax rates. Tax rates rise and fall across metropolitan areas; the presence of more players puts more pressure on cities to conform on their rates. Regardless of whether the rates are driven up or down, 11/22 states see significant linkage between number of cities in an area and the degree to which LOST rates cluster. LPTs track together even more closely, 17/22 states showed significant ties between the number of cities and the degree to which property tax rates cluster. The absolute average score is .196 for LOSTs and .171 for LPTs. This is far from insignificant, but not nearly as powerful as the results of H1, H2, and H3.

And, like H4, the results of the H5 test indicate little support for the competition mechanisms. The number of neighbors *does* correlate with sales and property tax rates, just not in ways competition predicts. The presence of more neighbors does drive rates together, but upward and downward pressure seem to be nearly equally likely.

Table 4.6: Number of jurisdictions versus tax rates

	LOST rate vs. number of jurisdictions	LPT rate vs. number of jurisdictions	LOST correlation less than LPT correlation?
Alabama	0.186	0.188	NO DIFFERENCE
Alaska	0.179	0.151	NO DIFFERENCE
Arkansas	0.066	0.171	REVERSE
Arizona	-0.277	0.030	YES
California	0.518	0.113	REVERSE
Colorado	0.292	-0.271	REVERSE
Idaho	-0.079	-0.171	REVERSE
Illinois	0.603	0.234	REVERSE
Iowa	-0.291	-0.129	YES
Kansas	0.287	-0.199	REVERSE
Louisiana	.0910	-0.184	REVERSE
Minnesota	-0.001	-0.320	REVERSE
Missouri	0.098	-0.211	REVERSE
Nebraska	0.099	-.0390	REVERSE
New Mexico	-.0260	-0.222	REVERSE
North Dakota	-.0820	-.0470	YES
Oklahoma	0.181	0.384	YES
South Dakota	0.084	-0.243	REVERSE
Tennessee	-0.165	0.105	YES
Texas	-0.015	0.043	NO DIFFERENCE
Utah	0.009	-.0730	REVERSE
Washington	0.685	-0.240	REVERSE
AVERAGE RATE VS. NUM NEIGHBORS	0.11	-0.04	Total 5/22 LOST < LPT
NUMBER OF STATES WITH r ≥ .1	11	17	

Finally, regarding H6, recall that the second half of the "more competition from more neighbors" proposed a test to see whether the number of neighbors was causing a tighter clustering of LOST rates or a tighter clustering of property tax rates. Correlation tests on the standard deviations of the average rates were compared to the number of cities in each metro area. These are summarized in Table 4.7. The first column gives the correlation score between the average LOST variance of each metro area for each state as compared to the number of neighbors in each metro area. The second column does the same for property tax variance against the number of neighbors. The third column compares those two metrics.

Table 4.7: Number of jurisdictions versus standard deviations of rates in a metro area. This is a summary of the H6-related test. The deviation of rates for each metro area in each state was run against the number of neighbors in the metro area. Positive numbers indicate more rate deviation among rates in areas with more players. Column 4 compares the LOST data to the LPT data.

	Number of neighbors versus StDev of Average LOST rate	Number of neighbors versus StDev of Average LPT rate	Variance correlation stronger among LOST rates?
Alabama	0.161	0.564	YES
Alaska	-.658	0.953	YES
Arkansas	.066	0.171	YES
Arizona	-.117	.202	YES
California	0.192	0.547	YES
Colorado	-.156	.062	YES
Idaho	-.113	.188	YES
Illinois	0.396	0.469	YES
Iowa	0.124	.027	REVERSE
Kansas	0.476	0.373	REVERSE
Louisiana	0.166	.069	REVERSE
Minnesota	0.13	-0.236	REVERSE
Missouri	.013	0.237	YES
Nebraska	0.217	0.108	REVERSE
New Mexico	.047	.242	YES
North Dakota	.035	.078	NO DIFFERENCE
Oklahoma	.074	0.470	YES
South Dakota	-0.203	.071	YES
Tennessee	0.154	0.212	REVERSE
Texas	-.014	-.068	REVERSE
Utah	-.138	0.326	YES
Washington	0.342	.058	YES
AVERAGE	0.054	0.232	14/22 ∂ LOST < ∂ LPT

“Yes,” indicates there is a higher correlation among the property tax metric. To illustrate, Alabama shows *more* variation in its property tax rates when there are more cities when compared to the variation on its LOST rates and the number of neighbors. Whereas H4 and H5 failed—even marginally reversed—the expectations to find evidence of the competition mechanism, the H6 results more closely follow the predictions made by the competition model in the methods section.

Whereas H4 and H5 failed—even marginally reversed—the expectations to find evidence of the competition mechanism, the H6 results more closely follow the predictions made by the competition model in the methods section. Even though Table 4.7 shows a significant diversity of results (some states confirmed expectations, some states showed insignificant results, and some results contradicted expectations) collectively, the 22 study states demonstrated a higher correlation between the deviation of LOST rates and the number of neighbors in a metro area compared to the deviation of LPT rates and the number of neighbors in a metro area.

Summary of the Deductive Tests

The results provide evidence—perhaps overwhelming evidence—that diffusion drives tax rate setting. This was especially evident from the tests associated with H1, H2, H3, and H6. Even if H4 revealed little evidence of diffusion-through-competition, the metric associated with this test again confirmed jurisdictions copy each other. Only H5 provides less-than-enthusiastic support for diffusion per se. And even the H5 test does not so much as refute diffusion as it does give lackluster evidence to support the existence of diffusion.

As above, evidence of competition evidence is more difficult to tease out. To facilitate the degree to which the study states exhibit evidence of the competition mechanism, the results of the six tests are compiled in Table 4.8. The scores from H1, H2, and H3 are taken directly from Table 4.4. The scores from the H4, H5, and H6 tests are calculated in a similar fashion to the H3 test. A "reverse" relationship scores a -1, an insignificant or tiny relationship scores a 0, and the expected "competition" result scores a 1. Although the scoring system here is at least somewhat arbitrary, it can be easily justified in comparison to the methods of the many studies reviewed in the "close scrutiny" section of Chapter 2.

Table 4.8: A summary of the competition-learning evidence, by state

	H1 Test	H2 Test	H3 Test	H4 Test	H5 Test	H6 Test	Total Competition Score
Alabama	2	2	1	-1	0	1	5
Alaska	0	0	0	-1	0	1	0
Arkansas	2	0	-1	1	-1	1	2
Arizona	1	0	1	-1	1	1	3
California	2	2	1	-1	-1	1	4
Colorado	2	0	0	-1	-1	1	1
Idaho	2	0	1	1	-1	1	4
Illinois	2	2	1	-1	-1	1	4
Iowa	2	2	1	-1	1	-1	4
Kansas	2	2	1	0	-1	-1	3
Louisiana	2	0	-1	1	-1	-1	0
Minnesota	2	0	1	1	-1	-1	2
Missouri	2	0	1	-1	-1	1	2
Nebraska	0	0	0	1	-1	-1	-1
New Mexico	0	0	0	0	-1	1	0
North Dakota	1	0	0	1	1	0	3
Oklahoma	0	0	-1	-1	1	1	0
South Dakota	2	0	0	-1	-1	1	1
Tennessee	2	0	1	-1	1	-1	2
Texas	2	1	1	-1	0	-1	2
Utah	2	1	-1	0	-1	1	2
Washington	1	2	1	1	-1	1	5
TOTALS	19/22 fair to strong diffusion	8/22 fair or strong competition	10/22 competition	7/22 competition	5/22 competition	14/22 competition	2.18 average competition score

Some states, like Alabama and Washington, exhibit more evidence of the competition mechanism. Others, like Colorado, exhibit little-to-no evidence of the competition mechanism. The discussion section will return to this table, offering an analysis of the implications of the variegated data.

<u>Inductive test results</u>

This paper conducted several inductive tests. These results provide more data to inform the diffusion question and clarify some of the data presented above.

Vertical Controls Results

A major undertaking of this paper was to collect and quantify the state rules imposed on municipalities. These rules were expected to have an impact on diffusion in general, and on the learning-competition question in particular. The rules imposed on Encinitas and Chula Vista by California should significantly affect the patterns of golf course diffusion throughout the greater San Diego area. The state rules for municipal sales taxes are summarized in Table 4.9 and the rules for municipal property taxes in Table 4.10.

There are two notable caveats. First, laws are often subtle and complex. These tables have oversimplified such rules in order to make the rules quantifiable. Despite such oversimplification, these rules have been adequately represented. Second, these rules do not capture any self-imposed restrictions. Salt Lake City might have rules written into its charter exceeding the limits imposed by the state of Utah. Since this test considered only state controls, and since such locally imposed restrictions are optional, these tables ignore such restrictions. For additional detail, the questionnaires generating this data are reprinted in full in Appendix E.

The data in these tables is difficult to summarize easily. Perhaps the clearest result of this section of the investigation is that states are myriad in the ways and means through which they restrict local governments' ratemaking power. Very generally, the restrictions tend to fall into four categories. First, states put direct limits on the rates. Second, states restrict the means through which rates can be adopted or changed, for instance requiring a voter referendum. Third, states constrict the target of the tax in some way, for instance in exempting food from sales tax or freezing the growth of property value. Fourth, states may restrict what cities do with the money, forcing them to share the revenue with other jurisdictions or spend the money on particular budget items.

AR	N	3.5	Y	Y	3.5	N	N	Y	N	6	Y	N	N	Y
AZ	N	4.5	Y	N	0	N	N	N	N	5.6	Y	N	N	Y
CA	N	2	Y	Y	2	N	Y	Y	N	6.2	Y	Y	N	N
CO	N	5	Y	N	0	N	Y	N	N	2.9	N	N	N	N
ID	N	2.5	N	N	0	Y	Y	N	N	6	Y	N	N	N
IL	N	1	Y	Y	1	N	Y	N	N	6.3	Y	N	N	N
IA	N	1	Y	N	0	Y	Y	N	Y	5	Y	Y	N	N
KA	N	3	Y	Y	2.5	N	Y	N	N	6.1	Y	Y	N	Y
LA	N	4°	Y	Y	4°	N	Y	N	Y	4	N	N	N	Y
MN	N	1	Y	N*	.25	Y	Y	N	Y	6.5	Y	Y	N*	N
MO	N	4.7	Y	Y	2.5	Y	Y	N	N	4.2	Y	N	N*	N
NE	N	1.5	Y	Y	2	N	Y	Y	N	5.5	Y	N	N	N
NM	N	1.5	Y	Y	.8	N	Y	N	N	5.1	Y	N	N	N
ND	N	2.5	Y	Y	2.5	N	N	N	N	5	N	N	N	Y
OK	N	4.5	Y	N	0	N	Y	N	N	4.5	N	N	N	N
SD	N	2	Y	N	0	Y	N	N	N	4	N	N	N	N
TN	N	2.5	Y	Y	2.5	N	Y	Y	N	7	N	Y	Y	Y
TX	N	2	Y	Y	.5	Y	N	N	N	6.2	Y	N	N	N
UT	Y	1	Y*	Y	1.5	N	N	N	Y	4.7	Y	Y	Y	Y
WA	N	1	Y	Y	2.5	Y	N	N	Y	6.5	Y	N	Y	Y

TABLE 4.9 A summary of state controls over local sales tax rates.
° = The LOST rate for this state is unlimited, but the maximum rate levied in 2007 is listed to simplify.
* = Since less (MORE) than half the cities in the state have been authorized to do this, this was simplified as "NO" (YES)

	Is there a base general LOST rate?	What is the maximum general LOST rate? U	Are all cities allowed to levy the general LOST? (Are cities treated equally?)	Can cities levy revenue-specific LOSTS in addition to the general LOST?	What is the maximum total rate on the combined revenue-specific LOSTS?	Is there a waiting period between successive LOST rate changes?	Are both leaders and voters' approved required to change LOST rates?	Are council supermajorities needed to change LOST rates?	Is state approval needed to change LOST rates?	What is the state sales tax rate?	Can other local governments impose overlapping LOST rates with municipalities?	Can cities collectively raise LOST rates?	Are cities required to share their LOST revenue with other jurisdictions?	Are cities required to hold public hearings in advanced of LOST rate changes?
AL	N	5	Y	N	0	N	N	Y	N	4	Y	N	N	Y
AK	N	7°	Y	N	0	N	Y	N	N	0	N	N	N	N

AK	N	N	N	N	U	N	N	N	N	N	Y	N	N	N
AR	Y	N	Y	N	0	Y	N	N	N	N	Y	N	N	Y
AZ	N	N	Y	Y	31	Y	N	N	N	N	Y	N	N	Y
CA	Y	N	Y	Y	1	N	N	N	N	N	Y	N	N	N
CO	N	N	N	Y	U	Y	N	N	N	N	Y	N	N	N
ID	N	Y	N	N	0	N	N	N	N	N	Y	N	N	N
IL	Y	N	Y	Y	75	N	N	N	N	N	Y	N	N	N
IA	N	N	Y	Y	26	Y	N	Y	N	N	Y	N	N	N
KA	N	N	N	Y	U	Y	N	N	N	N	Y	Y	Y	Y
LA	N	N	N	Y	U	Y	N	Y	Y	N	Y	Y	N	Y
MN	N	N	Y	Y	U	Y	N	N	N	N	Y	Y*	Y	N
MO	Y	Y	Y	Y	4	N	N	Y	N	N	Y	N	N	N
NE	N	Y	N	Y	4	Y	N	N	N	N	Y	N	N	N
NM	Y	Y	N	N	0	Y	N	N	N	N	Y	N	N	N
ND	N	Y	N	Y	67	N	N	N	N	N	Y	N	N	Y
OK	Y	N	N	Y	4	Y	N	Y	N	Y	Y	N	Y	N
SD	Y	N	N	N	0	Y	N	N	N*	N	Y	N	N	N
TN	N	N	N	N	0	Y*	N	Y	Y	N	Y	Y*	Y	Y
TX	N	Y	Y	Y	1	N	Y	N	N	N	Y	N	N	N
UT	Y	Y	N	Y	U	Y	N	N	N	N	Y	N	Y	Y
WA	Y	Y	N	Y	5	N	Y	N	N*	N	Y	N	Y	Y

TABLE 4.10: A summary of state controls over local property tax rates
° = Only a yes/no is given on this metric. Hoover, Alabama and Salt Lake City, Utah might both have 5% property tax rates, the state restricts the tax to a smaller percentage of the assessed value.
* = Since less (MORE) than half the cities in this state have been authorized by the state to do this, this is simplified as "NO" (YES). U = Unlimited

	Is there a maximum general municipal property tax?°	Are municipalities subject to Tax Expenditure Limits?	Does the state restrict property taxes through valuation growth limits?	Does the state allow for revenue-specific property tax levies?	How many revenue-specific levies does the state allow?	Are all cities treated equally under state law regarding the rate and number of	Is there a mandated waiting period between rate changes?	Does a rate or levy change require both the approval of city leaders and voters?	Are council supermajorities needed to change LPT rates?	Does any change in the levies or rates require the approval of a state office?	Do LPT levies potentially overlap with multiple local jurisdictions?	Are cities required to share their property tax revenue with other jurisdictions?	Can cities collectively change/levy LPTs?	Are cities required to hold public hearings in advanced of LPT rate changes?
AL	N	N	N	N	U	N	Y	Y	Y	Y	Y	N	N	Y

The restrictions are summarized in Table 4.11, which computes a restriction score for each of the states. One score for ratemaking on property taxes, and one scores for the ratemaking of sales taxes. When scoring the state, variables were forced into binomial categories and scored a "1" if the state was restrictive on that feature and "0" if the category was unrestricted. What Table 4.11 fails to illustrate is that not all restrictions are equal. A requirement to put a rate increase to a referendum is not as restrictive as California's very strict rate limits. Salt Lake City might have to put a rate increase to its voters, but such an increase is illegal under any circumstances for San Francisco.

Table 4.11: A summary of the states rules governing municipal ratemaking

	Total LOST restriction score (higher = more restrictive)	Total LPT restriction score (higher = more restrictive)
Alabama	6	8
Alaska	3	3
Arkansas	5	5
Arizona	5	3
California	4	4
Colorado	4	1
Idaho	7	4
Illinois	4	4
Iowa	6	3
Kansas	3	2
Louisiana	4	5
Minnesota	6	2
Missouri	4	6
Nebraska	5	2
New Mexico	4	4
North Dakota	3	4
Oklahoma	3	3
South Dakota	4	3
Tennessee	5	5
Texas	4	5
Utah	5	3
Washington	7	5

Nonetheless, there is a weak (r = .23) relationship between the two summary metrics. If anything, this is a weak-to-fair support for the validity of these "vertical control" metrics. It stands to reason that states restricting the sales tax ratemaking discretionary powers of their cities will also tend to restrict municipal property tax ratemaking. However, additional scholarship is clearly needed to produce a more accurately weighted ranking of restrictions and to further explore the means and degrees of state control.

The composite LOST restriction scores were run against the LOST diffusion scores (from Figure 4.1), and the composite LPT restriction scores were run against the LPT diffusion scores. The results are compiled in Figures 4.4a and 4.4b. The composite restriction score was then run against each state's competition-or-learning score (from Table 4.8) and compiled with those in Figure 4.5.

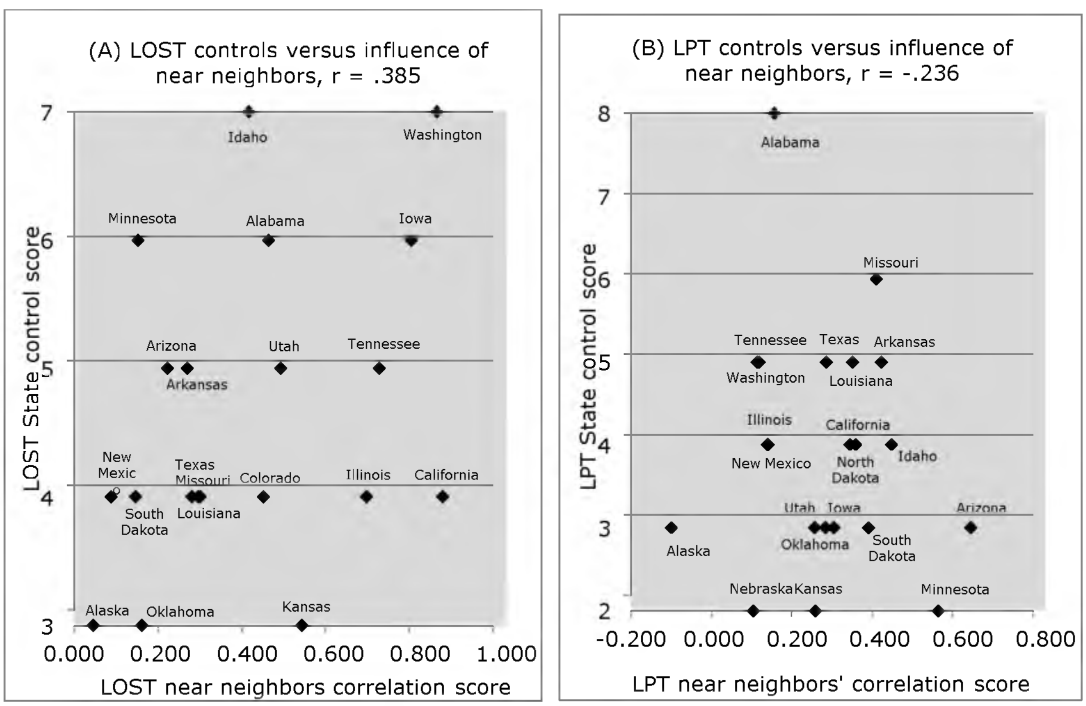


Figure 4.4a&b The correlations between near-neighbors and state controls. These scatterplots show the correlations between the strength of the influence of near-neighbors' rate and the level of state restriction, by state.

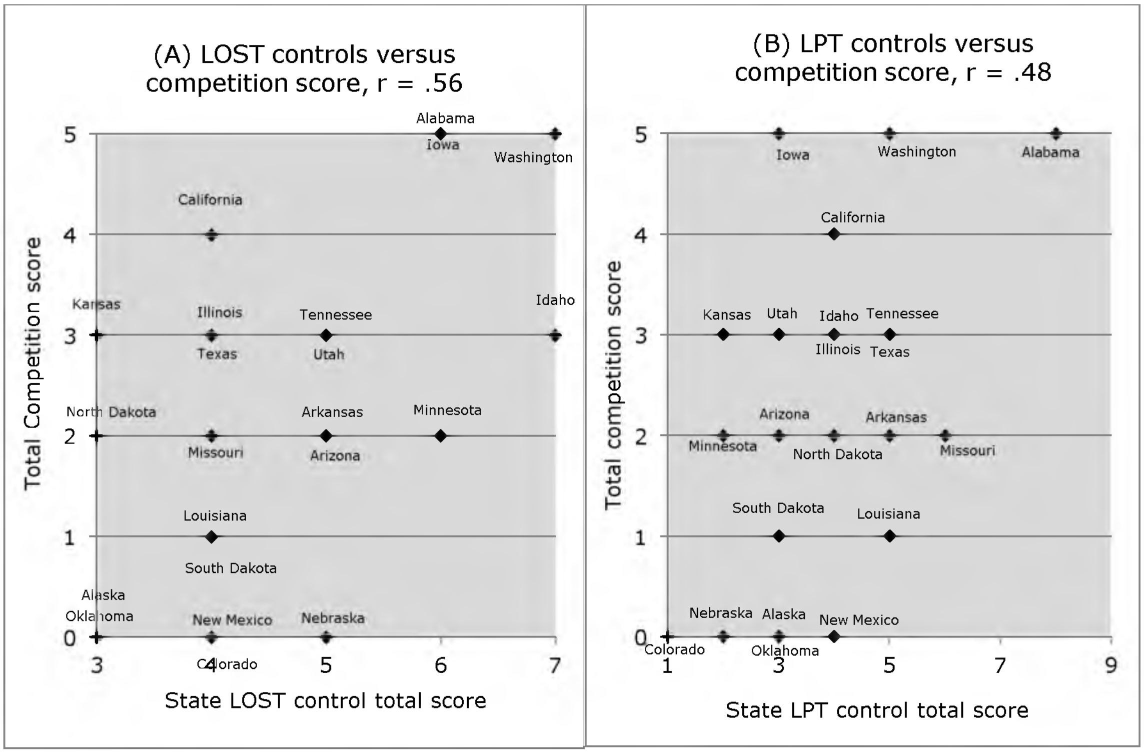


Figure 4.5. Scatterplots of the controls versus competition-or-learning. These scatterplots are graphic depictions of the correlation between the competition-or-learning scores and the rate control mechanisms for each state. More control predicts more competition.

The Figure 4.4 results are interesting, if somewhat surprising. State control seems to have some influence over the measures of diffusion, more so for sales tax controls and the diffusion of sales taxes than for property taxes. The degree of state restrictions does have a considerable correlation with the influence of neighbors' rates, but it is more surprising to see that more state control over local sales taxes *increases* the influence of neighbors on those tax rates, while more state control over local property taxes seems to *reduce* the influence of neighbors' rates over those tax rates.

The results of the second test were more robust, but also somewhat unexpected. More state control seems to lead to more evidence of competition, at least according to the ways in which the variables and the differences between these variables were scored according to the methods of this investigation.

Regardless, there are some implications for diffusion in general, and for the learning-competition question specifically. These will be revisited in the discussion. For now, the microscopic results on the influence of vertical controls are worthy of a summary. The competition-or-learning metrics (in Table 4.8) were run against the total vertical controls data (Tables 4.9 and 4.10). The results of this data run are in Tables 4.12 and 4.13.

Table 4.12: A correlation matrix of the competition-or-learning matrix against the state LOST control metrics. The bold numbers highlight scores above .3.

	H1: A closer LOST correlation with near neighbors than with distant neighbors	H2: LOST rates more dependent on geography than LPT rates	H3: LOST roll of greater than LPT roll off	H4: LOST rates more positively skewed than LPT rates	H5: More neighbors drives LOST rates down more than it does to LPT rates	H6: More neighbors reduces LOST deviation more than LPT deviation
Is there a base general LOST rate?	0.301	0.34	0.375	0.143	-0.042	-0.328
What is the maximum general LOST rate? U	0.139	-0.158	0.180	0.297	-0.195	-0.087
Are all cities allowed to levy the general LOST? (Are cities treated equally?)	-0.059	-0.181	0.087	-0.303	0.226	0.073
Can cities levy revenue-specific LOSTS in addition to the general LOST?	0.311	0.06	0.437	0.064	-0.227	0.013
What is the maximum total rate on the combined revenue-specific LOSTS?	-0.121	-0.097	0.111	-0.086	-0.068	-0.388
Is there a waiting period between successive LOST rate changes?	0.069	0.101	0.026	0.016	0.084	0.101
Are both leaders and voters' approved required to change LOST rates?	0.208	0.224	-0.115	0.378	-0.058	-0.057
Are council supermajorities needed to change LOST rates?	0.187	0.493	0.449	0.153	-0.157	-0.155
Is state approval needed to change LOST rates?	-0.391	-0.368	-0.241	0.072	-0.122	0.243
Is there a state sales tax rate?	0.085	0.164	-0.016	0.100	0.166	0.228
Can other local governments impose overlapping LOST rates with municipalities?	0.177	0.133	-0.153	0.312	0.105	0.073
Can cities collectively raise LOST rates?	0.301	0.340	0.375	0.143	-0.042	-0.328
Are cities required to share their LOST revenue with other jurisdictions?	0.139	-0.158	0.180	0.297	-0.195	-0.087
Are cities required to hold public hearings in advanced of LOST rate changes?	-0.059	-0.181	0.087	-0.303	0.226	0.073

Table 4.13: A correlation of the competition-or-learning data to property tax state control. Largely duplicating Table 4.12, this table lists scores for the state controls over property tax rates and whether those are associated with a higher competition score. Bold numbers are correlations above .3.

	H1: A closer LOST correlation with near neighbors than with distant neighbors	H2: LOST rates more dependent on geography than LPT rates	H3: LOST roll of greater than LPT roll off	H4: LOST rates more positively skewed than LPT rates	H5: More neighbors drives LOST rates down more than it does to LPT rates	H6: More neighbors reduces LOST deviation more than LPT deviation
Is there a maximum general municipal property tax?	-0.059	0.133	-0.272	-0.098	-0.259	0.612
Are municipalities subject to Tax Expenditure Limits?	-0.241	-0.117	0.011	0.400	-0.056	-0.025
Does the state restrict property taxes through valuation growth limits?	0.362	0.205	0.379	-0.229	-0.056	-0.025
Does the state allow for revenue-specific property tax levies?	-0.062	-0.272	-0.069	-0.044	0.029	0.297
Does the state allow additional revenue-specific levies?	0.059	0.343	.447	-0.098	-0.259	0.343
Are all cities treated equally under state law regarding the rate and number of levies?	0.085	0.464	0.328	-0.047	-0.008	0.228
Is there a mandated waiting period between rate changes?	0.130	0.021	-0.024	-0.299	0.39	0.203
Does a rate or levy change require both the approval of city leaders and voters?	0.254	0.014	-0.016	-0.047	0.166	0.035
Are council supermajorities needed to change LPT rates?	-0.202	0.130	-0.149	-0.271	0.340	0.335
Does any change in the levies or rates require the approval of a state office?	0.301	-0.073	0.083	0.250	-0.112	-0.531
Do LPT levies potentially overlap with multiple local jurisdictions?	0.00	-0.137	0.024	-0.154	-0.122	0.095
Are cities required to share their property tax revenue with other jurisdictions?	0.177	0.133	-0.153	0.312	0.105	0.073

This data delves more deeply into the minutiae of the relationship between the state control and its effect on the competition-or-learning question. In part because the data set is much smaller (only 22 cases), the strength of this whole population statistical data is more difficult to gauge. Only three of the LOST-control, and only four of the LPT-control relationships show significance above the .3 level.

There are some other relationships that show good correlations; perhaps with more data they would show higher scores.

True, the overall score (Figure 4.5) was robust, which—assuming my metrics and scoring are sound—does lead to the conclusion that state control makes some difference. However, the overall conclusion must be circumspect. The microscopic data confirm the macroscopic findings: there is limited (but not none) evidence state controls make a significant difference in the patterns of diffusion. But this evidence is far from profound.

The Factor Analysis Results

A factor analysis was then conducted on the data, nearly all the rates and roll-off differences from the data amassed in Appendix A. First, this would expose any latent clustering of the relationships between the data points within the mountain of data assembled for this study. This factor analysis determined by the degree to which independent variables are correlated with the other by discovering the degree to which they are loaded into the factor components. If the factor analysis produces a powerful, limited set of components, then the variables in those components could be said to have a profound, collective action on tax rate diffusion patterns. Second, this factor analysis will further clarify which of the ≥25 variables are the most significant within the data. The core results are given in Table 4.14, a full list of the factors and how the variables load into them is given in Table 4.15.

Table 4.14: A factor analysis of the financial, demographic and rate data. The first 4 factors in the factor analysis of the financial, demographic and rate data.

	Initial Eigenvalues		
Component	Total	% of Variance	Cumulative %
1	9.137	21.249	21.249
2	7.377	17.156	38.406
3	6.007	13.97	52.376
4	4.416	10.269	62.645

Table 4.15: The complete factor analysis of the demographic and financial data (through Factor 7). A full listing of all the correlations in the study and the degree to which they load in to the first seven factors in the factor analysis. Absolute Loading values ≥ .3 are in bold. Principal Component Analysis and Varimax rotation with Kaiser Normalization. Rotation converged in 21 iterations

Rotated Component Matrix(a)							
	Component						
	1	2	3	4	5	6	7
Sales Tax Rate (LOST) to Property Tax Rate (LPT)	0.372	0.258	-0.336	-0.287	0.036	0.068	0.189
LOST to near neighbors' LOST	0.079	-0.517	0.761	-0.046	-0.127	0.088	-0.093
LOST to distant neighbors' LOST	-0.017	0.092	0.914	0.030	-0.192	-0.135	-0.188
LPT to near neighbors' LPT	-0.437	-0.054	-0.258	-0.211	0.608	-0.213	0.297
LPT to distant neighbors' LPT	-0.716	-0.087	-0.222	-0.014	0.333	-0.108	-0.293
LOST "roll off" (near LOST– distant LOST)	0.135	-0.861	0.067	-0.101	0.034	0.283	0.079
LPT "roll off" (near LPT– distant LPT)	0.425	0.050	-0.016	-0.236	0.290	-0.114	0.748
LOST near-neighbors minus LPT near-neighbors	0.254	-0.382	0.711	0.057	-0.367	0.163	-0.204
LOST roll off minus LP roll off	-0.136	-0.79	0.068	0.052	-0.144	0.318	-0.379
LOST to number cities in metro area	0.089	0.262	0.796	0.34	-0.213	-0.104	0.087
LOST to city population as % of metro area	-0.013	0.454	-0.588	-0.018	0.256	-0.062	-0.201
LOST to home value	-0.041	0.123	0.205	0.898	0.036	-0.033	-0.074
LOST to household income	-0.094	0.095	0.467	0.778	-0.084	-0.049	-0.128
LOST to IGR in per capita	0.107	-0.158	-0.33	0.045	0.830	-0.134	-0.054
LOST to property tax revenue per capita	-0.111	0.02	0.039	0.878	-0.160	-0.105	0.173
LOST to sales tax revenue per capita	-0.075	0.769	-0.138	-0.083	-0.056	0.364	0.091
LOST to fees per capita	0.390	0.738	-0.331	-0.011	0.163	0.036	-0.235
LOST to other tax revenue per capita	0.095	-0.035	-0.082	0.872	0.043	0.028	0.098
LOST to capital outlay per capita	0.196	0.375	-0.219	-0.060	0.796	-0.132	-0.003
LOST to IGR out per capita	-0.222	-0.032	0.081	0.750	0.074	0.213	-0.310
LOST to operations per capita	0.425	0.378	-0.458	0.466	0.381	0.028	-0.057
LOST to city population	-0.162	0.768	0.181	0.169	-0.064	0.184	0.133
LOST to percent rural population	-0.004	-0.616	-0.226	-0.347	0.549	-0.097	0.079
LOST to percent for Obama	0.029	-0.218	0.812	0.325	0.042	-0.066	0.004
LPT to number cities in metro area	0.860	-0.122	0.037	-0.090	-0.003	0.018	0.246
LPT to city population as % of metro area	-0.098	-0.281	0.132	-0.026	0.119	0.284	-0.716
LPT to home value	0.915	0.181	0.088	-0.132	0.126	0.040	0.035
LPT to household income	0.904	0.144	-0.048	-0.076	0.157	-0.037	-0.046
LPT to IGR in per capita	-0.296	-0.25	0.045	-0.218	-0.358	0.334	0.286
LPT to property tax revenue per capita	0.062	0.075	-0.182	-0.075	0.142	0.259	0.176
LPT to sales tax revenue per capita	0.534	-0.087	-0.099	0.144	-0.044	0.149	0.764
LPT to fees per capita	0.124	-0.058	-0.031	-0.012	-0.115	0.893	-0.286
LPT to other tax revenue per capita	0.707	0.419	-0.115	-0.145	0.026	0.108	0.226
LPT to capital outlay per capita	0.052	0.435	-0.203	0.088	-0.044	0.606	0.044
LPT to IGR out per capita	0.342	-0.065	-0.376	-0.446	0.295	0.102	-0.045
LPT to operations per capita	0.058	-0.248	-0.064	-0.075	-0.16	0.758	0.054
LPT to city population	0.821	-0.255	0.050	-0.083	0.009	0.050	0.189
LPT to percent rural population	-0.755	0.318	0.163	0.089	0.213	-0.140	0.087
LPT to percent for Obama	0.596	0.196	-0.128	-0.045	0.101	0.130	0.216
Avg LOST <10 to LOST <10 standard deviation	-0.279	0.022	-0.033	0.459	0.507	0.459	0.170
Avg LPT <10 to LPT <10 standard deviation	0.324	0.017	-0.025	0.049	-0.036	-0.215	0.052
Number of neighbors to <10 LOST std dev	0.204	0.136	0.577	0.048	-0.253	0.583	0.059
Number of neighbors to <10 LPT std dev	0.767	-0.165	0.360	0.115	0.045	-0.136	0.090

Like the other inductive data examined in the previous subsection on vertical controls, this factor analysis produced some interesting data but failed to produce conclusive results. A substantial degree of the variance in the data set was loaded into the first four components, particularly the first two, but a glance at the complete factor loading suggests very few of the components load heavily into just a few factors. Table 4.15 is summarized graphically in Figure 4.6. Only the first four factors are included in this diagram in order to facilitate understanding and reduce clutter. The first factor only captures an unimpressive 21.2% of the variance in the data. However, the first four factors together capture 62.6% of the data, which is a little more impressive.

Figure 4.6 and Table 4.15 offer only limited insight into the complex relationship behind these variables. First, the property tax correlations load most heavily into Factor 1, with very few property tax correlations loading elsewhere. As a corollary, property taxes load more heavily into fewer factors. Second, the sales tax correlations load heavily into Factors 3 and 4, with a few loading into factor 2. Third, the factors *are* largely independent, particularly when considering most of the cases wherein correlations load significantly into more than one factor, the loading is split positively and negatively on that factor. For instance, the LOST rate to LPT rate correlation loads negatively into Factor 3 and positively into Factor 1.

The fourth item of note is one of the few robust patterns of interaction that the factor analysis was used (but largely failed) to find. Note Factor 1 captures many of the property tax relationships. As indicated in Table 4.3, neighboring rates are the most powerful predictor of a city's property tax rates. Yet Factor 1 indicates that higher property values and larger population (among others) associate with the influence of neighbors' rates *down.* Among less salient factors, these factors and their role in describing and explaining the overall rate-setting landscape will be revisited in the discussion section.

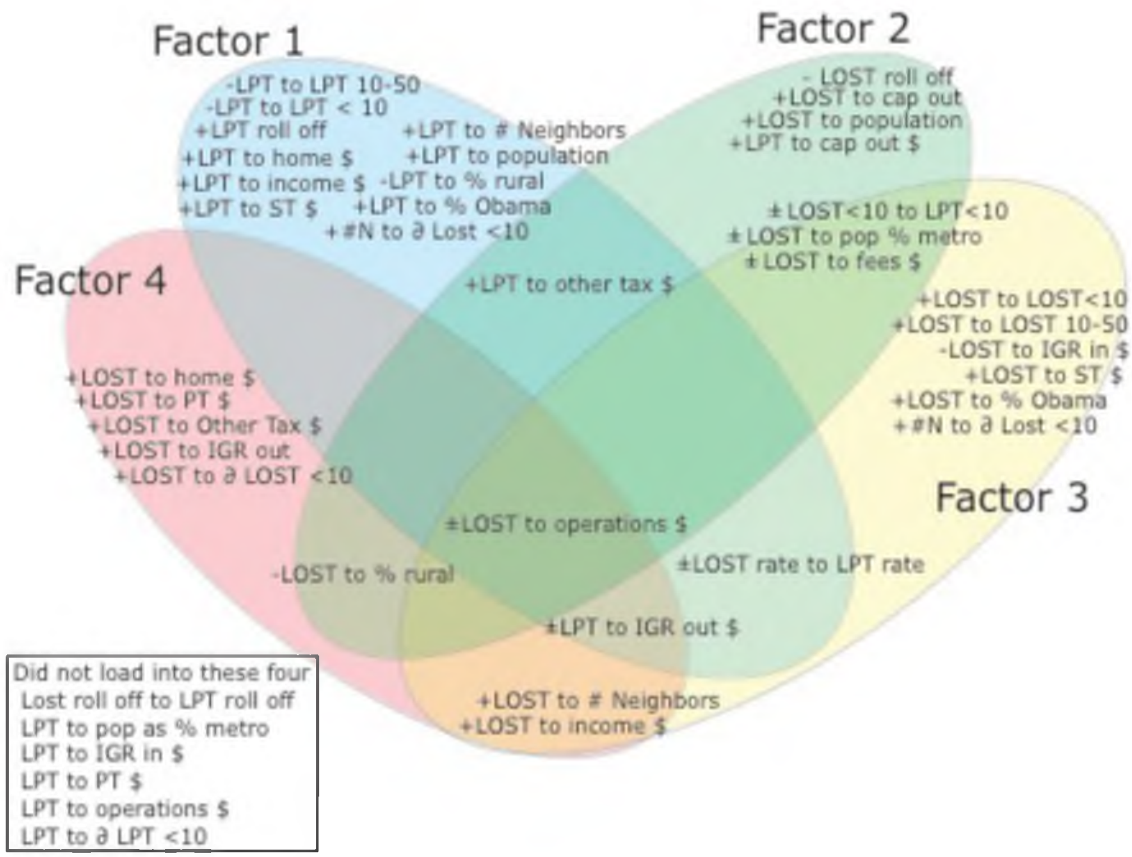
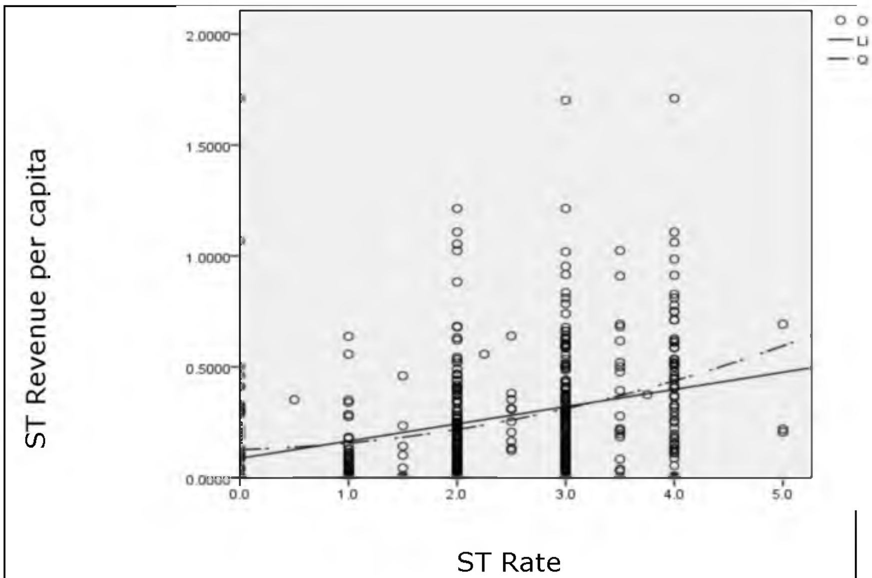


Figure 4.6: Venn diagram of the factor analysis results. This simplifies the factor analysis results in Table 4.15. Only factors that loaded with ≥ .33 were placed. Correlations that loaded into multiple factors are placed in overlapping regions. The +/-/± signs in front of the metric indicate whether the metric loaded positively, negatively, or mixed.

A Revenue Maximizing Test

This paper has vigorously investigated sales tax rates in an effort to inform and disentangle the roles of learning and competition as they influence policymaking, specifically rate setting. A related issue is whether cities are behaving in a revenue-maximizing manner. Recall from the methods section and Figure 3.7 that this is interesting as an end to itself but can also inform the learning-or-competition question. To this end, rates-to-revenues scatterplots were graphed, and given "best fit" regression curves for each of the study states. These results are compiled in Appendix D. Here, the Alabama results (Figure 4.7) serve as a "typical" example; Alabama's rate-to-revenue curve is positive and linear.



Linear fit r^2	.117

Figure 4.7: Alabama's rate-to-revenue scatterplot with "best fit" regression. A rate-to-revenue scatterplot for Alabama. The rates curve positively; higher rates correspond with higher revenues.

Recall from the methods section: if cities are setting their rates rationally with revenue-maximization being their sole consideration (e.g., no consideration of other factors such as voter preferences or state controls), a distribution of rate-to-revenue should look like an inverted "U" in Figure 3.7 as cities race to the Nash point. If the rate-to-revenue curve is roughly linear and negative, cities may be racing to the bottom. Finally, if the curve is roughly linear and positive, cities may be pushing up against a state-mandated maximum, which itself is probably below the Nash point. The results are summarized here in Table 4.16. This simple table shows that most states show significant positive rate-to-revenue curves, which undermines the assertion that cities are revenue maximers.

Table 4.16: Summary of the regression curves for the rate-revenue data

	Positive and linear	**Negative and linear**	**Inverted "U"**	**Insignificant data**
Number of states	18	0	0	4

As the example of Alabama demonstrates, and as Appendix D indicates, the rate-revenue distributions and corresponding regression curves are overwhelmingly positive and linear. Higher rates equate to more revenue almost without exception. Cities are not maximizing revenue. The rate-to-revenue findings have profound implications for the diffusion and learning-or-competition questions. There are also some compelling implications for city behavior here going well beyond the primary goals of this paper.

Other Points of Interest

Recall, finally, from the methods section that within the mountain of data considered in this study, one of the more potentially powerful variables pushing tax rates is the behavior of "leading cities." Does the size of a city (in proportion to its neighbors) tend to influence the rates of that city? These results, taken from the state data tables in Appendix A, are summarized in Table 4.17.

Large numbers, both positive and negative, indicate larger "anchor" cities tend to have higher or lower rates (respectively). Chicago, Illinois, contains a large percentage of the total population of the metro area (51%). Thus, South Dakota's city-population-as-percentage-of-metro area has a profound effect on those tax rates in South Dakota. The greater the percentage of population contained in one city, the higher the sales tax rates tend to be.

Clearly, anchor cities do matter. Eleven of the 22 states had significant ($r > .1$), positive results on their sales tax correlations. Eleven of 22 had significant, positive results on property tax. But the data tables in Appendix A demonstrate the anchor status matters only a little more than population alone in determining the sales tax rates of a city. Ten of 22 states' anchor-to-rate beat the population-to-rate, but six of the 22 came out with population beating population-as-percentage-of-metro, and six others were insignificant.

Table 4.17 A summary of the "leading city" data. This table summarizes the degree to which a city's relative size tends to influence the behavior of its tax rates.

	Coefficient of the rate to percentage-of-metro-population	
	Sales Tax	Property Tax
Alabama	.176	-.032
Alaska	-.063	.052
Arkansas	.301	.089
Arizona	.108	.030
California	-.317	.032
Colorado	-.198	.295
Idaho	.027	.246
Illinois	-.103	.074
Iowa	.074	.413
Kansas	.110	.277
Louisiana	-.129	-.251
Minnesota	.170	.181
Missouri	.258	.162
Nebraska	.359	.064
New Mexico	.024	.274
North Dakota	.351	.233
Oklahoma	.135	.007
South Dakota	.757	-.087
Tennessee	.037	.265
Texas	.030	.036
Utah	.232	.213
Washington	-.441	.308
Totals	11/22 positive correlation with r > .1	11/22 positive correlation with r > .1

Even though the anchor status tends to matter, it lags far behind the importance of the influence of neighbors (Figure 4.1) in its overall importance. In only four states did the anchor status prove to have a stronger correlation than the sales tax rates of cities' near-neighbors. And in only four (different) states did the anchor status of a city have more influence over property tax rates than did the average rates of near neighbors. These results do have some overall implications for the general goals of investigation for this paper, which will be revisited in the discussion.

Finally, does borders status matter? Recall from the discussion in the literature review, just as many states try to lower rates in order to capture cross-border shoppers, so do cities located in border towns presumably try to capture revenue from neighboring, high tax states. Similarly, cities in states with higher overall rates (California) might feel pressure to drive down their overall rates if they are near Oregon, which has no sales tax.

Again, returning to the state data tables, several states exhibit some evidence of this border city rate-setting behavior. However, evidence for influence is weak at best. The 22 study states collectively border 97 states. Thus, there are 194 (97 x 2 sales tax and property tax) potential cross-border influences at stake. But of these 194 possible correlations, only 35 were significant. Only 18 states' border towns' sales tax rates were significantly influenced and only 17 states' border towns' property tax rates were influenced. And, as a look at Appendix A will confirm, usually these correlations are weak even when significant. In other words, border town status does not seem to matter much. This is somewhat surprising considering the influence of neighboring cities within each state seems to matter a great deal.

Summary

As expected, the results indicate a powerful role for diffusion of municipal tax rates. Cities show very strong evidence of imitating others' tax rates. But the data indicate only a weak role for the competition mechanism driving this diffusion. Thus, learning must play a more critical role in the diffusion of tax rates. This conclusion is supported not only by the H1-H6 results, but also by the other tests as well.

CHAPTER 5

CONCLUSION

The results of this study offer a great deal of insight into the patterns of policy diffusion among local governments, strongly confirming the presence of diffusion. The results do not offer an unequivocal answer to the question of competition-or-learning, but do offer some answers to that question.

Diffusion, again

The most unequivocal conclusion this paper makes is hardly innovative: diffusion is a powerful mechanism driving policymaking. Diffusion can describe, explain, and even predict the spread of policy throughout a geographic region. The study has other significant findings, but the power of diffusion is abundantly clear. With little equivocation, this dissertation adds robustly to the mountain of evidence (Graham, Shipan, and Volden 2013) in support of diffusion as a mechanism for policy making.

Recall Figure 4.1, which graphs the ranking of the proposed variables affecting cities' rates. In ordinal rank, the power of neighbor's rates repeatedly comes out at or near the top of the list of these predictive variables. Tables 4.1 and C2 reinforce this conclusion. On average across all states and across all variables—for both sales taxes and property taxes—the best predictor of cities' rates is the rates of their near neighbors.

Some limited equivocation is necessary. The power of sales tax revenue to predict sales tax rates (.335) is, on average, nearly as robust as the power of near-neighbors' rates (.363) to predict sales tax rates. But several endogenous factors are implicated in the data as well. Property tax revenue also tracks well with property tax rates. Of all the internal models considered in Chapter 2, this implies the availability model; cities tax what they can. The behavioral model can also be inferred. Voters prefer a certain level of services and choose to meet such demand with sales taxes and property taxes. But support for the availability model is not without caveats. Property tax rates share a negative average correlation (-.095) with home values. High property values do not correlate with higher rates.

Additional support for the behavioral model is also indicated by the revenue correlations. Given that citizens pressure leaders to set rates to generate a desired level of revenue, a behavioral mechanism could also at least partly explain the relatively high correlations between home value and sales tax rates. Wealthy residents may be choosing to push higher rates to take pressure off their property taxes. More direct evidence comes from percentage voting for Obama correlation and sales tax rates. Although the evidence is not strong, Democratic-leaning cities were weakly linked to higher sales tax rates.

Finally, there are weaker (but not nonexistent) indicators of the obligations model (see Table C2). Municipal population, quite likely to be a strong indicator of the obligations mechanism, is not strongly correlated with either property or sales tax rates; a modest correlation is present in property taxes. The capital outlay numbers are fair at best, and the IGR out correlations are very weak. And last, there is a weak but positive correlation between sales taxes, property taxes, fees and other taxes in general, indicating some support for the obligations model. Cities need more revenue across the board and, as such, raise whatever revenue in whatever way they can. As with the other endogenous indicators, after such caveats are considered, the power of diffusion stands as the best predictor of cities' ratemaking behavior.

There are also some important differences in the ordinal rank of the average correlations in Tables 4.1 and C2. Variables with strong predictions for LOST rates are often nonexistent or even negative for LPT rates. Further implications of these results for the competition-or-learning mechanism are discussed below.

Bad and Missing Data

Before any serious discussion of the competition-or-learning question can be considered, weaknesses in the data set must be recognized and discussed. There are lurking variables not accounted for in this model. One important such variable is the number of retail outlets in a given city. A city with significant retail locations, such as shopping malls, big box stores, and auto dealerships per capita would be able to set lower tax rates lower and still raise significant revenue (see Figure 2.7). Yet, retail activity and its associated variables (e.g., geography and infrastructure) escape the measurement of this study. In a similar vein, cities with a higher percentage of vacation homes may also distort the simple model outlined in this dissertation. Vacation homes are often more expensive and taxed or assessed at a higher rate than primary-residence homes. In Utah the resort town of Park City (PT rate .00167) levies a nearly identical tax rate to nearby Francis (PT rate .00166). But the higher percentage of vacation homes and higher property values in Park City, Utah, create significantly more revenue per capita in Park City ($1,704) than in neighboring Francis ($156). Some of this variation is captured in the home value variable, but that variable does not fully account for those differences. Such unaccounted data weaken the overall certainty of the conclusions of this paper. The muddled results present in Figure 4.4 reflect some of these lurking variables, reducing the certainty of these findings.

However, if this lurking variable were so powerful as to invalidate the findings of the competition-or-learning test, it would show a stronger correlation between property tax and property values. As Table C2 indicates, property values have less than 0.1 predictive power over tax rates, seventh on the list of 18 variables. At worst, this lurking variable minimally undermines the findings of this paper.

Another possible lurking variable of note is the role of city tax abatements and other incentives municipalities offer to corporations affecting revenue (indirectly) rates. As in the BMW plant example, tax abatements are offered to commercial enterprises to lure retail centers and industry into a city (Bartik 1992). It is not uncommon for a city to grant several years of property tax abatements to a major corporation. In such a case, the overall sales tax revenues might increase while the property tax revenues for that specific factory would be negligible. Cities might be forced to make up a revenue shortfall by rates elsewhere, introducing revenue mechanisms unaccounted for by the tests conducted by this study. Another common tool used to lure firms is the promise of new infrastructure. These could be power, IT, or any number of transportation incentives. Such investments would certainly affect both the budget obligations of a city, but might also increase sales and/or property tax revenue. None of these incentives is measured in this study.

Another shortcoming is bad data. Without question, there are errors in the data set. To demonstrate, the City of Hanksville, Utah, reported no sales tax revenue for the study year (FY 2007) to the U.S. Census of Local Governments. This cannot be true, as Hanksville has several commercial businesses (gas stations and hotels, among others) and a 1% LOST rate. A likely cause for this “bad data” is that Hanksville’s clerks (a small town with very limited budget) may have rushed through the USCB survey and did not take the time to put line items on all budget numbers requested by the USCB. Larger cities will have larger accounting budgets and therefore more will more accurately complete the USCB survey. Such differences will distort the data.

These "bad data" problems elicit some concern. But there are more indications that the data is valid than vice versa. For instance, the operations budget of cities seems to be funded by sales taxes, while property tax funding towards capital outlay ranks higher than it does for sales tax rates. This fits the general trend (Bartle 2003). Many states, Utah and Oklahoma among them, have laws making property tax more useful when those revenues are spent on capital outlay projects. Thus, higher rates and more spending should rise and fall together. And they do. This congruence is one of many examples supporting the overall strength to the data set, lending additional validity for the strong H1. And it is likely that a more complete data set would generate even more robust support for at least H1 and (to a lesser extent) the other findings.

<u>The competition-learning question</u>

From the outset, this paper assumed diffusion was a powerful mechanism in policymaking. Its more ambitious goal was to differentiate between the diffusion-through-learning and diffusion-through-competition mechanisms, as several of the papers under close scrutiny had done (Recall the core learning-or-competition studies: Boehmke and Witmer 2004, Burge and Piper 2012; and de Costa Silva and Caravalho 2013; Shipan and Volden 2008). The evidence to answer this question is less satisfactory than the evidence for diffusion per se, but points to a stronger role for the learning mechanism than for the competition mechanism. The primary reason for this less-than-conclusive finding is the overall weak evidence for the existence and influence of the competition mechanism.

There is some evidence of competition, but consider the relatively weaker support for competition evidenced by H2, H3, H4, H5, and H6, and summarized in Tables 4.1, 4.2, 4.3, 4.5, 4.6, and 4.7, as well as Figure 4.1. Each of the results of the tests of these hypotheses are examined in more detail below, especially as those results pertain to the larger question of differentiating competition from learning.

H2 and the Learning-Competition Question

H2 tested the difference between the level of influence of the rates of neighbors' sales and property taxes in determining corresponding rates. Do neighbors' sales tax rates have more influence on sales tax rates, or do neighbors' property tax rates have more influence on property tax rates? This assumes the literature is correct (see the core studies) and that either learning—in its many forms—or competition is driving diffusion.

But these same core studies offer weak tests to disentangle the two mechanisms. The core tests offered by Brueckner and Saavedra (2003), like the others under close scrutiny, cannot distinguish between learning and competition, even if their tests do imply some role for both. Of all the tests offered in the previous literature, H2 test is the single best tool for disentangling competition from learning. Recall the discussion of golf courses and BMW plants. Ceteris paribus, cities are more likely to compete over the limited BMW plants than over (relatively) unlimited golf courses. Similarly, they are more likely to compete over limited sales tax dollars than over (relatively) unlimited property tax dollars. This test implicated the competition mechanism was at work for many, but not most of the states in the study. If competition were the more powerful mechanism, more than eight of 22 states should have satisfied the H2 test.

The simple explanation for this finding is that learning is a more influential instrument for diffusion than competition. This conclusion is sound, if oversimplified. Given the results of H1, and the overwhelming evidence in the literature, it is clear that cities copy their neighbors. However, these same cities do not exhibit the signs of competition expected in H2, at least not strongly. Assuming that the two possible mechanisms driving diffusion are either learning or competition, and given that the evidence for competition is weak, the only explanation remaining is that learning is driving the preponderance of diffusion. Hoover City copies Birmingham not because it wants to poach revenue from Birmingham but because it is learning from Birmingham. As covered in Chapter 2, this could include the simple belief that if Birmingham is successfully setting its rates at a certain point, Hoover should duplicate Birmingham's rate. Hoover sees tax rates as a positive-sum "golf course" game rather than a zero-sum "BMW plant" game.

But the learning mechanism is more complex than is indicated by this simple example. First, it is necessary to reconsider that individual learning drives municipal learning. Leaders, residents, and firms compare their own city's policies to those of neighboring cities (e.g., Bordignon, Cerniglia, and Revelli 2003). If those leaders, residents, and firms believe that a neighboring city has a more desirable policy, those groups and individuals are likely to push their city to emulate the neighbor's policy. This is still "learning" in the sense that cities are adopting policies to copy success more than they are to undercut the performance of a competitor. It is not (as much) a behavioral mechanism because the behavioral model (mostly) treats policy preferences as endogenous.

Second, the learning mechanism is complex because the costs and benefits of policies are convoluted and ambiguous. Recall that scholars give two reasons why jurisdictions copy each other: intentional and blind (Shipan and Volden 2008). In an intentional learning scenario, Chula Vista would carefully study the success of Encinitas' golf courses and build one or more for itself. But the leaders, residents and firms of Chula Vista might not have the time or resources to investigate the specific costs and benefits of all policies. These residents and leaders will collectively, blindly emulate their wealthier, higher-status neighbors as a decision-making shortcut. Under these conditions, Chula Vista is likely to blindly copy any/all of Encinitas' policies, including golf courses. Such blind copying is not the only explanation of the H2 results, but it is a likely explanation. The review of H4 (below) further implicates blind copying.

The core studies considered in this paper, particularly Shipan and Volden (2008) and Burge and Piper (2012), predict complex endogenous-exogenous interaction, even going so far as to predict both learning and competition as active exogenous mechanisms. But this study is more decisive. The preponderance of evidence from H2 suggests that cities are playing a mostly positive-sum game with wealth, and by implication, status. But some elements of zero-sum behavior seem to be creeping into their decisions as well, indicating some degree of competition driving diffusion. And even though much of the copying appears to be blind, there is also some evidence of intentional copying.

Is it possible to reconcile these findings? One way to resolve these ambiguous results is through consideration of a wider application of the implications of these learning-or-competition findings. Existing literature indicates sales taxes are more mobile than property taxes, but that same literature also indicates residents and firms do factor such things as economic growth and perceived quality of life into their decisions to live/locate in a particular city (Dowding, John and Biggs 1994; Tiebout 1956). This accounts for the (surprising) finding that cities copy their neighbors' property tax rates more readily than they copy their neighbors' sales tax rates. Considering the wider, long-term arena in which cities compete, city leaders, firms, and residents might actually be more inclined to copy neighbors' property tax rates because those property tax rates are perceived to have a larger, long-term impact on quality of life, home values, and economic growth (Baldwin, Forslid, and Martin 2005).[28]

[28] This "long-run competition" is discussed in more than a dozen studies cited by this paper but several studies in which it figures more prominently are Tiebout (1956), Kenyon an Kincaid (1991), Baskaran and Lopes da Fonseca (2013), Bordignon, Cerniglia and Revelli (2004), DeHood, Lowrey and

There are elements of both competition and learning in this long-term alternative to the revenue-maximizing premise of this investigation, as a review of the core studies would predict. In the long run, a rational mix of rates and services will grow the city's economy and status, winning the competition with its neighbors as well as improving the intrinsic qualities of the community as it seeks to better itself in a positive-sum game. And since quality is difficult to measure, much of the diffusion takes the form of blind copying (Shipan and Volden 2008; Volden, Ting, and Carpenter 2008). In other words, Chula Vista copies Encinitas because it wants to be like Encinitas more than it wants to take revenue from Encinitas. But it is at least partly motivated by a desire to win the long-term race for revenue and prestige as well.

H3

H3 tested the roll off differences in tax rate correlations. Was the sales tax correlation difference between near-neighbor influence and distant neighbor influence greater than that of property tax? Recall that cities in a zero-sum game are more likely to watch their nearer neighbors than they are to watch their distant neighbors (Asplund, Friberg, and Wilander 2007; Brueckner and Saavedra 2001). H3 assumes that more competition among sales taxes will result in a faster decline of the geographic influence of neighbors' behavior than for property taxes. In the BMW example, as geographic distance increases, the influence of neighbors' behavior falls off faster than it does for golf courses. Sales taxes are even more sensitive to near-neighbor-close-clustering/distant-neighbor-weak-clustering phenomenon than the BMW scenario. Assuming property taxes are less competitive than sales taxes, Vestavia's sales taxes will be strongly influenced by its near neighbors but only

---

Lyons (2009), Inman (1989), and Wallis (2000). Book-length, comprehensive account can be found in Baldwin, Forslid and Martin (2005) and Kenyon and Kincaid (1991).

weakly influenced by its more distant neighbors. With respect to sales taxes, Vestavia directly competes with cities in the Birmingham metro area than it does with cities in Tuscaloosa (30 miles away). Shoppers might travel a few miles to save a few dollars but will not travel a longer distance (e.g., to Tuscaloosa) to save a few dollars.

Cities in a positive-sum game would, in contrast, be less likely to watch their near neighbors significantly more than they watch their distant neighbors. In such a positive-sum game, Vestavia would copy and learn from its neighbors not because it is worried about its neighbors poaching revenue from it, but because it wants to be successful, like Hoover. A difference in the degree to which cities watch their near and distant neighbors indicates competition or learning.

A stronger sales tax roll off (H3) indicates the competition mechanism at work. While the results of this test suggest a slightly stronger role for competition than that found in H2, the results are still nowhere near as convincing as the support for diffusion per se. As Table 4.4 indicates, slightly less than half the states had significantly higher sales tax roll offs than property tax roll offs. Twelve of the 22 study states had either higher property tax roll offs or the differences between the two roll offs were insignificant.

Duplicating the conclusion surrounding H2, the most straightforward explanation is competition does not play a large role in the setting of tax rates. If cities really were looking to compete over tax dollars, many more than 10 of the 22 study states would show a higher roll off difference for sales tax than for property tax.

H4

The H4 test measured the degree to which the rate distributions were skewed. Like all the differentiating tests, the H4 test was also based on the premise sales taxes are more competitive than property taxes. This should have produced a positively skewed rate distribution curve as cities raced to the Nash equilibrium (Figure 3.6).[29] The sales tax rate distributions should have been more positively skewed than the property tax rate distributions.

According to these expectations, H4 produced disappointing results for the competition mechanism. As a review of Appendix C, Figure 4.2, Figure 4.3, and Table 4.5 will demonstrate, only a third of the states met the full conditions to pass this test, even at the very low threshold needed for a state to score a competitive rating in the H4 skew test. The tax rate distributions are positively skewed, but property tax rate distributions are much more positively skewed. This could potentially indicate that cities are racing to the bottom on property taxes faster than they are racing to the bottom on sales taxes. But they are not racing to the bottom, since the rate-to-revenue test indicates cities are setting rates well below the Nash equilibrium (Figure 3.6). The most likely explanation is that cities are cautiously pushing up towards the Nash equilibrium, more so on sales tax rates than on property tax rates.

Therefore, as with the H2 and H3 tests, the most likely explanation is that learning is playing a stronger role in the setting of rates. Cities are simply copying each other's rates because they believe those rates are successful. A closer inspection of the data surrounding H4 also adds nuance to the overall picture of what kind of learning may be occurring. These surprising and compelling findings will also be revisited in the rate-to-revenue discussion below.

Despite this test's overall weak support for the competition mechanism, the

---

[29] As discussed in the methods section, an unskewed sales tax rate distribution curve would have indicated that cities were hovering around the Nash equilibrium as they test different rates, or it could have meant cities were simply choosing tax rates more likely to fit their preferred balance of taxes and services. Finally, a negatively skewed test would have implied states had set rate ceilings well below the Nash equilibrium, and cities were experimenting with setting rates higher and higher as they pushed up against the state-mandated maximum.

data fall far short of a robust rejection. Nearly half of the states did show a positive skew for the sales tax rates, which could indicate downward pressure on rates. Coupled with the overall picture emerging from this data so far, the results of the H4 test add additional weak support for the influence of competition, at least for competition in a standard zero-sum game.

H5

To review, H5 and H6 examine the effect of more neighbors on rate-setting behavior (Dixit and Skeath 1999; Ostrom 1998). More neighbors depress sales tax rates more than they depress property tax rates.

If the premises and conclusions of these hypotheses are correct, the H5 results offer significant evidence to reject the competition mechanism. As with the skewed distribution data (Table 4.5), the results in Table 4.6 run mostly contrary to the expected results indicated by a strong competition mechanism. Nine of the thirteen states showing a significant correlation between LOST rates and the number of neighbors exhibited a positive correlation; the average effect of number of neighbors on sales tax was slightly positive (.11). More neighbors put upward pressure on sales taxes, although not for every state.

In contrast, the average correlation between property tax rates and number of neighbors is essentially zero (Table 4.6). As such, the results discount the role of competition just as the rate skew tests did. Very few states exhibit clear evidence for a more powerful role for the influence of sales tax rates over those of property taxes. Given that diffusion is powerful, the fact that having more neighbors does not significantly depress sales taxes more aggressively than it depresses property taxes indicates indirect support for the learning mechanism. Cities seem to be copying each other in what they perceive to be a positive-sum, not zero-sum, game.

In addition to the weakness of this test and of the data in general, the H5 results also provide some support for the endogenous factors proposed in the literature review: availability, obligations, and behavioral models. Many cities in a metro area correlate with larger populations (see Table C2) and more infrastructure, creating a need for more revenue (the obligations model). With more cities in an area, more cross-border shopping would occur. Imagine a resident of Hoover is deciding where to shop. If sales tax rates were only slightly higher in Vestavia than in Hoover, information and transaction costs for this consumer could cancel out the slightly higher taxes Vestavia could levy. Shoppers would not hesitate to trade convenience for slightly higher taxes. Finally, residents may demand higher rates to meet their demand for more services (the behavioral model), which again tend to correlate with higher populations.

H6

Hypothesis six was the final either-or test. This test measured the deviations in the rates compared to the number of cities in an area, again assuming more competition comes with more players. The result will be less deviation with those additional players, akin to the methods used by Bruecknet and Saavedra (2001), among others. This was the only test that did not use the LOST and LPT rates as the dependent variable, but instead used the deviation of those rates across a metropolitan area as the DV. As in the H5 test, the independent variable is the number of jurisdictions in an area. Assuming sales taxes are more responsive to competitive pressure, there should have been less deviation among sales tax rates than among property tax rates.

This test yielded somewhat stronger, but certainly not unequivocal, support for the competition mechanism (see Table 4.7). Nine of the 12 states with statistically significant results showed lower LOST rate deviations. More neighbors push sales taxes to converge more readily than they push property taxes to converge. But assuming the premises behind H6 are valid, and considering the size of the data set, more than twelve states should have produced statistically significant results. This finding alone weakens the H6 test's implied strength for the competition mechanism.

In addition, the H6 test generated one of the most surprising results in the entire data collection, and analysis can be found in the data. Recall the first part of H6 expects to find less deviation with more neighbors. The H6 test fails this part of the test miserably. Eleven of 12 statistically states showed *more* LOST rate deviation with more neighbors, and 10 of 11 states showed the same for property taxes. As discussed in the methods section competition, competition pressure should put convergence pressure on rates in areas with more jurisdictions.

The evidence for diffusion in general is robust, bordering on unequivocal. Therefore, the weak evidence of more players causing more conformity leads to the rejection of the competition as a strong mechanism for explaining the diffusion. Indeed, the fact that having more players diversifies rates leads once again to conclude the learning mechanism is primarily driving the diffusion. However, this conclusion is far from the final picture. The H6 results also support the "wider competition" implications as discussed above and below.

In addition to the standard equivocations offered earlier in this section, there is at least one other major caveat to add to this subsection. As noted in the literature section, unlike the core premise—sales taxes are more competitive than property taxes—there is still considerable debate within the academic community about the effect of more players in a gaming situation. If the existing weight of the research is incorrect in assuming more competition drives behavior together, then this test and its results are meaningless. But the results of the H6 test mostly match the findings of the other tests, this internal consistency increases the validity of the central finding of this paper.

A more complex picture

The tax rate data strongly support policy diffusion. Do the data support a role for the learning mechanism? Yes, but a stronger role for learning than for competition is less convincing. All five competition-or-learning tests revealed at least indirect support for learning as the more influential factor driving tax rates. Probing this data a little more deeply offers a more complex picture of what might be happening in the municipal tax rate landscape. The most likely explanation is that cities are blindly copying in the short term, but are also intentionally copying and blindly competing in the long term.

Irrational Rates?

Chula Vista, Encinitas, Huntsville, and Jackson have all been depicted as rational gamers. As discussed in the literature review, the question of governments-as-rational actors continues to be a contentious one among political scientists. Few scholars argue that institutions are purely irrational or rational (Dickson 2014). Thus, the highly rational BMW scenario is more than a little unrealistic. The data in this study demonstrate convincing evidence of that fact. Cities apparently copy each other's rates, but those tax rates are set without strategic considerations and without much regard to the actual revenue they generate. Rigorous, conscious calculation of costs and benefits, as well as predicting other players' behavior, is too time consuming to do well. Cities spend minimal time consciously evaluating the success of their practices.

Two data sets most efficaciously demonstrate this conclusion. First, the results of the H4 test show rates are distributed largely in positive skews. This implies a "race to the bottom." The downward pressure on rates exhibited by the rate distribution data imply competition is driving rates down. As discussed at length in Chapters 2 and 3, if cities were simply conforming for the sake of conformity, the learning mechanism would generate a normal distribution of rates *unless* there was an unequivocal "best practice."[30] Such a practice should generate a negatively skewed curve (the sigmoid distribution from Chapter 2). But neither property nor sales tax rates are distributed normally.

There is one more possibility that would describe this skewed rate distribution: if cities were cooperating at the Pareto equilibrium (see Figures 4.2 and 4.3), the rates might be skewed in the manner revealed by the H4 tests. But cities are not cooperating when they set their rates; if they were, cities that set a rate lower than the regional Pareto point would see more revenue as they undercut the cooperators. But they do not. Cities are therefore not clustering around the Pareto equilibrium (See Figures 4.2 and 4.3, and Appendix D). The simple (but incorrect) conclusion is that cities are racing to the bottom. But the rate-to-revenue regression tests reject that conclusion. According to neoclassical economics, the statewide rate-to-revenue distribution curve should look like an inverted "U", as in Figure 2.8. Ceteris paribus, cities with rates above or below the Nash equilibrium should see less revenue than cities at the equilibrium. However, a vast majority of states (see Table 4.16) exhibited a positive, statistically significant linear slope, as illustrated in Figure 3.7(a). This implies most cities in most states are setting sales tax rates below—often far below—the Nash equilibrium. In contrast, if cities were acting only to maximize revenue, then states would exhibit inverted "U" curves in Appendix D.

The conclusion is that cities are setting rates below the Nash point. Figures 5.1 and 5.2 describe this phenomenon. From the rate-to-revenue data (Appendix D), Figure 5.1 shows that as rates climb so do revenues. Figure 5.3 shows the rate distribution curve as compiled from the rate distribution data (Appendix B).

---

[30] There is at least one more way to interpret these results: the "best practice" is at the lower end of the distribution, resulting in the positive skewing apparent in the data. But if this is true, the practice cannot be "best" in the sense it produces the most sales tax revenue. It might be best in other ways, however; see the following text for a discussion.

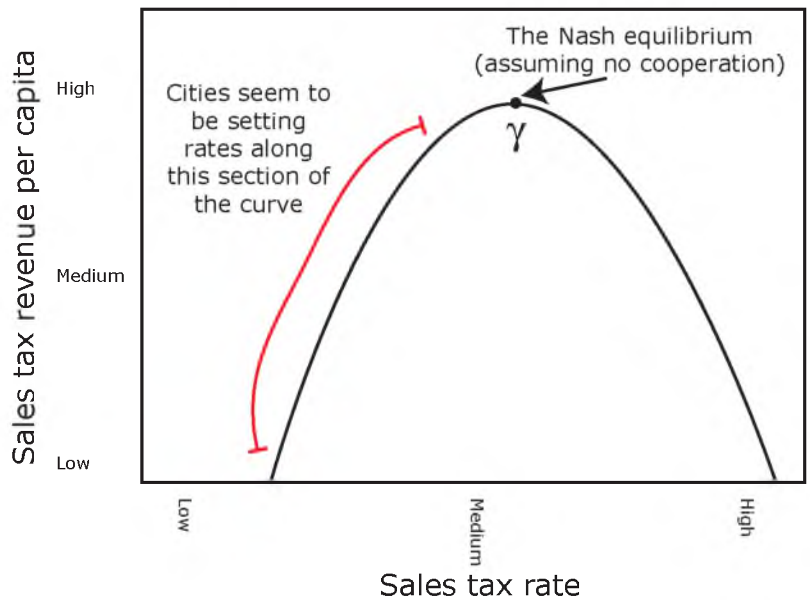


Figure 5.1: A graphic representation of the collective rate-to-revenue landscape. If cities were acting rationally and strategically, but without cooperation, the rate-to-revenue distributions would look like this (black) curve. But instead, cities appear to be setting rates on the left side of the curve (indicated in red).

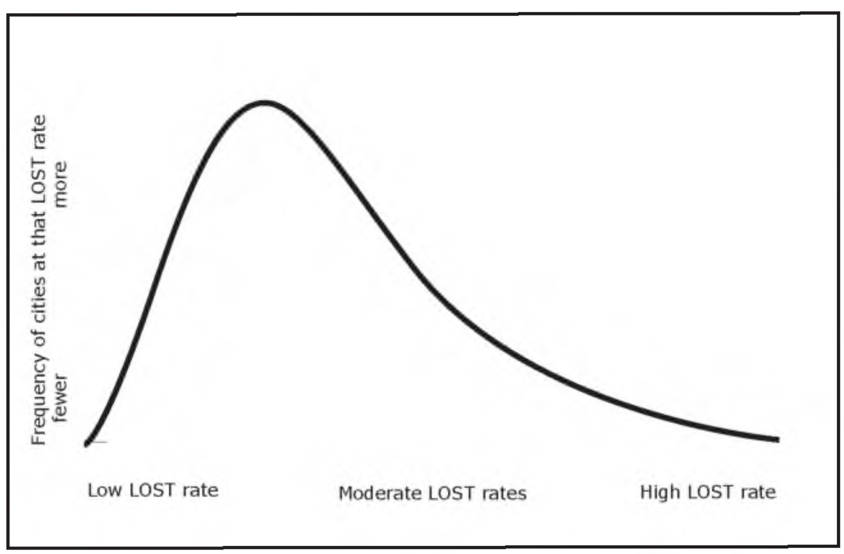


Figure 5.2: Aggregate LOST rate distribution curve. This figure compiles the rate distribution data in Appendix B. Recall from Chapter 3, sales tax rates are only weakly positively skewed in 12 of the 17 states. This figure exaggerates the degree of the skew.

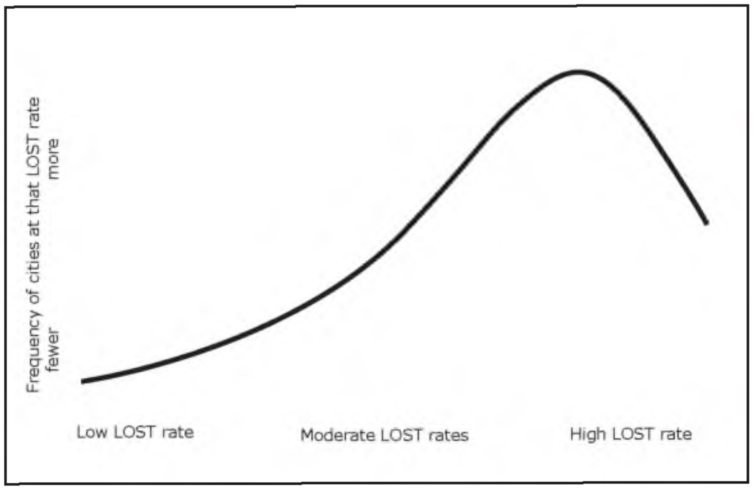


Figure 5.3: A "race to the top" sales tax rate distribution. This is a fictional "rational" rate-setting scenario in which cities are solely interested in maximizing revenue but bump up against legal maximums set by the state.

This paradox is enigmatic. Given the claim that at least part—maybe a significant part—of cities' rate-setting decisions are motivated by a zero-sum desire to poach revenue from their neighbors, cities should consistently push their rates right up to their states' statutory maximums. In doing so, cities would not lose any revenue. But if this were true, the rate distribution curves (Appendix B) would look more like Figure 5.3. But they do not. The implications are that cities are either completely irrational or cities are interested only partly in short-term revenue gains.

The rate distribution data (Figure 5.2) indicates cities are racing to the bottom, but it's a false bottom. In a typical case from the Birmingham metro area, Bessemer (3% LOST, $223 per capita sales tax revenue) does not appear to be poaching, or even trying to poach the revenue of Birmingham (4% LOST, $478 per capita sales tax revenue).[31] City leaders do seem to be competing, but only partly for revenue. A simple explanation is these leaders are not aware of the actual consequences of their rates. Bessemer, Alabama officials have not taken the time to

[31] Hoover, in contrast, does satisfy the "inverted U" condition. It has a LOST rate of 3%, and a per capita sales tax revenue of $835. But mostly the cities in Alabama (and in the Birmingham metro area) obey the positive, linear slope as illustrated in Appendix D.

figure out they are losing money by setting sales tax rates below the area average. Superficially, such city leaders appear as ignorant as students who spend no time reflecting on their study habits and as a consequence waste their effort on fruitless practices. But that is not the case. City leaders are not ignorant. Instead, city leaders do not see sales tax revenue as a simple zero-sum game.[32]

The Wider Competition

The literature review and methods chapters of this dissertation superficially covered the concept of the wider competition. The zero-sum competition model that has been the primary focus of the competition mechanism in this paper focused on retailers (e.g., large shopping malls) who—ceteris paribus—avoid locating in the city with the highest sales tax rates in the metro region, since such relatively high sales taxes will—ceteris paribus—depress sales, however slightly (Figure 2.7). Residents—ceteris paribus—choose to live in cities with lower sales tax rates. However, there are too many "all other things," both short-term and long-term, for small rate differences to have a real impact on sales and the recruitment of firms. This "wider competition" is represented in Figure 5.4. Even if there are a few firms or residents who choose to avoid moving into Vestavia because Vestavia has slightly higher rates than the surrounding region, higher rates do not actually reduce revenue since more retailers and residents will weigh the other factors (including real estate prices, infrastructure, and schools) more heavily in their choice of location (Dowding, John, and Biggs 1994).

But since tax rates do not seem to have a great impact on cities' economic health, why is there any race to the bottom at all? Why do cities refrain from pushing their rates up to the revenue-maximizing, state-limited ceilings?

---

[32] Recall Volden, Ting and Carpenter's "exogenous versus endogenous learning". My results imply cities are *not* learning from their own trial-and-error

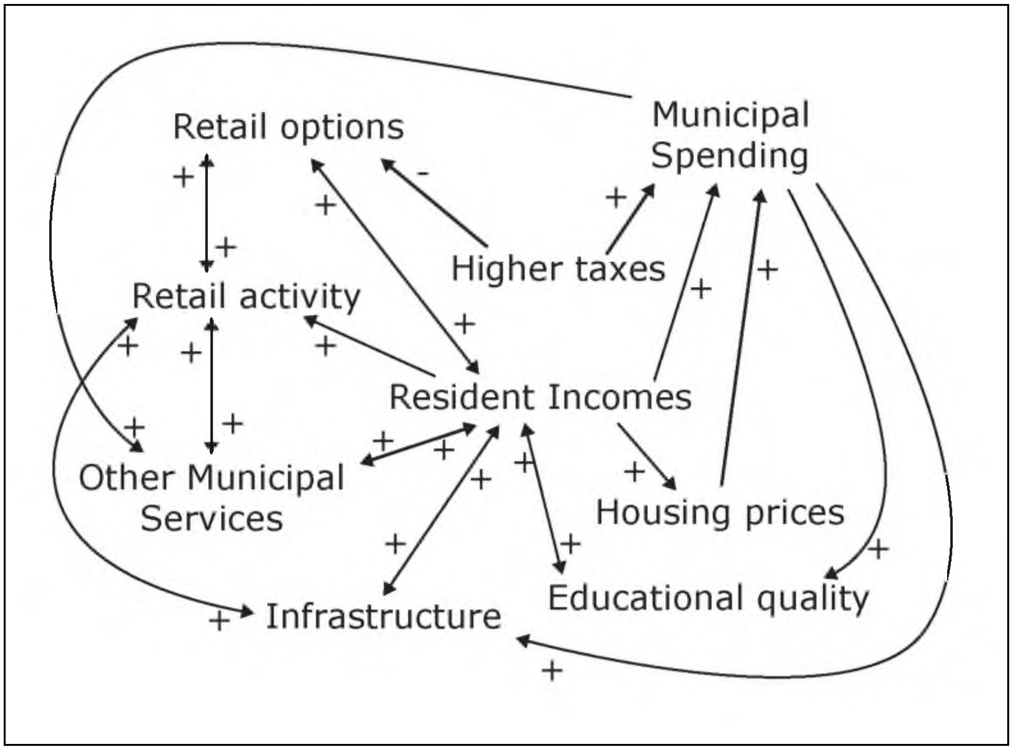


Figure 5.4: The wider competition model. This is a more realistic representation of the factors in play as cities learn and compete with and against each other for wealth and status than the simple one given in 2.7.

Assuming cities are indeed competing, they are doing so more indirectly and more subtly than the direct competition model predicts. Instead of the straightforward, hyperrational contest game theory predicts, cities seem to be in a real, mostly positive-sum race for long-term economic prosperity, cultural prestige, and quality of life I discussed in Chapter 2. Cities benefit from their neighbors' health as much as (or more than) they might benefit from short-term poaching of revenue or firms. Birmingham recruits industry, attracts high-value residential/retail development, invests in the arts, nurtures its schools and builds infrastructure. Vestavia and Hoover benefit from those policies; they want to see Birmingham succeed with these efforts.

But, since the data indicate a compelling (but not commanding) role for the competition mechanism, there must be some elements of a zero-sum game in play as well. A hybrid model of (mostly) learning and (some) competition is the most likely explanation for the data. The NFL expansion in Chapter 2 is such an example of such a mixed learning/competition scenario.

Resident behavior plays a significant role in this wider competition. Residents and firms track city policy decisions and judge their own city's performance based on the perceived performance of neighbors. The residents and firms of Vestavia are happy to see Birmingham succeed, but they want Vestavia to be more successful. Residents and firms of Vestavia punish their city when Vestavia chooses policies that weaken its position in the long race for wealth, quality of life, and prestige. If Vestavia sets tax rates above the local average, residents and firms are likely to judge their city to be losing ground in the race. Residents might move out or vote against city leaders, albeit at the margins of perceived success and failure. And those margins are set by the conditions in neighboring cities. Firms might choose to move into Hoover rather than Vestavia if Hoover seems to be winning the long-term race. They will be likelier to move if Hoover seems to be doing much better than its neighbors, and less likely to move if all cities in the greater metro area are performing equally. The data support the conclusion that leaders are more worried about voter perceptions than about revenue.

If such a political cost could be considered on a graph, a distribution more closely resembling Figure 5.1 might emerge. And if such a political cost can be applied to cities' choices, there may be some cooperation after all. The rate distributions and the rate-to-revenue curves support this concept. Cities also cluster around regional averages and seem to wait for others (most likely the anchor city) in the region to raise rates so they can follow. And they do follow; more on this momentarily. Such city behavior supports "indirect" cooperation at work.

Why Copy Neighbors?

Cities copy neighbors without a clear expectation of short-term gains or losses. This claim warrants a more vigorous discussion of the motives behind this conformity. The data from this study indicate that cities do not appear to be learning so much as they are simply imitating. If they were learning, they would adopt more rational[33] tax rates. They would adopt nonconforming policies if such policies had predictable benefits that outweighed costs. For example, temporary voter disgust over modest tax hikes would likely be outweighed by the corresponding, long-term benefits produced by more revenue. This should result in pushing all cities in a metro area up to the statutory maximum, as long as the maximum is below the Nash equilibrium. But cities do not appear to be making these rational choices. If cities are only competing over the long term, the logical question of "why bother to copy at all?" emerges as central to the goal of understanding this bigger, quasi-rational, mostly learning model. Rationally, cities should compete with whatever strategies are available, not just those in the immediate geographic vicinity.

Individuals use shortcuts to decide best practices. Tom is successful. It would take too long for Mike to figure out everything he needs to do to be successful, so as a shortcut he copies Tom. Sometimes those behaviors are actually beneficial (saving aggressively in an IRA) and sometimes they are less so (whitening teeth). Regardless, the result is more conformity. Whether it really is the best use of his money, Mike saves more in his IRA than in his daughter's college savings plan because that is what his friends do. Mike accepts a salary of $50,000 because Tom earns about that much and works about the same amount. Mike uses shortcuts to evaluate his success based on how he is doing compared to Tom, not compared to

---

[33] The degree to which copying can be considered irrational is debatable. Given Huntsville's long-term interests, is it really so silly for it to copy Chattanooga? Even blind mimickry might be better than no copying at all. At the least, copying allows Huntsville city leaders to explain to their residents that they tried to "match" Chatanooga's offer.

how he is doing in an absolute sense.

Cities, and the residents and firms that compose them, use similar shortcuts. What is acceptable in a given city is largely determined on what other nearby cities do (Berry and Berry 1994; Bordignon, Cerniglia, and Revelli 2003). Returning to the BMW example, the information cost for cities might be too high for them to make rationally informed, strategic moves. Huntsville wants to win the bid for the plant, but it cannot spend so much that the costs of recruiting BMW outweigh the benefits. And Huntsville has neither the time, nor the intelligence, nor the will to conduct rigorous trial-and-error research to find which combination will best recruit BMW to its city. Making matters even more complex, Huntsville can only speculate what its near-neighbors might do to recruit BMW; planning all the best responses to such moves asks too much of Huntsville city leaders. For instance, Huntsville should weigh the intangible costs of an "arms race" with Chattanooga. Even though it might win the short-term victory of recruiting BMW, it might cost more in the long run. But the ramifications of such moves are too difficult to completely calculate. In short, only superficial estimations can be expected.

Tax rates are some of the easiest metrics for residents and firms to make comparisons (Besley and Case 1995; Burge and Rogers 2011). For example, the Anniston, Alabama metro area has a considerably higher average tax rate (4%) than the Birmingham area (2.656%). In the Birmingham area, Maytown (no LOST in 2007) city leaders would face voter disapproval if they raised Maytown's sales tax rates well above the Birmingham metro average, even if such a rate was still well below Anniston's rate, and even if a rate increase in Maytown to 4% brought it significant sales tax revenue. Cities compete and succeed within the context of what is acceptable, and the highly visible sales tax rate stands as a proxy for overall performance, just as Mike makes career decisions based on a quick survey of salaries that his friends make—even though salary is only one part of job satisfaction. This is the "learning" mechanism at work; whether such behavior is rational is another question.

Cities' decision-making is hampered by a similar lack of information, a reluctance to take risky experiments and a general unwillingness to act strategically to undercut each other. Vestavia might easily pay for a study showing a short-term change in revenue from a change in property tax, but the long-term effects are less clear.[34] Vestavia also will not experiment with tax rates outside the regional norm because the cost (e.g., voter disgust, more difficulty in recruiting retailers) will not necessarily be worth the increase in revenue. Finally, Vestavia will be reluctant to recklessly undercut its neighbors because it needs them for future intermunicipal, cooperative efforts. In the face of all this uncertainty, cities set "safe" rates mirroring their neighbors, nearly (but not completely) ignoring the actual revenue outcomes pursuant to those rates. The factor analysis results reinforce this conclusion. The tax landscape is too complex to facilitate rational decisions. As a shortcut, cities—and their residents and firms—copy neighbors in this landscape. This will be revisited in the "advice to city managers" section below.

Vertical Controls and the Wider Competition

Vertical controls matter (Allers and Elhorst 2005; Bednar, Eskridge, and Weingast 2001; McKinnon and Nechyba 1997). Cities have limited options (e.g., rate ceilings, required referenda) shaping the kind and level of taxes cities can levy. But given its goals, this study is more concerned with the overall effect of these rules on the learning-or-competition question. Recall from the literature review and methods chapters of this paper that scholarly consensus on this issue is lacking. Therefore, no firm predictions were offered as to what the results would reveal.

---

[34] Irrational, too long term, too much information: consider the data in Appendix C (Table C2) showing *higher* sales tax rates correlating with both higher income and property value. But higher property taxes correlate with weaker overall prosperity.

Recall further from the vertical controls results that rate-setting behavior does seem to depend significantly on the rules states impose on cities' ratemaking discretion. However, vertical controls seem to have only a limited effect on the competition/learning question as compared to the effect on diffusion in general.

An examination of Figures 4.4 and 4.5 indicates that vertical controls do matter, at least in aggregate. But those same figures are enigmatic. First, a synthesis of Figures 4.5 and 4.5 and Table 4.11 indicates vertical control over sales tax rates has a fair-to-good correlation with the diffusion of those tax rates. States typically clustered in the "strong evidence of diffusion" in Figure 4.1 also tend to cluster in Figure 4.4a. Figure 4.4a also shows that increasing state restrictions over municipal sales tax ratemaking increases the degree of conformity of those rates. In contrast, Figure 4.4b shows that more state control over property taxes decreases the conformity of those rates. But since the statistical significance of the property tax numbers are so weak, there is little reason to put much effort into unraveling this paradox. The more important, troubling paradox is the discrepancy between Figures 4.4 and 4.5 (especially 4.5b).

But first, a description and possible explanation for the more-rules-creates-more-clustering phenomenon is possible. To reconsider the effect of vertical control and its effect on diffusion in general and on tax competition specifically, assume the causal direction is from control to conformity.[35] If cities are more constrained in their behavior, their choices are more limited. With fewer choices, cities might be even more likely to copy their neighbors. Alabama cities have less statutory discretion in setting their sales tax rates than do cities in Texas. In the face of less discretion, the Alabama cities are more likely to be influenced by one another since they have less overall discretion. Alabama cities look to their neighbors because their choices are

---

[35] This assumption itself may be invalid. Recall the footnote in the discussion of Figure 4.4. I will return to this momentarily.

so limited they do not feel like they have the freedom to make the wrong choice. Sales tax controls push sales tax rates together. The effect of property tax control on property tax conformity is too uncertain to draw strong conclusions, but it seems safe to say that sales tax controls force sales tax rates together more forcefully than property tax controls force property tax rates together. The lack of a powerful effect of vertical controls on property tax clustering may be due in part to the considerable number of lurking variables as discussed above in the equivocations subsection of this chapter.

In part because the results are more significant, a more troublesome paradox is the one between the numbers in Figures 4.5 and 4.5. These findings run contrary to the tangential studies cited in the literature review; more control should reduce competition.

There are two possible explanations to this enigma. First, it is possible that the control-competition correlation is actually a reverse correlation. Cities may be pressuring state governments to contain their tax rates to prevent a race to the bottom. If this were the case, restrictions on tax rate discretion create an effective rate floor, ending the race to the bottom at the rate floor. This might explain why vertical controls correlate with more rate conformity, but does not explain the results of the Figure 4.5 test.

The second, more probable answer to the Figure 4.5 problem is measurement. Figure 4.5 indicates that control increases competition. But this apparent paradox has to do with the way competition is measured in this study. The H2-H6 premises all hinge at least in part on the assumption that if sales tax rates cluster more strongly than property tax rates, competition is indicated. Recall that higher competition scores will therefore correlate with states showing more sales tax rate conformity. In short, much of the strength of the correlations in Figures 4.4 and 4.5 is duplicative. The H2-H6 tests all have some of the sales tax rate conformity built into them; therefore the net effect of the vertical controls on the competition composite additively amplifies this effect. The duplicative nature of the vertical controls tests is therefore significantly compromised. The strength of the effect of vertical controls on competition is less powerful than the numbers in Figure 4.5 indicate. Tables 4.12 and 4.13 are less duplicative, and show a less significant impact of such controls on rate competition. And in these tables, only a handful of the individual controls had any statistically significant impact on any of the competition measurements.

A closer look at these elucidates some possible patterns of causality. For instance, Table 4.13 shows one of the most powerful correlations between controls and rate behaviors. There is a .612 correlation between the H6 test and the existence of municipal rate ceilings. This means states with municipal rate property tax ceilings are much more likely to see more neighbors driving sales tax rates together more aggressively than they are to see property tax rates driven together by more neighbors. Vestavia, limited by state law in its property tax choices, is more likely to be forced into sales tax rate conformity with its neighbors. Without much latitude to set property taxes, cities are likely to feel bound to adopt their neighbors' rate conformity to compensate for the lack of property tax discretion (and corresponding revenue flexibility).

One interesting anomaly in Table 4.13 shows a -.531 correlation between state approval for LOST increases/changes and the same outcome variable. More state control creates *more* deviation in sales taxes for more neighbors, running contrary to the general trend of more neighbors creating less rate diversity. This could be a matter of larger, wealthier cities being more likely to have the political and economic weight to push a tax increase through the state agency, increasing the diversity of rates within an area.

State controls matter in aggregate. But compare the limited number of statistically significant correlations between the controls and the results with the relatively immense power of neighbors (Figure 4.1). The conclusion follows that cities find ways to set rates within the margins of what each state allows, regardless of how restrictive those rates are. What limited controls do seem to make a difference, do not seem to have a profound effect on the rate landscape.

Even if the effect of vertical controls is small, as strong as the numbers are, it also seems likely—at the very least—vertical controls force rates together. Sales tax rates seem particularly prone to this influence. Even if there are several methodological and confounding variables in play, "less freedom means more conformity" holds true at least in these measures of this study.

More Complexity and the Role of Property Tax

The picture emerging from this discussion is one of a complex landscape of municipal tax rates and revenue. The factor analysis results do almost nothing to mitigate such complexity. First, revisit Tables 4.14 and 4.15 and Figure 4.6 from the results chapter. These represent an analysis of all the demographic, financial, and clustering data in the set: 43 variables with 22 cases each. As discussed in the text accompanying those results, the factor analysis exhibited almost no evidence of the variables clustering together tightly.[36]

A factor analysis can be said to find patterns within which variables interact. This can be useful for identifying key variables as well as seeing which variables cluster together more readily. Finally, a factor analysis can help describe the degree to which variables interact. Returning to the BMW example, a factor analysis would show that lower business taxes, good schools and low cost of living cluster with the choice of where major industries locate, and that industry locations depend on

[36] More so than the deductive tests, the factor analysis data are circumspect. All the data from all the data tables in Appendix A were included; most of these correlations were not statistically significant. Another problem is the number of variables in the factor analysis. 43 variables are difficult to model.

climate, but that school quality depends very little on climate.

Among statisticians, a factor analysis is quite fungible. At what point does one factor become "heavily loaded"? In genetics research, the bar is quite high. In looking for a suspect gene, researchers like to see very strong clustering between genes and phenotypic consequences before reaching conclusions about what pairs with what. In social science, the bar is lower. But the factor analysis of this study falls short of revealing powerful associations even by those lower standards, although they are not nonexistent. The prime factor only explains 21% of the variance in the entire model and the top four factors account for 63% of the total variance. Perhaps data problems contributed to this low level of variable clustering. Thus, the only enthusiastic conclusion from the factor analysis is that patterns of ratemaking are myriad and complex. A meticulous review of the data tables in Appendix A demonstrates that a powerful correlation between variables in one state may be completely absent in a neighboring state.

But a few trends emerge beyond this cautious statement. First, the lack of strong clustering of data indicates the demographic, geographic, and financial variables sometimes track together across neighboring states. Idaho, Washington and Utah all show strong correlations between LOST rates and other tax revenue, but whereas Idaho and Washington show a positive correlation between LOST rates and average home values, Utah does not. The factor analysis is an effective way of capturing the haphazard way in which the variables and corresponding trends fail to consistently correlate. And this haphazardness further indicates the way in which cities must consider each variable independently as they engage in wider competition with their neighbors.

Second, the correlations do not load heavily across multiple factors. In other words, the variables usually do not correlate with more than one factor. Only one of the relationships (LOST to operations spending) correlates above the (low) $\geq$ .33

with all four of the primary factors. And of the 43 relationships, only ten load into more than one factor. The relationships between variables are insulated from one another. This further adds to the complexity of the rate and revenue landscape. Cities cannot reliably expect for multiple interactions between variables to be predicted by one variable.

On the other hand, the limited but significant data do add some insight into the relationship between these variables. Of the 43 variables, only six variables did not load at ≥ .33 into one of the first four factors. Thus, the factor analysis does suggest the correlations between variables do load at least partly into these first four factors, even if those factors are largely independent from one another.

What do these four factors indicate? The most powerful, Factor 1, primarily loads property tax relationships. In fact, of the 21 property-tax-only relationships, only seven did not load at ≥ .33 into Factor 1. And among the property tax correlations loading at all into the first four factors, only one loaded exclusively into a factor other than the first. Contrast this to factors 2-4, which tend to capture the LOST correlations much more haphazardly, and with more common overlapping between factors. One additional feature of Factor 1 is that property tax and income load negatively compared to the diffusion correlations. In states where income and property tax are more tightly linked to local property tax rates, so does the influence of neighbors fall, and vice-versa.

Upon reflection, this should have been expected. If cities' rates are not bound to the rates of their neighbors, the influence of other mechanisms will be more pronounced, in this case the behavioral and availability models. Yet, if this condition were more salient, the same situation would have been revealed for sales taxes. But that was not the case. Thus, as indicated elsewhere in this dissertation, property taxes seem to be less influenced by the behavior of neighbors and more dependent on endogenous factors.

The loading of the property tax relationships more consistently and uniquely into a single factor indicates property taxes are more insulated from the rest of the variables in this study. This is at least partly due to the overall (relative) importance of the property tax in funding municipal government. As Figures 2.2 and 2.4 indicate, property tax is significantly more important in the overall revenue picture for more states. This offers limited but important support for property tax as a crucial factor in the wider competition problem. Cities depend on property taxes as their primary source of revenue (Figure 2.4). Therefore, cities will make short-term sacrifices elsewhere in order to win the long-term race for higher property values.

There are a few other interesting relationships hidden in the factor analysis. Although the influence of income and wealth are not linked to sales tax diffusion correlations, LOST diffusion is negatively related to spending. In fact, both property tax spending and LOST spending correlations correlate negatively with their primary diffusion measures (see Figure 4.6 and Table 4.15). Factor 2 indicates this trend for sales taxes, and Factor 1 does as much for property taxes. The more influential neighbors' rates are, the less likely there is a relative relationship between those same taxes and spending. A state whose cities show strong influence of neighbors, Alabama, is less likely to see those same tax rates correlate with higher tax-to-spending correlations. A state showing less influence of neighbors, New Mexico, will be more likely to see a stronger positive relation between their tax rates and spending. One possible interpretation of this relationship is the more heavily a city (or state full of cities) relies on revenue, the less likely it (they) is (are) to rely on the rates of neighbors to set its (their) own rate(s). This adds to the complexity of the tax and revenue landscape, even if it is not surprising. More reliance on revenue means cities are not as willing to copy each other, supporting the obligations model. Property taxes show an even stronger negative relationship in this regard, verifying once again that property tax rates are less dependent than sales tax rates on neighbors' rates, for possible reasons discussed above.

Advice to city managers

The last section of this dissertation offers a synthesis of much of what has been discussed above as it applies to the practical implications for this dissertation. What, if anything, does all this mean for city managers? As discussed, the lack of powerful clustering in the factor analysis indicates most of the variables involved in the rate, revenue, and demographic landscape are detached from one another. But the data and analysis can offer other conclusions that are more helpful.

Watch Your Neighbors

The most salient results of this study indicate very strong tax rate pressure from neighbors. City residents and leaders watch their neighbors closely. The closer the neighbors, the more slavishly cities should copy those neighbors. While this is at least somewhat irrational, the information cost of the effect of raising or lowering taxes is too high to make completely rational choices that residents and firms will accept. Many of these variables (not just revenue) are embedded in the long-term race for wealth and status. Since immediate neighboring cities are more likely to share similar traits than more distant neighbors, this information shortcut can produce more reliable results. If Vestavia copies five of Hoover's habits, it is likely to hit one or more that will improve its wealth and status. Residents and firms will judge the city's success against the success of neighboring cities, cities should continue to watch and learn from their neighbors, especially their neighbors with similar traits. And since tax rates are one of the most visible metrics for making comparisons, city leaders should be even more careful to adhere to tax rate regional norms.

Property taxes are less responsive to neighbors' behavior than sales taxes are, but property taxes also respond to the pressure to conform. Cities do have more discretion—when permitted by law—to adjust their property tax rates. The data and analysis confirm this long-held belief. Residents and firms appear to be more likely to use the comparatively visible sales tax rates when making comparisons about a city's health. The implication is that city leaders who push their tax rates well above the local average will be punished (or at least fear punishment) at the ballot box. A much higher rate might also hinder the long-term wealth and status of the city, even if it increases revenues in the short term.

But within the metro-area average, city leaders have a great deal of discretion in setting tax rates. A small increase to .25% above the local average certainly seems to be tolerated by city residents. This is especially true for "anchor cities" which seem to be able to set rates a little higher than their neighbors.

The data also suggests cities should move collectively to reduce commercial and voter backlash. Even though this study makes no formal tests of this specific phenomenon, other studies in the literature have found cities do often move together, and the data in this study at least indirectly confirms this trend. If Vestavia needs more revenue, city managers should not be afraid to send signals to the rest of the Birmingham metro area that they are thinking of raising taxes. If cities in an area move collectively, citizens will not judge those leaders as harshly.

Recall the commentary on strategic interactions in section four of chapter two. Cities need to know whether their neighbors are acting strategically to poach retail revenue from each other. The data strongly imply there is little if any such strategic rate setting. As above, cities are not competing over revenue dollars with lower tax rates. Consistently across the study states, lower rates do not generate more revenue, even if they do lure more retailers and residents. Instead, city leaders should worry more about the long-term successes and failures of their policies.

Cities should be a bit less afraid to raise taxes when necessary. My research shows that cities will not lose revenue for incremental changes, and small changes will not make a big enough difference to deter retail and residential activity, at least in the short term. If raising a little more revenue with taxes slightly higher than the average can bring attractive benefits to your city, it is probably worth doing so. But do not go far above the averages set by your neighbors.

Tax the Possible

Equal tax rates, especially property tax rates, are not equal in their application. Higher tax rates tend to produce more revenue, but there are many exceptions to this general rule (consider Table 4.16). In particular, resort cities seem to have their own set of rules about the relationship between their rate-to-revenue ratio and that of their neighbors. These cities have the luxury of levying low overall tax rates while still generating significant revenue per capita.

Sales tax too is dependent on several lurking variables, one of which is a higher percentage of retail activity. As discussed, cities with a great deal of retail activity tend to create positive feedback loops wherein they can levy lower rates which, in turn, lure more retailers into the city. If a city has a great deal of retail activity, city leaders should not be averse to raising sales taxes *slightly* above the metro average (at maximum), which will capture more revenue, especially from nonresidents traveling into the retail cluster to shop who will not vote leaders out of office. Only a tiny percentage of these cross-border shoppers will notice the slightly higher charge at the end of their shopping bill. Potential retailers will still be attracted to the large shopping centers. Cities without large retail centers will need to rely more heavily on property taxes, as any increase in sales tax rates will not generate a substantial increase in revenue. Managers should closely study their city's tax base and potential revenue, compare it with the base of their near neighbors, and make incremental changes.

What if cities have neither strong retail activity nor strong property values? The data do not seem to indicate a solution through sales and property tax rate setting. Clearly, there is at least some rate competition. Lipscomb, Alabama is one of the poorest communities in the Birmingham area and has among the lowest tax rates in all of Jefferson County, well below the metro average for both sales and property taxes. Higher rates produce more revenue only on average. If retailers believed that Lipscomb could not generate the business they wanted, they will move their firms anywhere else, even if the tax rates are lowest in Lipscomb. If Lipscomb were to raise taxes up to the metro average, retailers that might consider locating there might be even more reluctant to do so. This research indicates that tax rates only matter at the margins of the other factors, such as overall wealth of the city. The data therefore suggests that to win the long-term game for wealth and status, cities must create commercial and cultural wealth through means other than tax rates. Ironically, that might mean raising taxes in the short term to make long-term investments (e.g. schools) that could add to the long-term status of a city and start it down the road to prosperity.

Know Your State's Formal and Informal Rules

State rules make a difference. Among others, California and Oklahoma have extremely tight restrictions on municipal property taxes. It probably is not necessary to advise veteran city administrators, but if such officials tried to pass a tax increase without the proper legal steps, all the political capital spent wooing a city's voters in an attempt to "sell" a tax increase could be stopped by state law.

Even in states with extremely restricted local ratemaking, there is room for action, especially collaboratively. Oklahoma only allows property taxes for capital outlay, and California has tight valuation ceilings and rate limits. Yet cities in these states can, with some difficulty, raise their rates, especially when they act in tandem with other cities in similar situations. Both states have stronger-than-average LPT-to-near-neighbors correlations.

Overall, there were only a few vertical controls affecting the individual components of competition and therefore of tax rates. But this was on a collective scale. Vertical controls do matter, if only modestly. Different controls affect different states (and even regions) differently. The city leaders spending some effort determining which controls will increase their discretion will be more likely to use such controls to gain the upper hand when competing for retailers.

As demonstrated in the data regarding vertical controls, states with a strong degree of control over sales taxes will see a corresponding conformity of rates. Cities fearing a sales tax rate race to the bottom may lobby the state legislature to adopt stricter rules for changing rates.

Finally, the data imply some "unwritten rules" that influence ratemaking behaviors from state to state. Statewide behaviors vary considerably. Perhaps most importantly, some states show limited evidence of diffusion. Cities in these states should have more flexibility in setting their rates, as city leaders, firms and residents have different expectations in states like New Mexico.

These different behaviors must be at least partly to blame for the significant variation in correlations, as discussed primarily in relation to the factor analysis. Cities that learn these informal rules could benefit and turn those rules into more revenue, for instance as more leverage in recruiting retailers. Cities unhappy with these rules could also persuade such knowledge in their region to help persuade their neighbors (for instance, to take collective action on a massive infrastructure project) in peer-to-peer negotiations.

Summary

The primary goals of this paper were to describe and explain patterns of tax rate diffusion in US cities and towns. As was completely expected—even taken for granted—the evidence of diffusion was robust, but not overwhelming. Neighbors' rates were the single most important predictor (on average) of municipal rates. But although most states showed strong evidence for diffusion, not every state did. A few states showed no evidence of tax diffusion.

Taking for granted the diffusion mechanism, this study's further goal was to explain and describe that diffusion. Existing literature indicates two possible mechanisms shaping it: learning and competition. But the existing literature has struggled with disentangling these two mechanisms and left the subject unsatisfactorily resolved.

This study made significant progress disentangling the two mechanisms, finding evidence both are involved in shaping the diffusion of tax rates, but it fell short of clearly and unequivocally differentiating between the two. It did find evidence that cities are less likely to be influenced by competition than by learning when setting their rates.

An analysis of dozens of variables and hundred of thousands of data points has led me to conclude that learning-through-diffusion is the primary mechanism shaping tax rates. But since there is some evidence for competition, I assert that there is a wider competition for wealth and status transpiring as cities make moves against and with each other. The data indicate cities see this long-range, wider competition as more of a positive-sum game than a zero-sum one.

This study also suggests city leaders do not set tax rates rationally, at least not to maximize revenue, and not in the short term. This is indicative of the complex landscape in which leaders operate. They must account for several big variables and hundreds of small ones. In the face of such complexity, it is unsurprising they take shortcuts to adjust tax rates to mirror those of their neighbors. This may be irrational in the short term, but it is rational (and even strategic) in the long term, wider competition.

Practically, city leaders can benefit from watching their neighbors. By staying within the acceptable range of regional behavior, cities are less likely to alienate retailers and residents with “excessive” taxes. Cities can also benefit from knowing their state’s formal and informal rules and learning how to us those rules to win the long-term wealth and status game.

Methodologically, only a handful of studies have examined diffusion through numerical data (and none with such a large data set). This paper joins that small group. The more robust statistical tests available with such continuous variables allow this study to flesh out relationships that might have remained hidden in less comprehensive, nominal data. In large part, such data and corresponding tests have allowed me to conclude that evidence for competition is weak, that cities are strongly influenced by neighbors and that policy decisions are complex.

For further study: from where does competition arise? The data indicate, at least fairly well, that some states show more evidence of diffusion-through-competition. This study made only the most superficial attempts to explain the origins of that competition. One possible agent for the genesis/absence of more competition may lie in informal rules of behavior evolving in each state. Formal rules, such as the length of time states have had local option sales taxes, might also be to blame. Additional study might reveal some interesting features of game theory affecting the ways and means through which cities increase their strategic behaviors.

Why do some states show more evidence of regional rate conformity? One answer lies in the rules set by state government, since there was a significant relationship between controls and conformity. But habit (informal rules) and demographics are likely causal forces as well. Additional study could potentially help uncover these forces.

Finally, I am reluctant to call for studies to consider even more data and thus create an even more complex picture than the one depicted here. But, as discussed in some detail in the discussion section and elsewhere above, there are clearly a great number of vehicles besides tax rates cities use to compete against one another in the long-term, wider competition. Redevelopment agencies and public infrastructure investment are two such possible vehicles. Perhaps a similar study on one or both of these metrics would reveal more strategic moves and less “blind” copying.

APPENDIX A

STATE CORRELATION TABLES

Table A1: Alabama Results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	.010
Municipal Property Tax Rate	.010	1
Near-Neighbor average LOST rate	.449	.016
Distant-Neighbor average LOST rate	.161	-.116
Near-Neighbor average property tax rate	-.011	.144
Distant-Neighbor average property tax rate	-.143	.021
Within 10 miles of Florida	.032	-.017
Within 10 miles of Georgia	.016	-.035
Within 10 miles of Mississippi	-.047	-.007
Within 10 miles of Tennessee	-.008	-.043
Number of neighbors within 10 miles	.186	.188
Population as a percentage of the metro area	.176	-.032
Average home value	.112	.034
Average household income	.029	.060
Intergovernmental revenue in per capita	-.055	.019
Property tax revenue per capita	.251	.053
Sales tax revenue per capita	.342	-.017
Revenue from fees per capita	.165	.000
Other tax revenue per capita	.183	-.008
Capital outlay payments per capita	.016	-.054
Outgoing IGR payments per capita	.031	.080
Maintenance & operations payments per capita	.278	.073
Municipal population	.228	.147
Percentage of rural population (density)	-.373	-.167
Percent voting for Obama in 2008	.040	.126
Standard deviation of LOST rates <10 miles	.114	.067
Standard deviation of LPT rates <10 miles	.036	.188

Table A2: Alaska Results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	.246
Municipal Property Tax Rate	.246	1
Near-Neighbor average LOST rate	.044	.069
Distant-Neighbor average LOST rate	.051	.042
Near-Neighbor average property tax rate	.106	-.104
Distant-Neighbor average property tax rate	.009	.217
Number of neighbors within 10 miles	.179	.151
Population as a percentage of the metro area	-.063	.052
Average home value	.012	.217
Average household income	.105	.403
Intergovernmental revenue in per capita	.194	.295
Property tax revenue per capita	.051	.670
Sales tax revenue per capita	.453	.476
Revenue from fees per capita	.056	.184
Other tax revenue per capita	-.120	.036
Capital outlay payments per capita	.279	.423
Outgoing IGR payments per capita	.186	.352
Maintenance & operations payments per capita	.186	.352
Municipal population	-.075	.254
Percentage of rural population (density)	.196	.048
Percent voting for Obama in 2008	NA	NA
Standard deviation of LOST rates <10 miles	.365	-.481
Standard deviation of LPT rates <10 miles	-.043	.732

Table A3: Arkansas results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	.182
Municipal Property Tax Rate	.182	1
Near-Neighbor average LOST rate	.262	.084
Distant-Neighbor average LOST rate	.218	.073
Near-Neighbor average property tax rate	.096	.402
Distant-Neighbor average property tax rate	.073	.124
Within 10 miles of Louisiana	-.004	.120
Within 10 miles of Mississippi	.014	.007
Within 10 miles of Missouri	.016	.069
Within 10 miles of Oklahoma	.063	.044
Within 10 miles of Tennessee	-.065	.015
Within 10 miles of Texas	.053	-.033
Number of neighbors within 10 miles	.136	.051
Population as a percentage of the metro area	.301	.089
Average home value	.008	.026
Average household income	.027	.018
Intergovernmental revenue in per capita	.014	.030
Property tax revenue per capita	.252	.418
Sales tax revenue per capita	.526	.053
Revenue from fees per capita	.193	.043
Other tax revenue per capita	.210	.060
Capital outlay payments per capita	.235	.046
Outgoing IGR payments per capita	-.083	.003
Maintenance & operations payments per capita	.295	.096
Municipal population	.236	.274
Percentage of rural population (density)	-.015	.049
Percent voting for Obama in 2008	.057	.225
Standard deviation of LOST rates <10 miles	.074	-.031
Standard deviation of LPT rates <10 miles	.075	.068

Table A4: Arizona results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	.071
Municipal Property Tax Rate	.071	1
Near-Neighbor average LOST rate	.215	.238
Distant-Neighbor average LOST rate	-.143	-.123
Near-Neighbor average property tax rate	.144	.618
Distant-Neighbor average property tax rate	-.135	.366
Within 10 miles of California	-.047	-.026
Number of neighbors within 10 miles	-.277	.030
Population as a percentage of the metro area	.108	.030
Average home value	.028	-.160
Average household income	-.098	-.076
Intergovernmental revenue in per capita	.239	.154
Property tax revenue per capita	.096	.312
Sales tax revenue per capita	.091	.108
Revenue from fees per capita	-.019	-.069
Other tax revenue per capita	-.039	.009
Capital outlay payments per capita	.153	.002
Outgoing IGR payments per capita	-.024	.230
Maintenance & operations payments per capita	.174	.081
Municipal population	-.190	.092
Percentage of rural population (density)	.345	.112
Percent voting for Obama in 2008	.122	-.157
Standard deviation of LOST rates <10 miles	.021	.212
Standard deviation of LPT rates <10 miles	.079	.702

Table A5: California results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	.050
Municipal Property Tax Rate	.050	1
Near-Neighbor average LOST rate	.852	.042
Distant-Neighbor average LOST rate	.615	-.075
Near-Neighbor average property tax rate	.132	.327
Distant-Neighbor average property tax rate	-.167	.100
Within 10 miles of Oregon	-.119	.092
Within 10 miles of Nevada	-.016	.054
Within 10 miles of Arizona	-.018	.030
Number of neighbors within 10 miles	.518	.113
Population as a percentage of the metro area	-.317	.032
Average home value	.365	.022
Average household income	.324	-.054
Intergovernmental revenue in per capita	.028	-.006
Property tax revenue per capita	.071	.026
Sales tax revenue per capita	.068	.018
Revenue from fees per capita	.044	-.033
Other tax revenue per capita	.057	-.037
Capital outlay payments per capita	.054	.000
Outgoing IGR payments per capita	-.006	-.108
Maintenance & operations payments per capita	.047	-.030
Municipal population	.104	.172
Percentage of rural population (density)	-.135	.056
Percent voting for Obama in 2008	.659	.097
Standard deviation of LOST rates <10 miles	.197	.108
Standard deviation of LPT rates <10 miles	.520	.156

Table A6: Colorado results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	-.212
Municipal Property Tax Rate	-.212	1
Near-Neighbor average LOST rate	.438	-.343
Distant-Neighbor average LOST rate	.450	-.526
Near-Neighbor average property tax rate	-.347	.529
Distant-Neighbor average property tax rate	-.482	.520
Within 10 miles of Utah	-.020	.124
Within 10 miles of Colorado	-.103	.059
Within 10 miles of Nebraska	-.173	.278
Within 10 miles of Kansas	-.059	.097
Within 10 miles of New Mexico	-.076	-.046
Within 10 miles of Wyoming	-.103	.042
Number of neighbors within 10 miles	.292	-.271
Population as a percentage of the metro area	-.198	.295
Average home value	-.010	-.055
Average household income	-.020	-.087
Intergovernmental revenue in per capita	.072	-.070
Property tax revenue per capita	.076	-.069
Sales tax revenue per capita	.178	-.140
Revenue from fees per capita	.113	-.052
Other tax revenue per capita	.099	-.086
Capital outlay payments per capita	.089	-.112
Outgoing IGR payments per capita	.114	-.038
Maintenance & operations payments per capita	.101	-.084
Municipal population	.160	-.038
Percentage of rural population (density)	-.059	.084
Percent voting for Obama in 2008	.397	-.391
Standard deviation of LOST rates <10 miles	-.217	.025
Standard deviation of LPT rates <10 miles	-.131	.127

Table A7: Idaho results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	-.158
Municipal Property Tax Rate	-.158	1
Near-Neighbor average LOST rate	.403	-.023
Distant-Neighbor average LOST rate	-.053	-.101
Near-Neighbor average property tax rate	-.002	.427
Distant-Neighbor average property tax rate	-.075	.460
Within 10 miles of Montana	-.028	-.118
Within 10 miles of Oregon	-.033	.183
Within 10 miles of Utah	-.028	-.124
Within 10 miles of Washington	-.045	-.075
Within 10 miles of Wyoming	.049	-.143
Number of neighbors within 10 miles	-.079	-.171
Population as a percentage of the metro area	.027	.246
Average home value	.602	-.309
Average household income	.317	-.188
Intergovernmental revenue in per capita	.186	-.057
Property tax revenue per capita	.499	.151
Sales tax revenue per capita	-.068	.029
Revenue from fees per capita	-.002	.106
Other tax revenue per capita	.756	-.186
Capital outlay payments per capita	.056	-.034
Outgoing IGR payments per capita	.338	-.132
Maintenance & operations payments per capita	.306	.137
Municipal population	-.034	.103
Percentage of rural population (density)	.025	-.090
Percent voting for Obama in 2008	.250	-.129
Standard deviation of LOST rates <10 miles	.468	-.158
Standard deviation of LPT rates <10 miles	-.219	.183

Table A8: Illinois results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	.146
Municipal Property Tax Rate	.146	1
Near-Neighbor average LOST rate	.676	.150
Distant-Neighbor average LOST rate	.514	.144
Near-Neighbor average property tax rate	.310	.127
Distant-Neighbor average property tax rate	.435	.110
Within 10 miles of Iowa	-.038	-.009
Within 10 miles of Indiana	.134	.050
Within 10 miles of Kentucky	-.057	-.010
Within 10 miles of Missouri	-.199	.007
Within 10 miles of Wisconsin	.031	-.037
Number of neighbors within 10 miles	.603	.234
Population as a percentage of the metro area	-.103	.074
Average home value	.341	.110
Average household income	.287	.113
Intergovernmental revenue in per capita	.089	.066
Property tax revenue per capita	.148	.099
Sales tax revenue per capita	.178	.058
Revenue from fees per capita	.054	.120
Other tax revenue per capita	.177	.043
Capital outlay payments per capita	.087	.034
Outgoing IGR payments per capita	.043	.001
Maintenance & operations payments per capita	.094	.123
Municipal population	.132	.254
Percentage of rural population (density)	-.335	-.189
Percent voting for Obama in 2008	.548	.133
Standard deviation of LOST rates <10 miles	.114	.113
Standard deviation of LPT rates <10 miles	.277	.117

Table A9: Iowa results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	-.047
Municipal Property Tax Rate	-.047	1
Near-Neighbor average LOST rate	.780	.029
Distant-Neighbor average LOST rate	.318	.069
Near-Neighbor average property tax rate	.028	.288
Distant-Neighbor average property tax rate	.064	.269
Within 10 miles of Illinois	.034	-.100
Within 10 miles of Minnesota	.009	.009
Within 10 miles of Missouri	-.057	.048
Within 10 miles of Nebraska	.068	.028
Within 10 miles of South Dakota	.047	-.007
Within 10 miles of Wisconsin	.068	-.143
Number of neighbors within 10 miles	-.291	-.129
Population as a percentage of the metro area	.074	.413
Average home value	-.170	-.160
Average household income	-.188	-.104
Intergovernmental revenue in per capita	.042	.039
Property tax revenue per capita	-.118	.260
Sales tax revenue per capita	.606	-.084
Revenue from fees per capita	.076	.230
Other tax revenue per capita	-.052	.012
Capital outlay payments per capita	.027	.065
Outgoing IGR payments per capita	-.019	.046
Maintenance & operations payments per capita	.083	.244
Municipal population	-.120	.156
Percentage of rural population (density)	.071	-.173
Percent voting for Obama in 2008	-.053	-.153
Standard deviation of LOST rates <10 miles	-.465	-.007
Standard deviation of LPT rates <10 miles	.013	-.015

Table A10: Kansas results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	-.039
Municipal Property Tax Rate	-.039	1
Near-Neighbor average LOST rate	.527	-.228
Distant-Neighbor average LOST rate	.396	-.271
Near-Neighbor average property tax rate	-.232	.244
Distant-Neighbor average property tax rate	-.331	.203
Within 10 miles of Kansas	.000	.015
Within 10 miles of Missouri	.242	-.144
Within 10 miles of Oklahoma	.050	.062
Within 10 miles of Nebraska	-.050	.001
Number of neighbors within 10 miles	.287	-.199
Population as a percentage of the metro area	.110	.277
Average home value	.267	-.130
Average household income	.134	-.092
Intergovernmental revenue in per capita	.123	-.024
Property tax revenue per capita	.177	.541
Sales tax revenue per capita	.524	-.039
Revenue from fees per capita	.216	.143
Other tax revenue per capita	.304	.104
Capital outlay payments per capita	.182	.012
Outgoing IGR payments per capita	.131	.021
Maintenance & operations payments per capita	.283	.204
Municipal population	.157	-.059
Percentage of rural population (density)	-.416	.060
Percent voting for Obama in 2008	.311	-.220
Standard deviation of LOST rates <10 miles	.220	-.077
Standard deviation of LPT rates <10 miles	.524	-.039

Table A11: Louisiana results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	.302
Municipal Property Tax Rate	.302	1
Near-Neighbor average LOST rate	.286	.161
Distant-Neighbor average LOST rate	.209	.002
Near-Neighbor average property tax rate	.104	.333
Distant-Neighbor average property tax rate	-.009	.092
Within 10 miles of Texas	.060	.040
Within 10 miles of Mississippi	-.025	.040
Within 10 miles of Arkansas	.040	.096
Number of neighbors within 10 miles	.091	-.184
Population as a percentage of the metro area	-.129	-.251
Average home value	.069	-.224
Average household income	-.139	-.312
Intergovernmental revenue in per capita	-.032	.087
Property tax revenue per capita	.235	.310
Sales tax revenue per capita	.475	.168
Revenue from fees per capita	.058	.083
Other tax revenue per capita	.230	.121
Capital outlay payments per capita	.041	.102
Outgoing IGR payments per capita	-.027	-.072
Maintenance & operations payments per capita	.071	.090
Municipal population	.228	.122
Percentage of rural population (density)	-.428	-.148
Percent voting for Obama in 2008	-.028	.013
Standard deviation of LOST rates <10 miles	.025	-.045
Standard deviation of LPT rates <10 miles	-.172	-.147

Table A12: Minnesota results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	-.075
Municipal Property Tax Rate	-.075	1
Near-Neighbor average LOST rate	.147	-.125
Distant-Neighbor average LOST rate	.040	.010
Near-Neighbor average property tax rate	-.074	.540
Distant-Neighbor average property tax rate	-.007	.503
Within 10 miles of Iowa	.055	.191
Within 10 miles of Wisconsin	.071	-.160
Within 10 miles of North Dakota	-.026	.063
Within 10 miles of South Dakota	-.020	.092
Number of neighbors within 10 miles	-.001	-.320
Population as a percentage of the metro area	.170	.181
Average home value	.028	-.424
Average household income	.008	-.358
Intergovernmental revenue in per capita	.017	.184
Property tax revenue per capita	.007	.087
Sales tax revenue per capita	.692	-.068
Revenue from fees per capita	.073	.132
Other tax revenue per capita	.132	-.224
Capital outlay payments per capita	.035	.069
Outgoing IGR payments per capita	.057	-.093
Maintenance & operations payments per capita	.084	.203
Municipal population	.386	-.130
Percentage of rural population (density)	-.226	.286
Percent voting for Obama in 2008	.074	-.064
Standard deviation of LOST rates <10 miles	.136	-.161
Standard deviation of LPT rates <10 miles	-.063	.269

Table A13: Missouri results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	.046
Municipal Property Tax Rate	.046	1
Near-Neighbor average LOST rate	.291	-.084
Distant-Neighbor average LOST rate	.254	-.198
Near-Neighbor average property tax rate	-.114	.390
Distant-Neighbor average property tax rate	-.194	.491
Within 10 miles of Kentucky	-.027	.009
Within 10 miles of Iowa	-.093	.215
Within 10 miles of Arkansas	.029	-.056
Within 10 miles of Oklahoma	-.061	-.073
Within 10 miles of Kansas	-.105	.067
Within 10 miles of Illinois	.087	-.178
Within 10 miles of Nebraska	.041	.108
Within 10 miles of Tennessee	-.022	.052
Number of neighbors within 10 miles	.098	-.211
Population as a percentage of the metro area	.258	.162
Average home value	.115	-.193
Average household income	.062	-.149
Intergovernmental revenue in per capita	-.014	.007
Property tax revenue per capita	-.061	-.063
Sales tax revenue per capita	.221	-.152
Revenue from fees per capita	.055	.027
Other tax revenue per capita	.086	.016
Capital outlay payments per capita	.063	-.013
Outgoing IGR payments per capita	.032	-.050
Maintenance & operations payments per capita	.086	.016
Municipal population	.155	.088
Percentage of rural population (density)	-.317	.151
Percent voting for Obama in 2008	.109	-.097
Standard deviation of LOST rates <10 miles	-.115	-.067
Standard deviation of LPT rates <10 miles	.002	.001

Table A14: Nebraska results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	.146
Municipal Property Tax Rate	.146	1
Near-Neighbor average LOST rate	-.015	-.024
Distant-Neighbor average LOST rate	.111	-.066
Near-Neighbor average property tax rate	-.011	.094
Distant-Neighbor average property tax rate	-.048	.107
Within 10 miles of Iowa	.137	.051
Within 10 miles of Colorado	.026	-.053
Within 10 miles of Wyoming	-.005	-.043
Within 10 miles of Missouri	-.030	.023
Within 10 miles of Kansas	-.017	.012
Within 10 miles of South Dakota	-.056	-.112
Number of neighbors within 10 miles	.099	-.039
Population as a percentage of the metro area	.359	.064
Average home value	.400	-.033
Average household income	.214	.000
Intergovernmental revenue in per capita	.004	.181
Property tax revenue per capita	.363	.519
Sales tax revenue per capita	.843	.027
Revenue from fees per capita	.319	.177
Other tax revenue per capita	.206	.158
Capital outlay payments per capita	.075	.203
Outgoing IGR payments per capita	.087	.041
Maintenance & operations payments per capita	.343	.223
Municipal population	.204	-.036
Percentage of rural population (density)_pop	-.520	.086
Percent voting for Obama in 2008	.067	-.008
Standard deviation of LOST rates <10 miles	-.040	-.110
Standard deviation of LPT rates <10 miles	.088	.065

Table A15: New Mexico results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	.258
Municipal Property Tax Rate	.258	1
Near-Neighbor average LOST rate	.085	.152
Distant-Neighbor average LOST rate	.140	.102
Near-Neighbor average property tax rate	.178	.130
Distant-Neighbor average property tax rate	.099	.191
Within 10 miles of Colorado	.223	.035
Within 10 miles of Oklahoma	.107	.075
Within 10 miles of Arizona	-.190	-.094
Within 10 miles of Texas	-.022	.136
Number of neighbors within 10 miles	-.026	-.222
Population as a percentage of the metro area	.024	.274
Average home value	.180	-.178
Average household income	.077	-.138
Intergovernmental revenue in per capita	.007	-.013
Property tax revenue per capita	.198	.117
Sales tax revenue per capita	.119	-.053
Revenue from fees per capita	.177	.015
Other tax revenue per capita	.063	-.072
Capital outlay payments per capita	-.050	-.005
Outgoing IGR payments per capita	-.073	.043
Maintenance & operations payments per capita	.127	.002
Municipal population	-.017	.020
Percentage of rural population (density)	-.321	-.061
Percent voting for Obama in 2008	.153	-.140
Standard deviation of LOST rates <10 miles	.170	-.143
Standard deviation of LPT rates <10 miles	.448	.557

Table A16: North Dakota results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	.408
Municipal Property Tax Rate	.408	1
Near-Neighbor average LOST rate	-.042	.003
Distant-Neighbor average LOST rate	.018	.024
Near-Neighbor average property tax rate	-.002	.340
Distant-Neighbor average property tax rate	.011	.352
Within 10 miles of South Dakota	-.033	.102
Within 10 miles of Montana	.012	-.043
Within 10 miles of Minnesota	-.009	.061
Number of neighbors within 10 miles	-.082	-.047
Population as a percentage of the metro area	.351	.233
Average home value	.290	.131
Average household income	.057	.022
Intergovernmental revenue in per capita	.171	-.236
Property tax revenue per capita	.005	.001
Sales tax revenue per capita	.347	-.089
Revenue from fees per capita	.314	.214
Other tax revenue per capita	.128	.101
Capital outlay payments per capita	.267	.194
Outgoing IGR payments per capita	.228	.099
Maintenance & operations payments per capita	.324	-.036
Municipal population	.242	.165
Percentage of rural population (density)	-.250	-.225
Percent voting for Obama in 2008	-.034	.217
Standard deviation of LOST rates <10 miles	-.188	-.054
Standard deviation of LPT rates <10 miles	-.135	.150

Table A17: Oklahoma results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	.136
Municipal Property Tax Rate	.136	1
Near-Neighbor average LOST rate	.156	.097
Distant-Neighbor average LOST rate	.088	.056
Near-Neighbor average property tax rate	.116	.268
Distant-Neighbor average property tax rate	.059	-.021
Within 10 miles of Arkansas	-.023	-.038
Within 10 miles of Kansas	-.111	-.030
Within 10 miles of Missouri	-.016	-.016
Within 10 miles of Texas	-.100	-.027
Number of neighbors within 10 miles	.181	.384
Population as a percentage of the metro area	.135	.007
Average home value	.175	.372
Average household income	.064	.344
Intergovernmental revenue in per capita	.025	-.040
Property tax revenue per capita	.049	.180
Sales tax revenue per capita	.491	.249
Revenue from fees per capita	.226	.056
Other tax revenue per capita	.320	.349
Capital outlay payments per capita	.093	.078
Outgoing IGR payments per capita	.027	-.009
Maintenance & operations payments per capita	.300	.099
Municipal population	.090	.413
Percentage of rural population (density)	-.281	-.356
Percent voting for Obama in 2008	.089	.148
Standard deviation of LOST rates <10 miles	-.033	-.056
Standard deviation of LPT rates <10 miles	.112	.269

Table A18: South Dakota results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	-.028
Municipal Property Tax Rate	-.028	1
Near-Neighbor average LOST rate	.142	-.268
Distant-Neighbor average LOST rate	.301	-.276
Near-Neighbor average property tax rate	-.248	.371
Distant-Neighbor average property tax rate	-.251	.342
Within 10 miles of North Dakota	-.088	.105
Within 10 miles of Nebraska	-.062	.000
Within 10 miles of Minnesota	.068	-.081
Number of neighbors within 10 miles	.084	-.243
Population as a percentage of the metro area	.757	-.087
Average home value	.401	-.416
Average household income	.273	-.192
Intergovernmental revenue in per capita	.052	.126
Property tax revenue per capita	.251	.506
Sales tax revenue per capita	.504	-.126
Revenue from fees per capita	.158	-.047
Other tax revenue per capita	.120	-.076
Capital outlay payments per capita	.188	.091
Outgoing IGR payments per capita	.127	-.067
Maintenance & operations payments per capita	.170	.003
Municipal population	.143	-.130
Percentage of rural population (density)	-.274	.179
Percent voting for Obama in 2008	-.138	-.040
Standard deviation of LOST rates <10 miles	-.144	.033
Standard deviation of LPT rates <10 miles	-.171	.058

Table A19: Tennessee results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	.079
Municipal Property Tax Rate	.079	1
Near-Neighbor average LOST rate	.706	.078
Distant-Neighbor average LOST rate	.227	.071
Near-Neighbor average property tax rate	.107	.398
Distant-Neighbor average property tax rate	.037	.159
Within 10 miles of Kentucky	.054	-.004
Within 10 miles of Arkansas	-.130	.013
Within 10 miles of Georgia	-.074	.091
Within 10 miles of Missouri	.109	.044
Within 10 miles of Mississippi	-.130	.043
Within 10 miles of Virginia	-.092	.041
Within 10 miles of North Carolina	-.051	-.027
Within 10 miles of Alabama	.119	-.095
Number of neighbors within 10 miles	-.165	.105
Population as a percentage of the metro area	.037	.265
Average home value	-.164	-.058
Average household income	-.154	-.041
Intergovernmental revenue in per capita	-.041	.372
Property tax revenue per capita	-.027	.624
Sales tax revenue per capita	-.022	-.003
Revenue from fees per capita	.028	.277
Other tax revenue per capita	-.022	-.032
Capital outlay payments per capita	.004	.067
Outgoing IGR payments per capita	-.021	.060
Maintenance & operations payments per capita	.020	.359
Municipal population	-.086	.256
Percentage of rural population (density)	.046	-.423
Percent voting for Obama in 2008	.042	.087
Standard deviation of LOST rates <10 miles	-.075	.056
Standard deviation of LPT rates <10 miles	-.054	.148

Table A20: Texas results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	.236
Municipal Property Tax Rate	.236	1
Near-Neighbor average LOST rate	.272	.047
Distant-Neighbor average LOST rate	.126	.076
Near-Neighbor average property tax rate	.043	.269
Distant-Neighbor average property tax rate	.060	.306
Within 10 miles of Arkansas	-.006	-.059
Within 10 miles of Louisiana	.010	.003
Within 10 miles of New Mexico	-.060	.001
Within 10 miles of Oklahoma	.014	.022
Number of neighbors within 10 miles	-.015	.043
Population as a percentage of the metro area	.030	.036
Average home value	-.039	-.230
Average household income	-.069	-.222
Intergovernmental revenue in per capita	.035	.034
Property tax revenue per capita	.081	.050
Sales tax revenue per capita	.179	-.075
Revenue from fees per capita	.113	-.005
Other tax revenue per capita	.106	-.041
Capital outlay payments per capita	.085	.009
Outgoing IGR payments per capita	-.063	-.062
Maintenance & operations payments per capita	.136	.024
Municipal population	-.015	.079
Percentage of rural population (density)	-.270	-.152
Percent voting for Obama in 2008	.017	.036
Standard deviation of LOST rates <10 miles	.004	-.085
Standard deviation of LPT rates <10 miles	-.022	-.050

Table A21: Utah results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	-.075
Municipal Property Tax Rate	-.075	1
Near-Neighbor average LOST rate	.477	-.009
Distant-Neighbor average LOST rate	.412	.027
Near-Neighbor average property tax rate	.019	.242
Distant-Neighbor average property tax rate	.103	.133
Within 10 miles of Colorado	.096	.023
Within 10 miles of Arizona	-.055	-.031
Within 10 miles of Wyoming	.059	-.153
Within 10 miles of Nevada	-.066	.008
Number of neighbors within 10 miles	.009	-.073
Population as a percentage of the metro area	.232	.213
Average home value	.205	-.116
Average household income	.123	-.116
Intergovernmental revenue in per capita	.134	-.055
Property tax revenue per capita	.267	.136
Sales tax revenue per capita	.363	-.041
Revenue from fees per capita	.133	.010
Other tax revenue per capita	.396	-.047
Capital outlay payments per capita	.200	.024
Outgoing IGR payments per capita	.059	-.111
Maintenance & operations payments per capita	.255	.041
Municipal population	.104	.261
Percentage of rural population (density)	-.170	-.178
Percent voting for Obama in 2008	.210	.127
Standard deviation of LOST rates <10 miles	.035	.018
Standard deviation of LPT rates <10 miles	.305	.016

Table A22: Washington results

	Municipal Sales Tax Rate	Municipal Property Tax Rate
Municipal Sales Tax Rate	1	-.284
Municipal Property Tax Rate	-.284	1
Near-Neighbor average LOST rate	.839	-.256
Distant-Neighbor average LOST rate	.677	-.259
Near-Neighbor average property tax rate	-.281	.103
Distant-Neighbor average property tax rate	-.500	.241
Within 10 miles of Idaho	-.159	.163
Within 10 miles of Oregon	-.209	-.031
Number of neighbors within 10 miles	.685	-.240
Population as a percentage of the metro area	-.441	.308
Average home value	.547	-.310
Average household income	.600	-.328
Intergovernmental revenue in per capita	-.219	.119
Property tax revenue per capita	.476	-.125
Sales tax revenue per capita	.261	-.048
Revenue from fees per capita	-.086	.127
Other tax revenue per capita	.337	-.147
Capital outlay payments per capita	-.163	.076
Outgoing IGR payments per capita	.364	-.198
Maintenance & operations payments per capita	.033	.092
Municipal population	.181	.058
Percentage of rural population (density)	-.538	.083
Percent voting for Obama in 2008	.637	-.281
Standard deviation of LOST rates <10 miles	.355	-.030
Standard deviation of LPT rates <10 miles	.162	-.048

APPENDIX B

STATE TAX RATE HISTOGRAMS

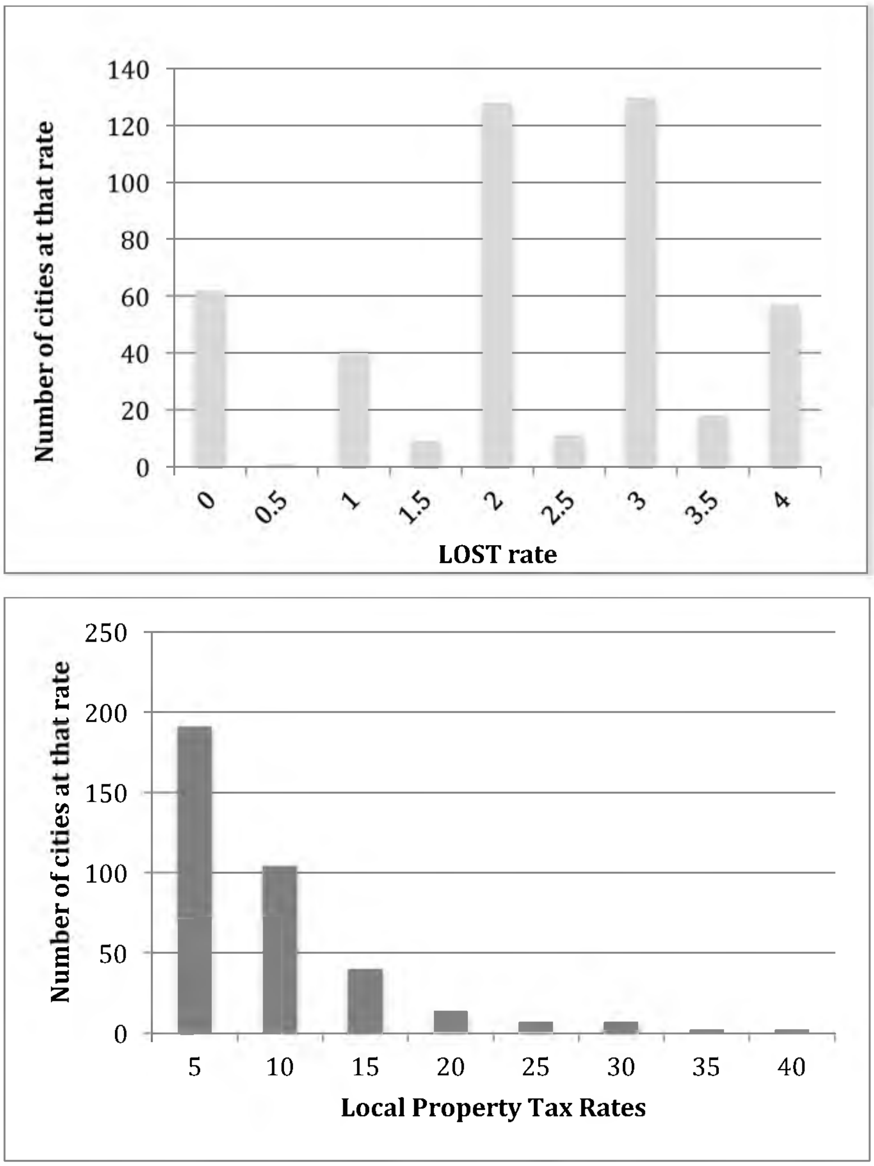
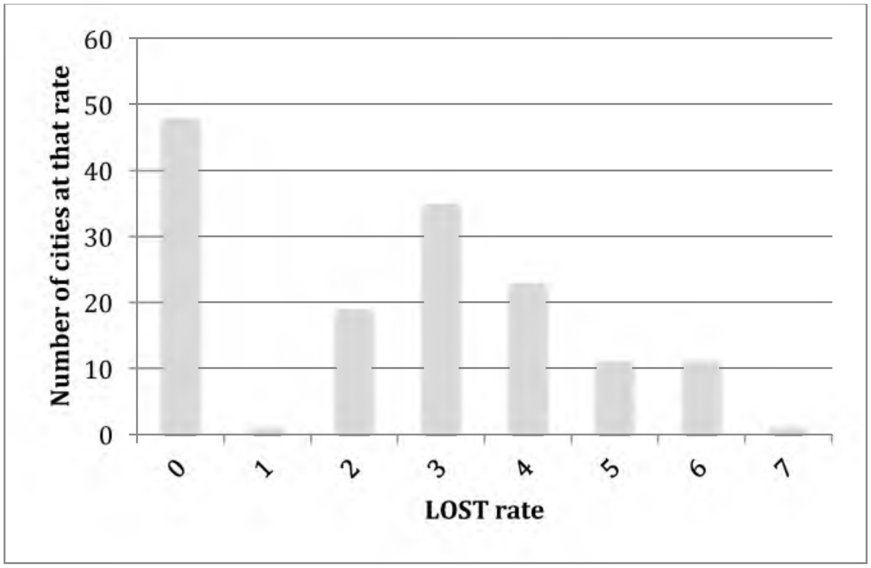


Figure B1: Alabama rate histograms



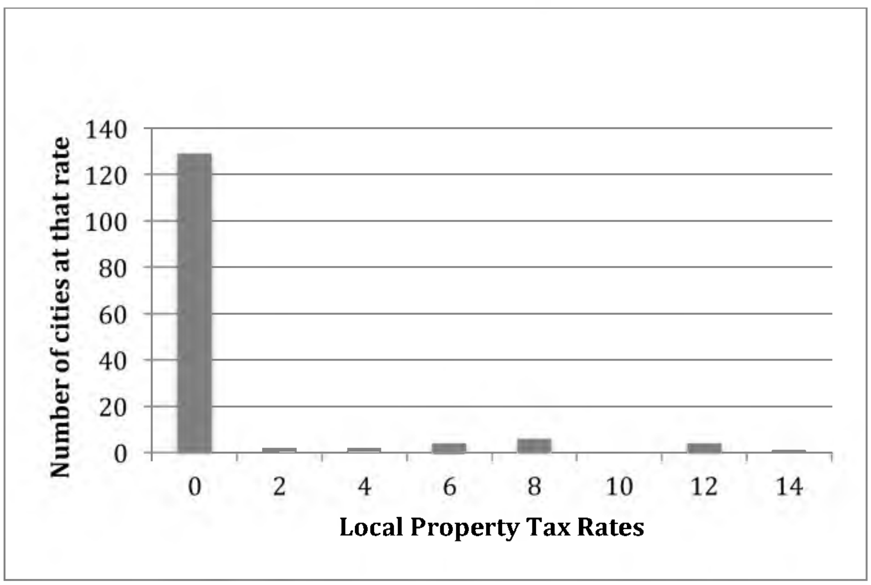
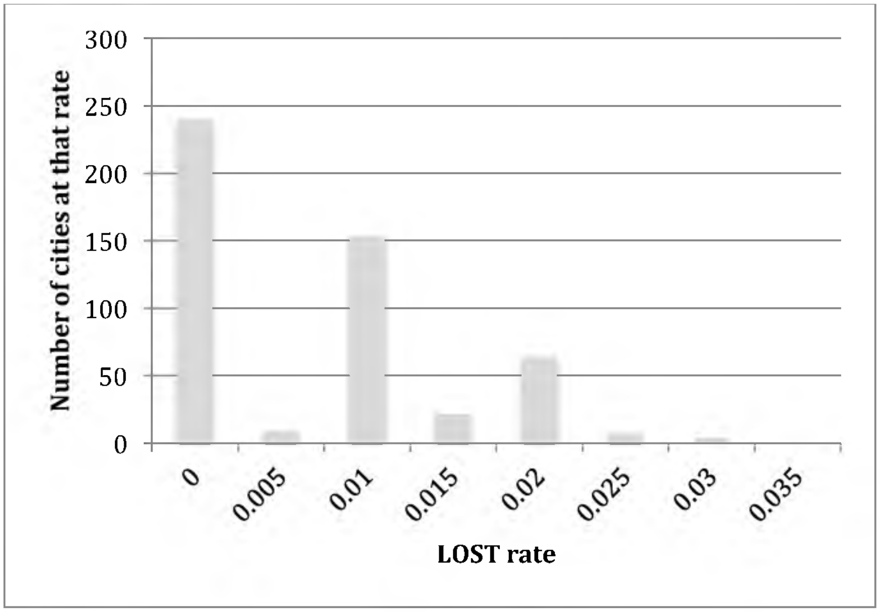


Figure B2: Alaska rate histograms



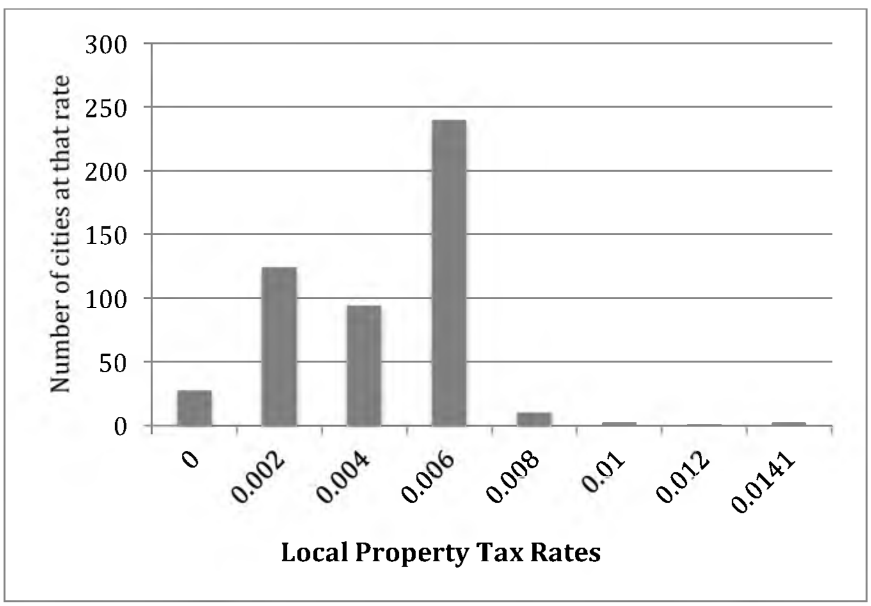
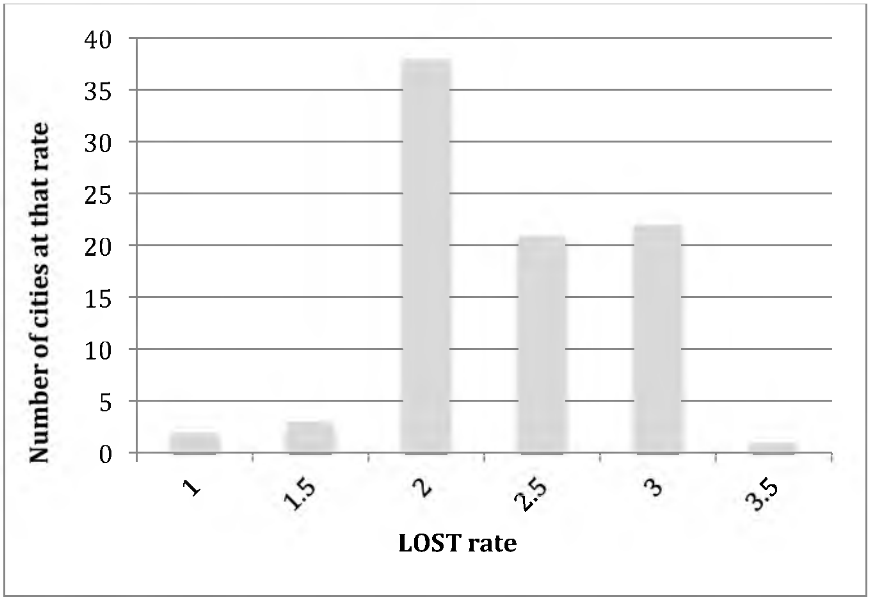


Figure B3: Arkansas rate histograms



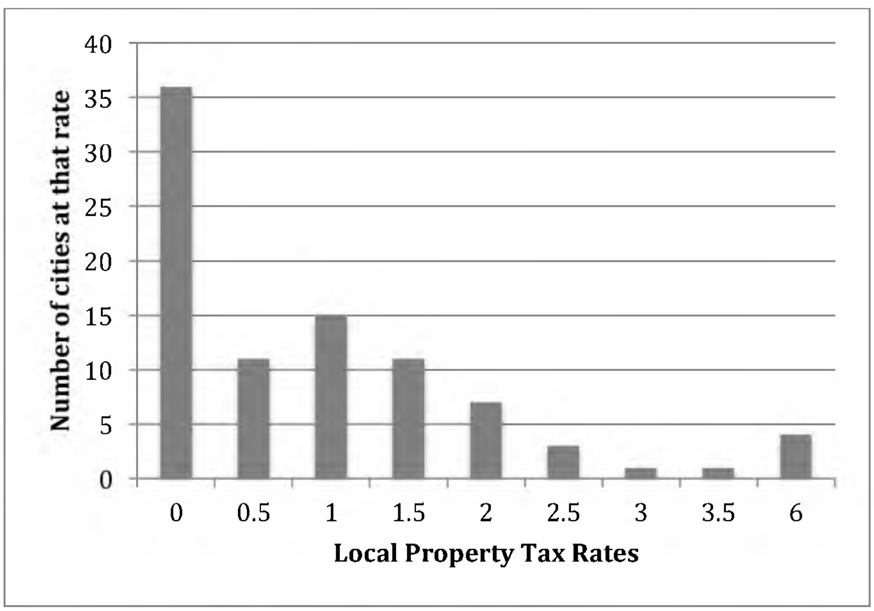


Figure B4: Arizona rate histograms

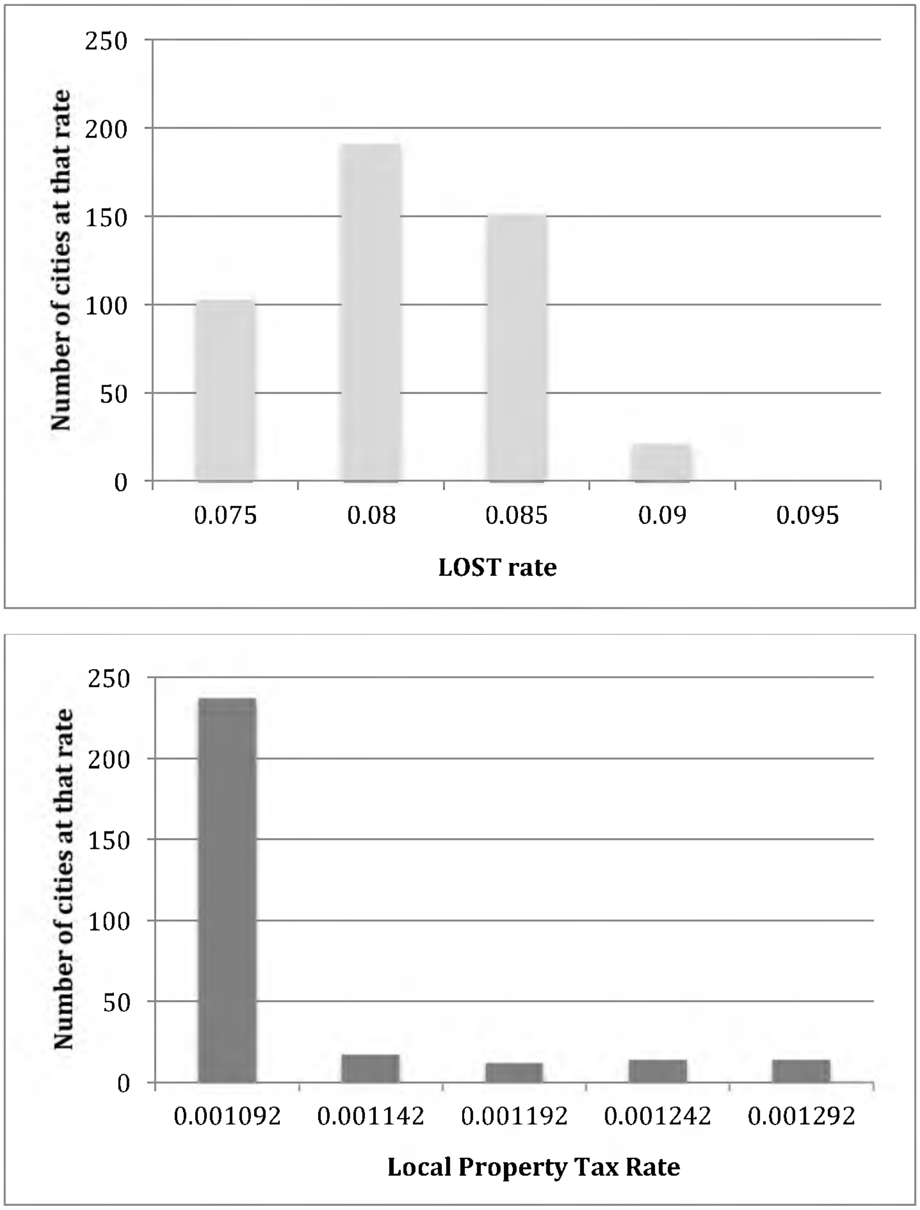


Figure B5: California rate histograms

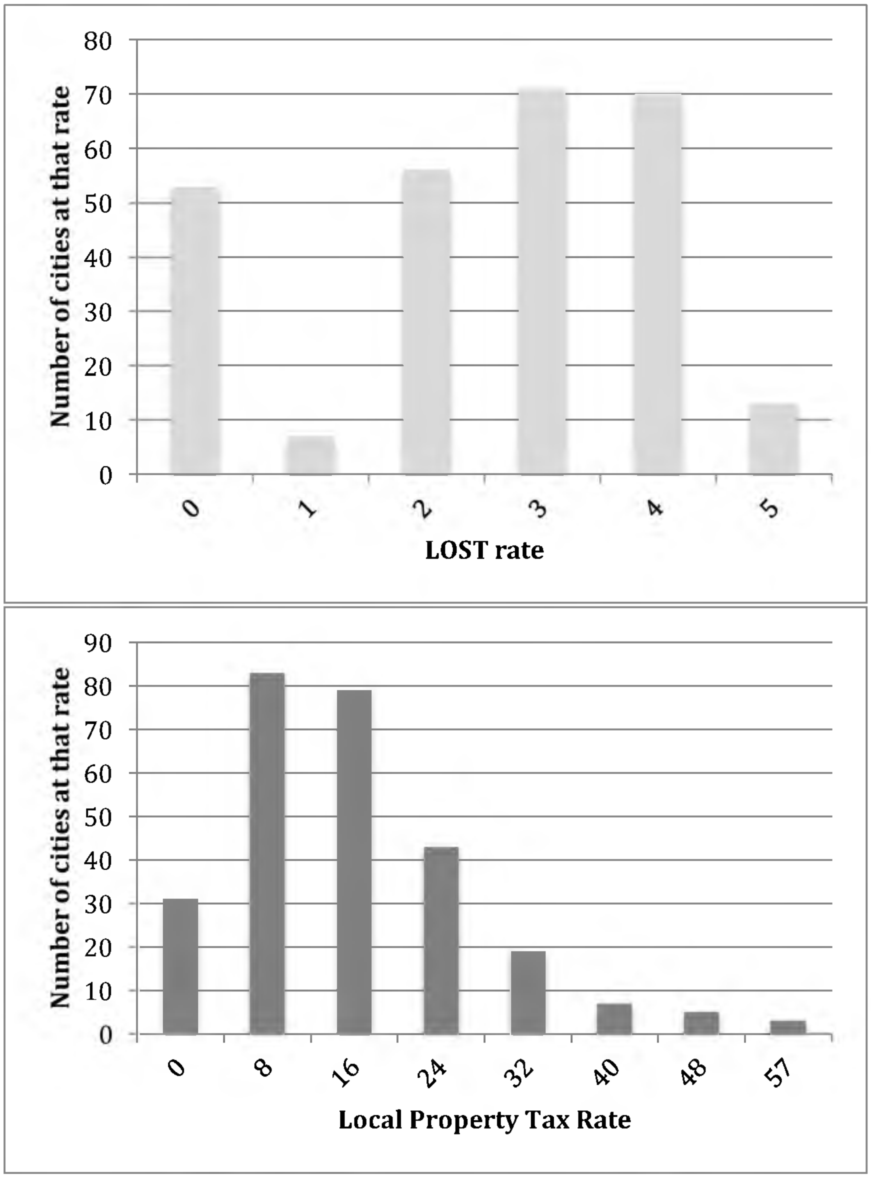
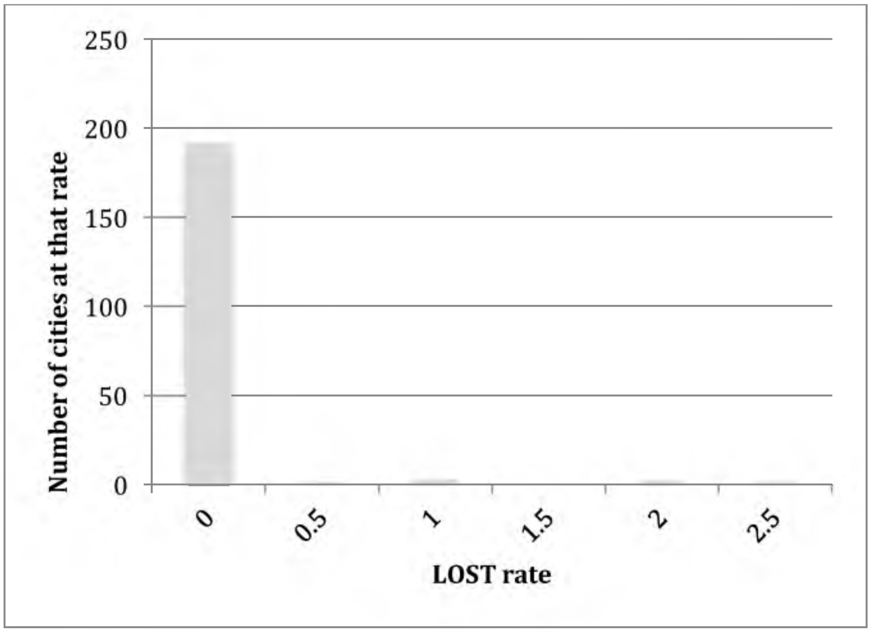


Figure B6: Colorado rate histograms



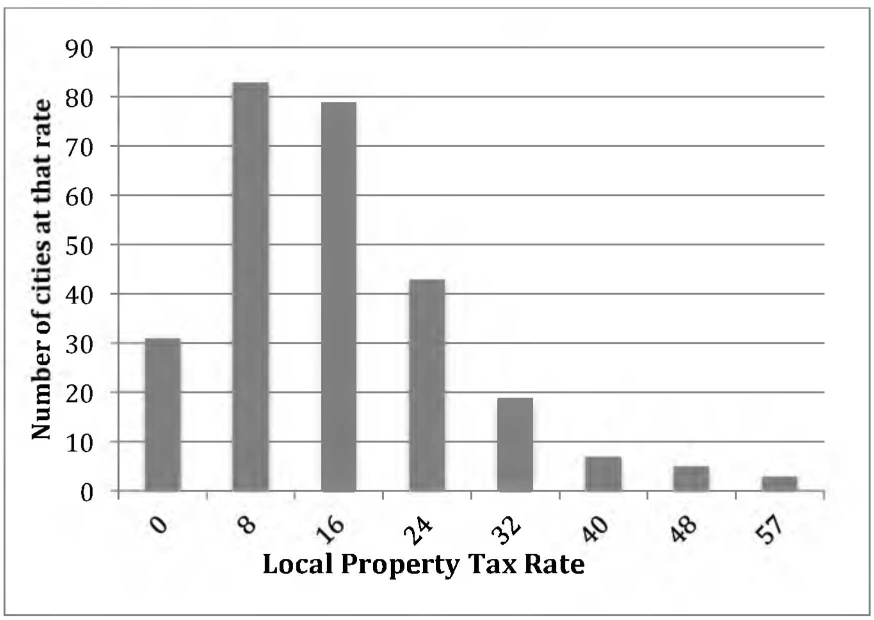


Figure B7: Idaho rate histograms

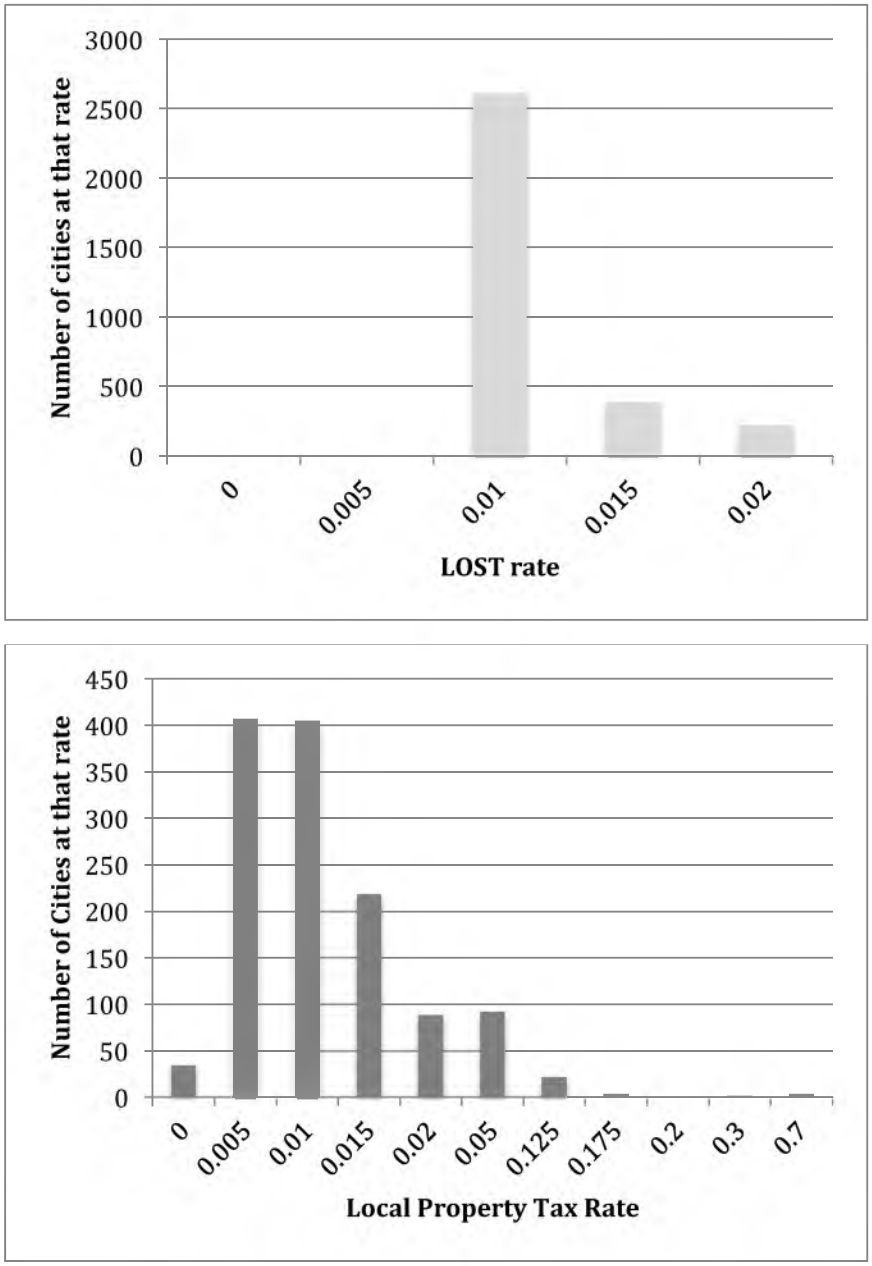


Figure B8: Illinois rate histograms

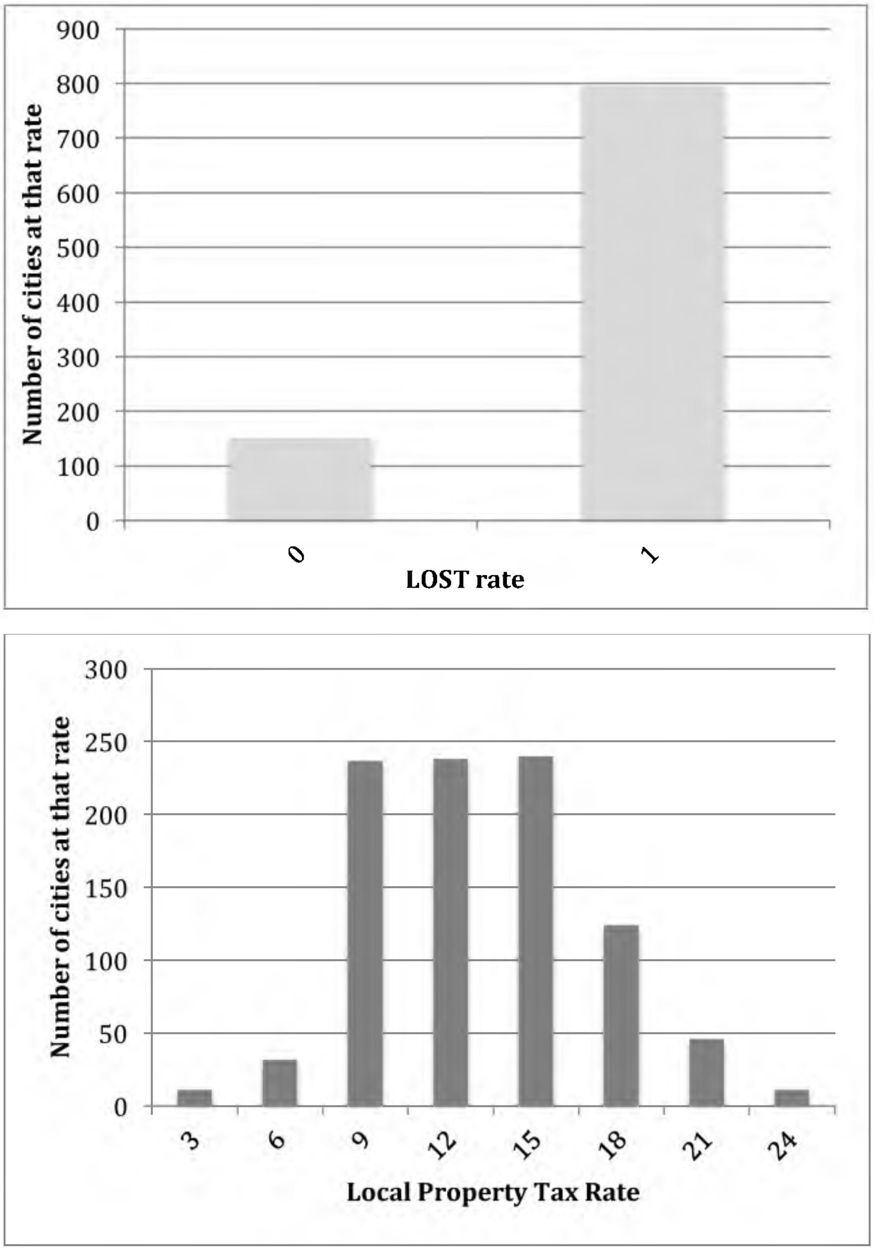


Figure B9: Iowa rate histograms

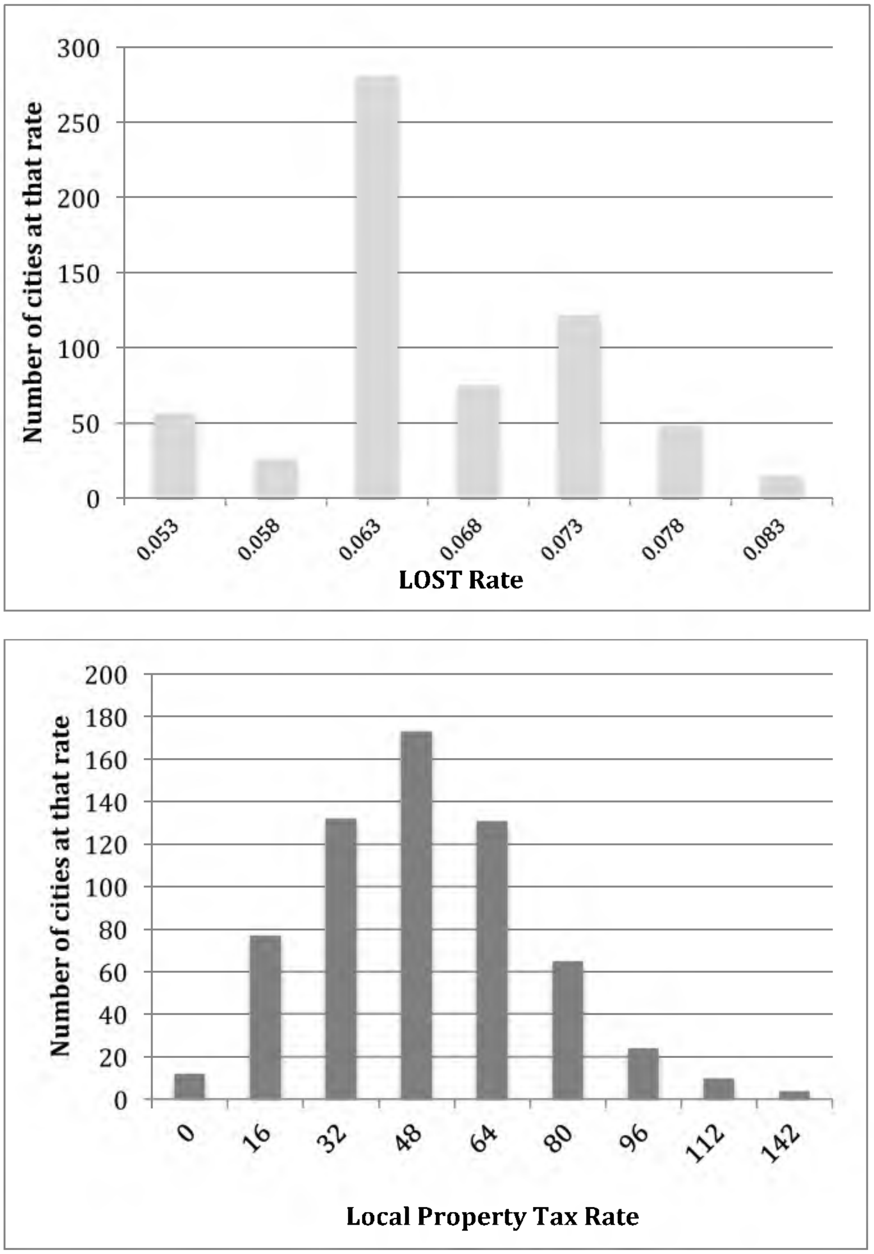
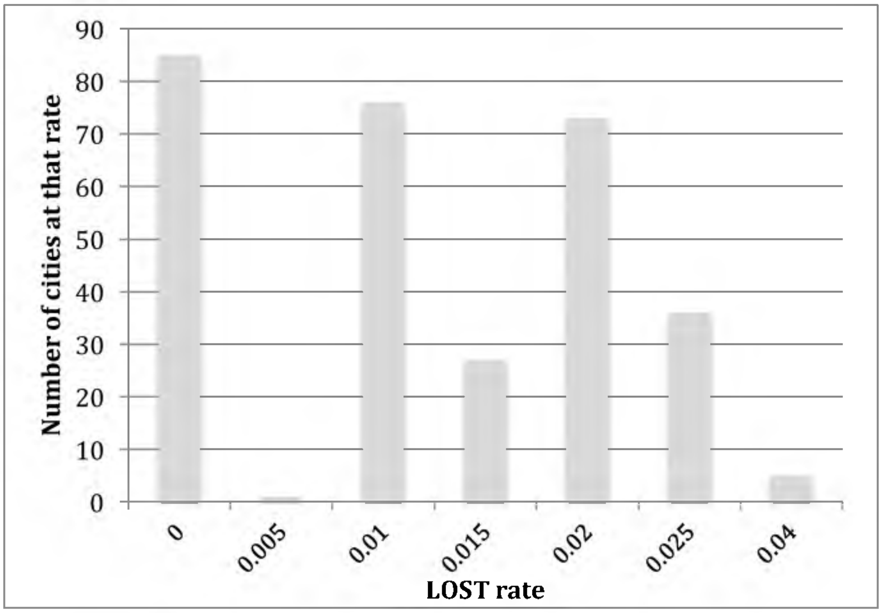


Figure B10: Kansas rate histograms



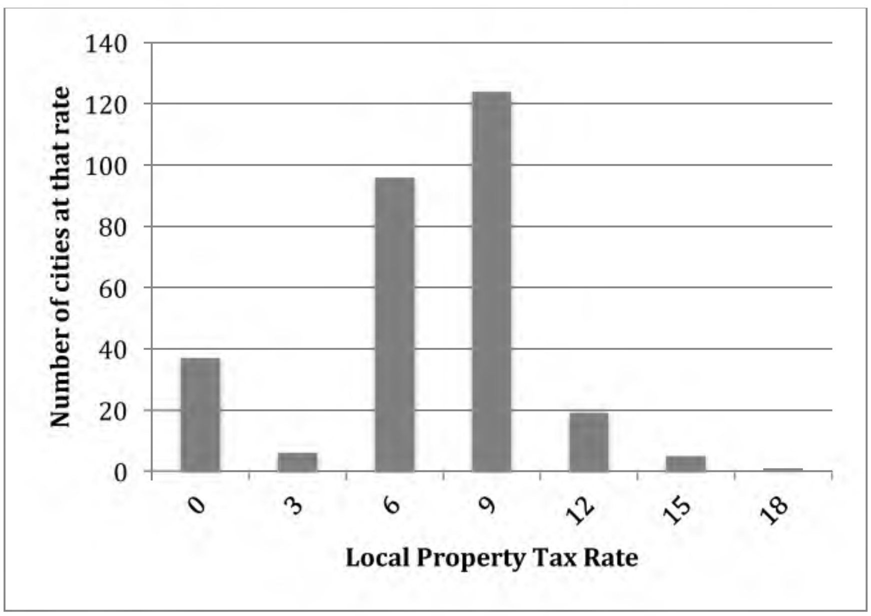


Figure B11: Louisiana rate histograms

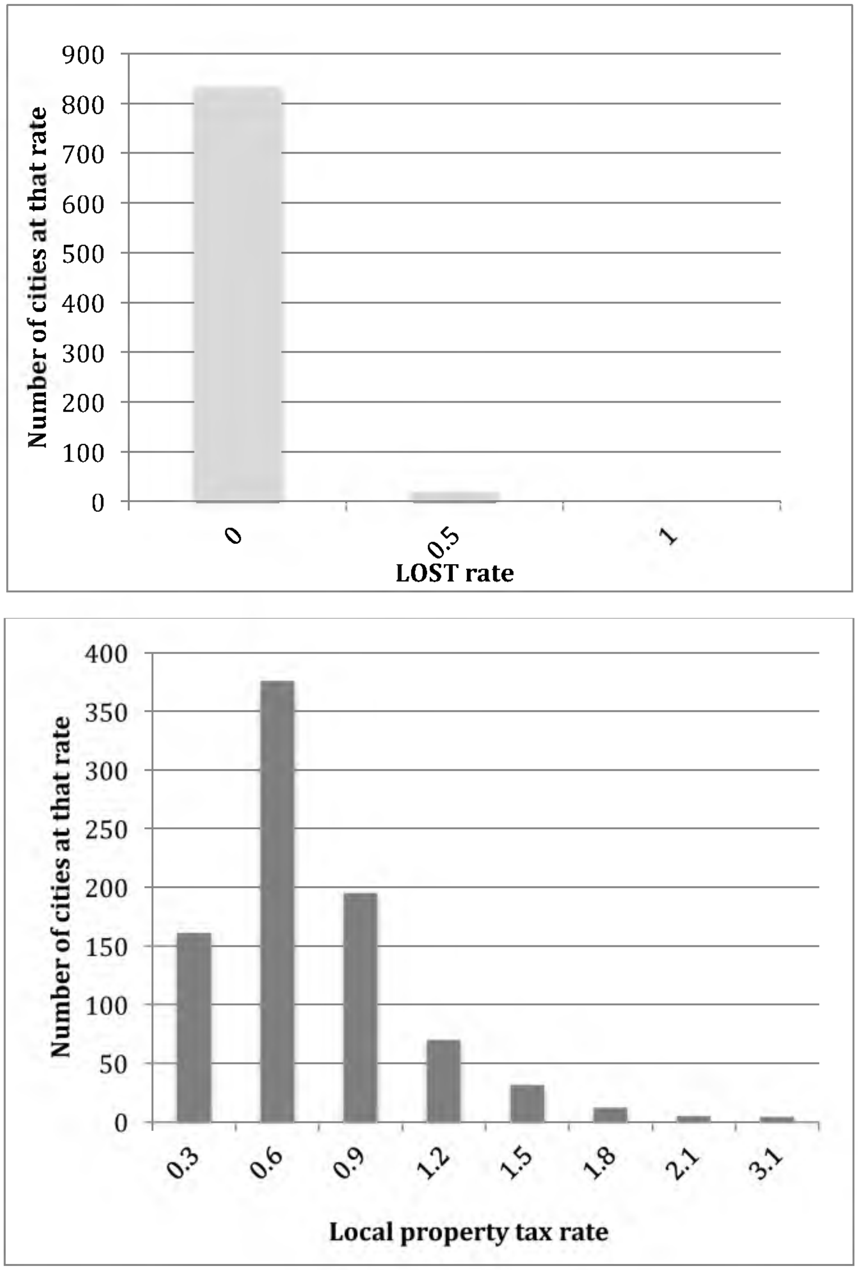
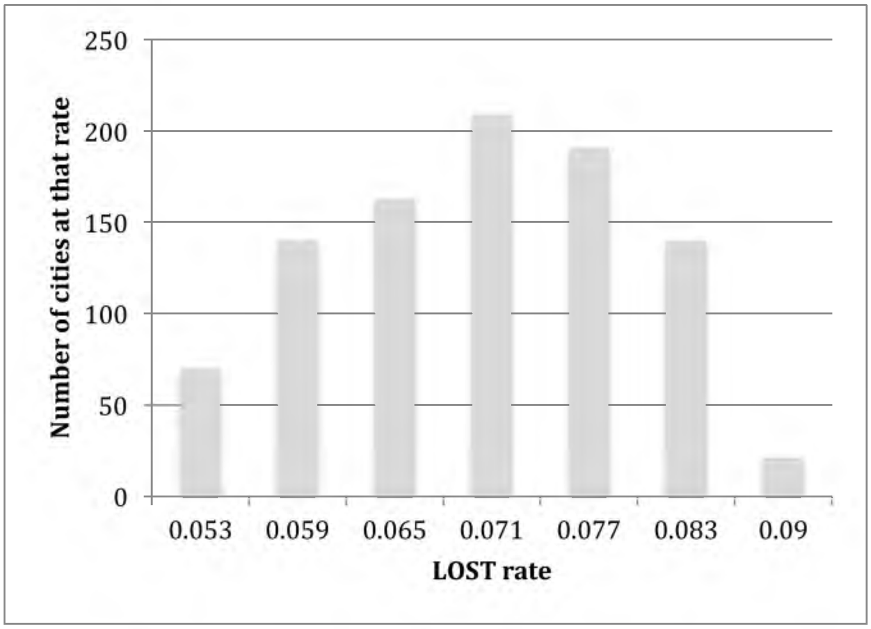


Figure B12: Minnesota rate histograms



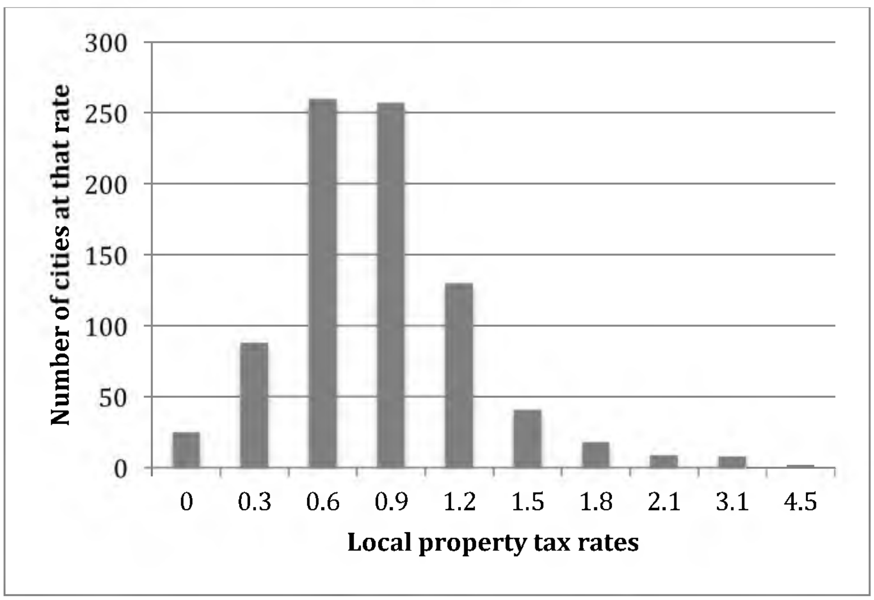


Figure B13: Missouri rate histograms

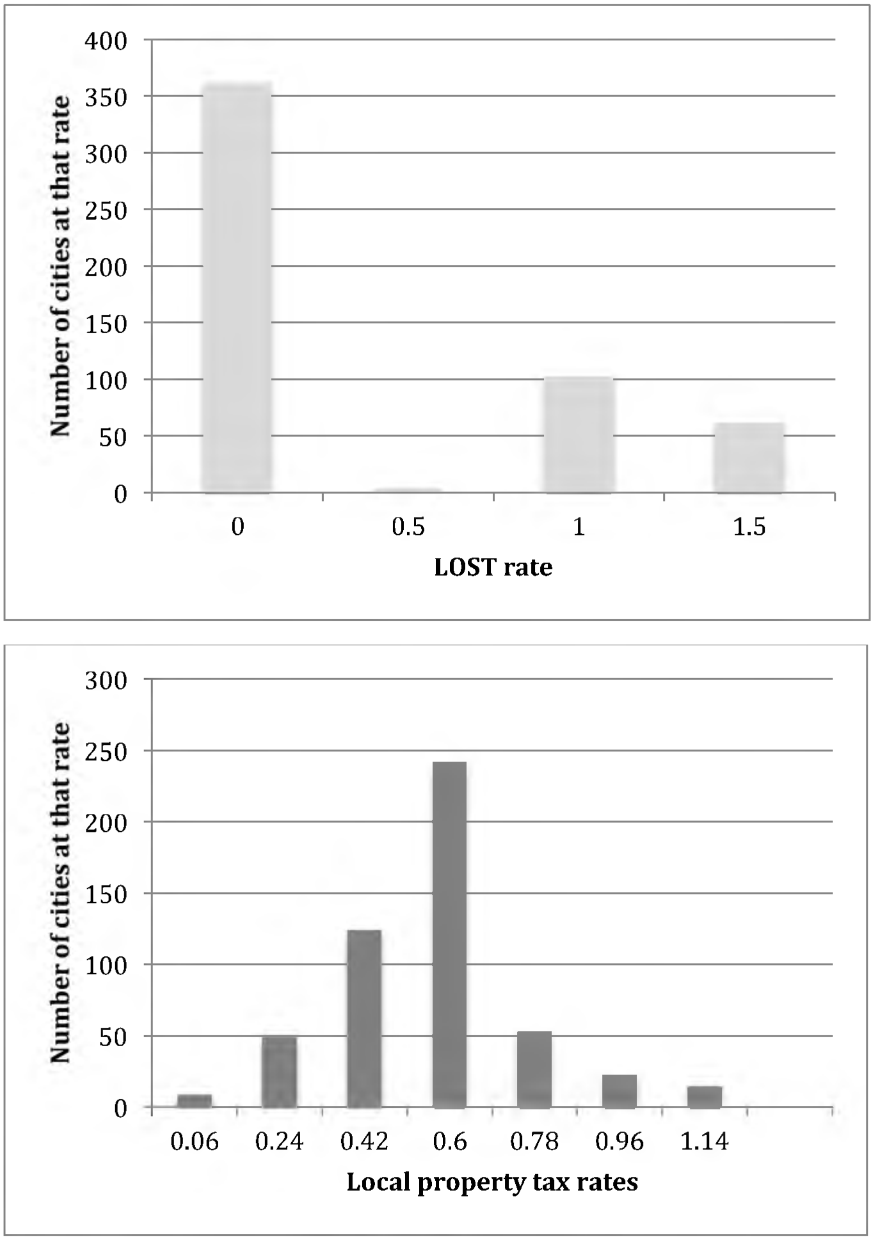


Figure B14: Nebraska rate histograms

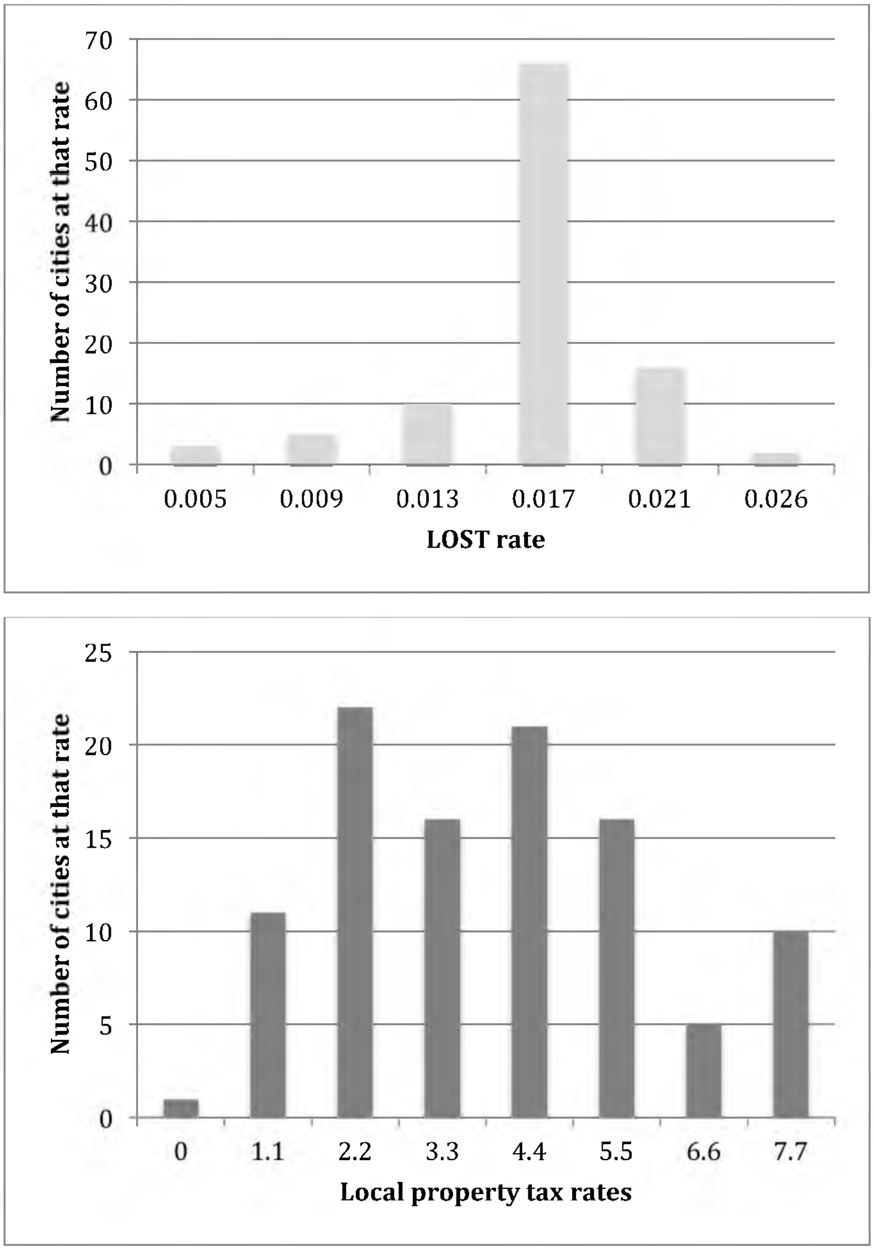
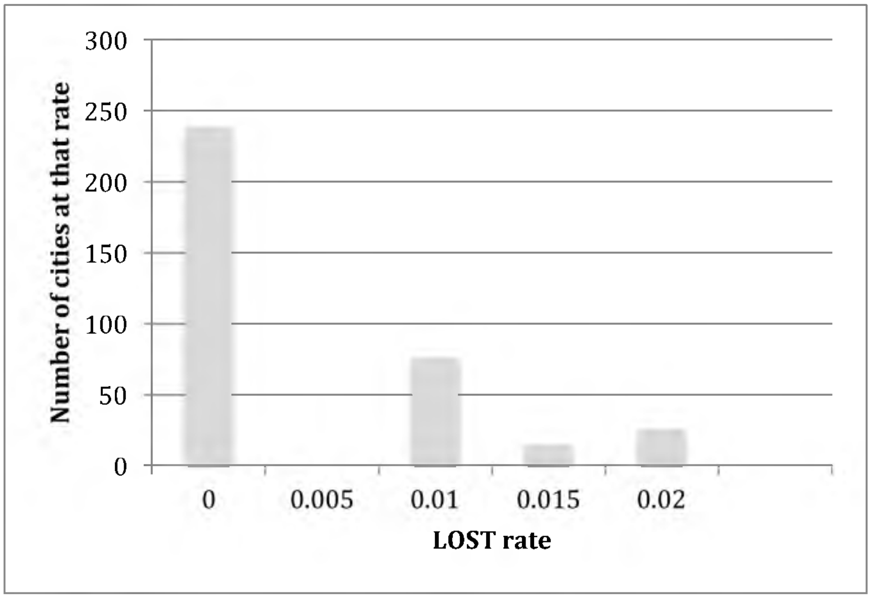


Figure B15: New Mexico rate histograms



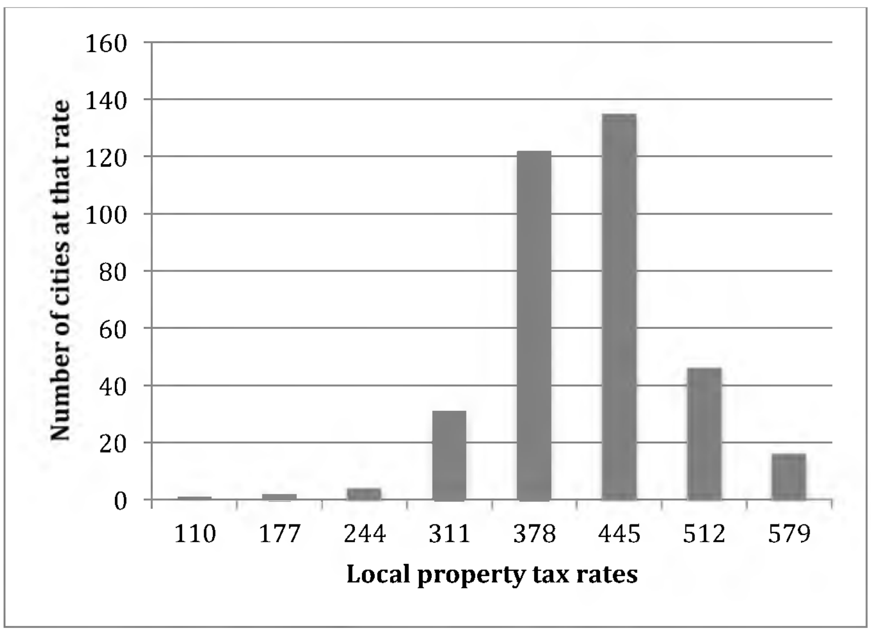
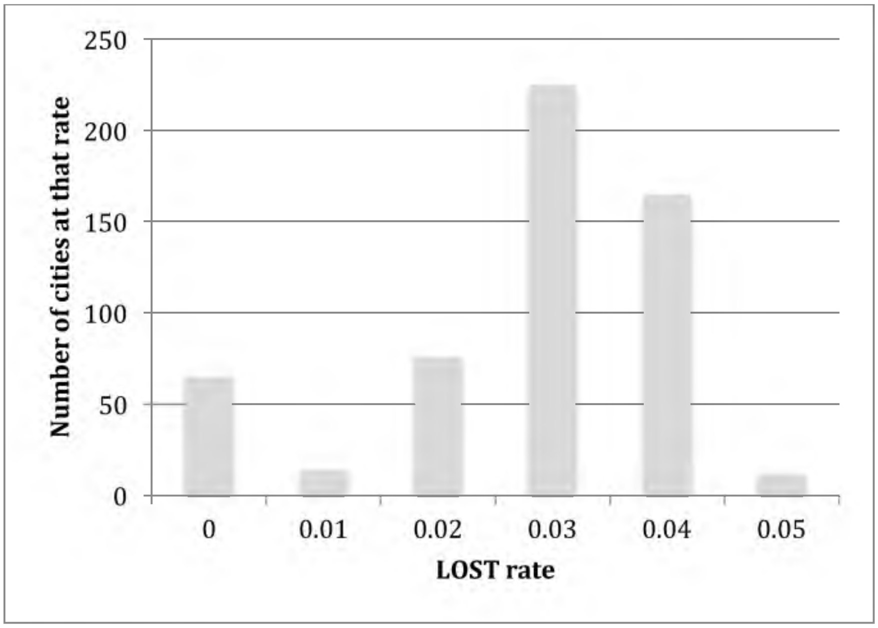


Figure B16: North Dakota rate histograms



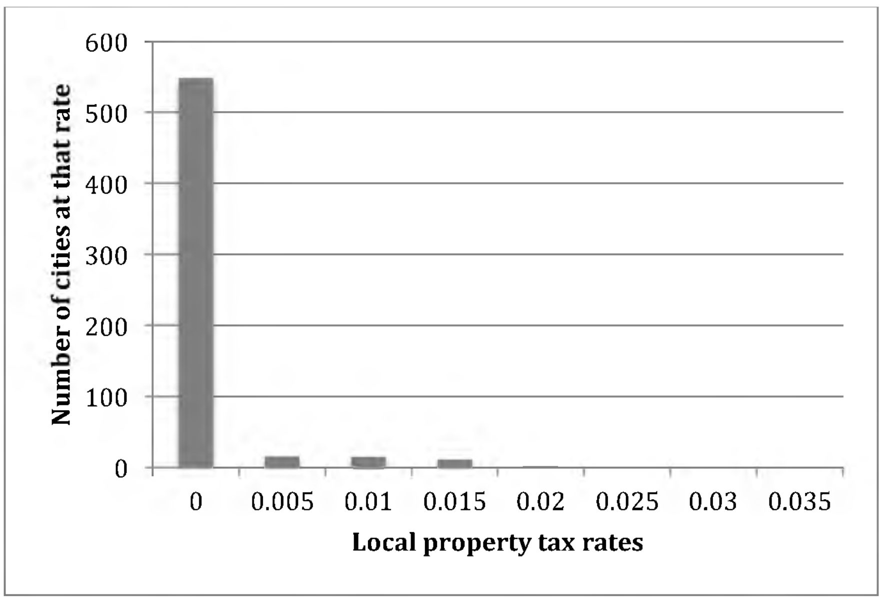
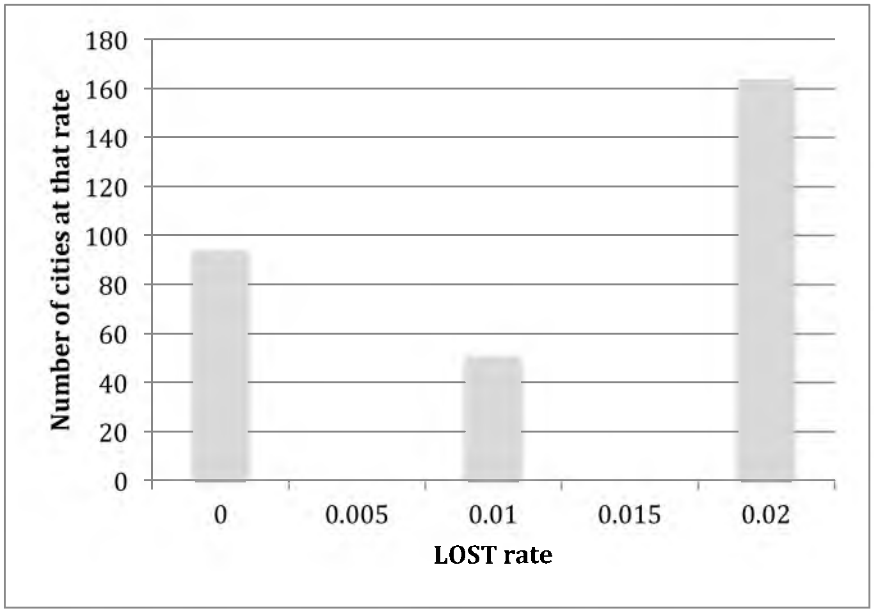


Figure B17: Oklahoma rate histograms



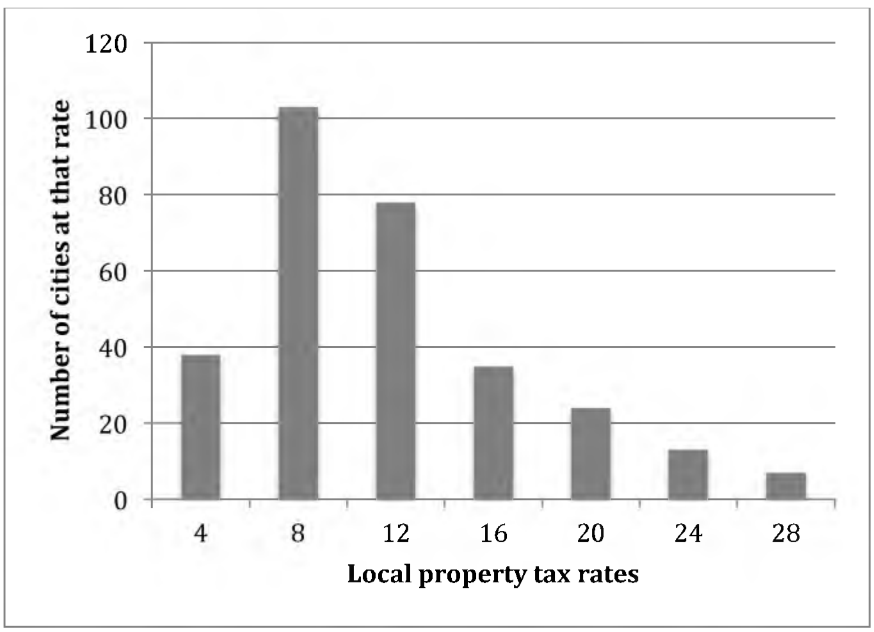
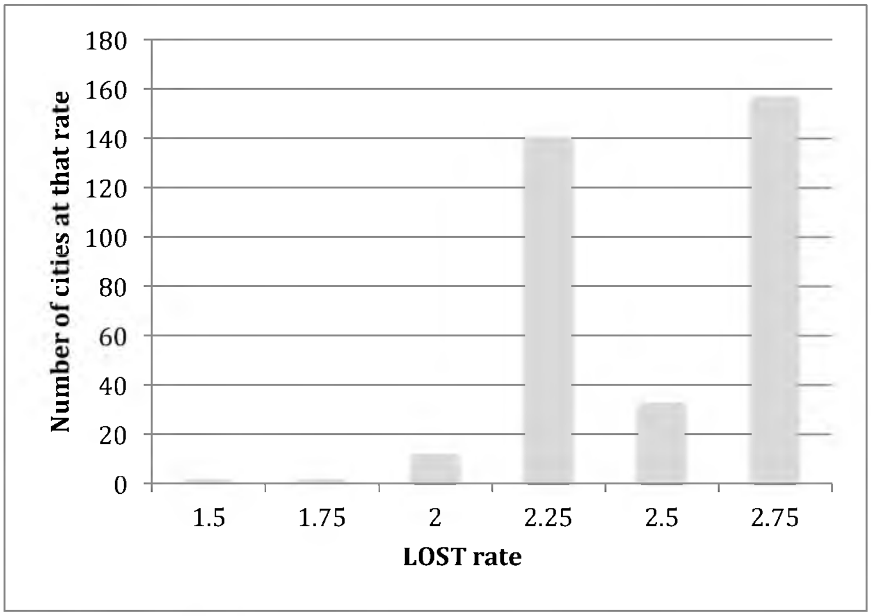


Figure B18: South Dakota rate histograms



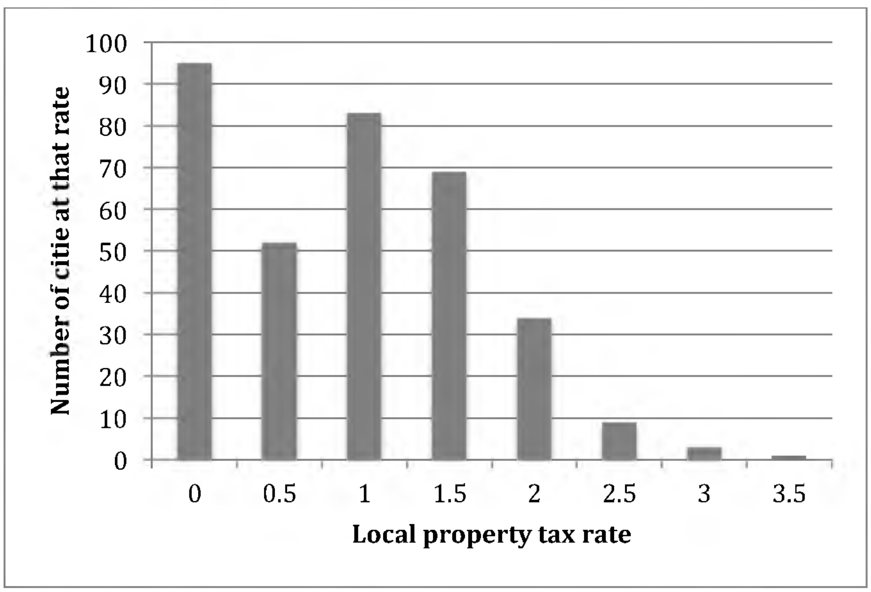
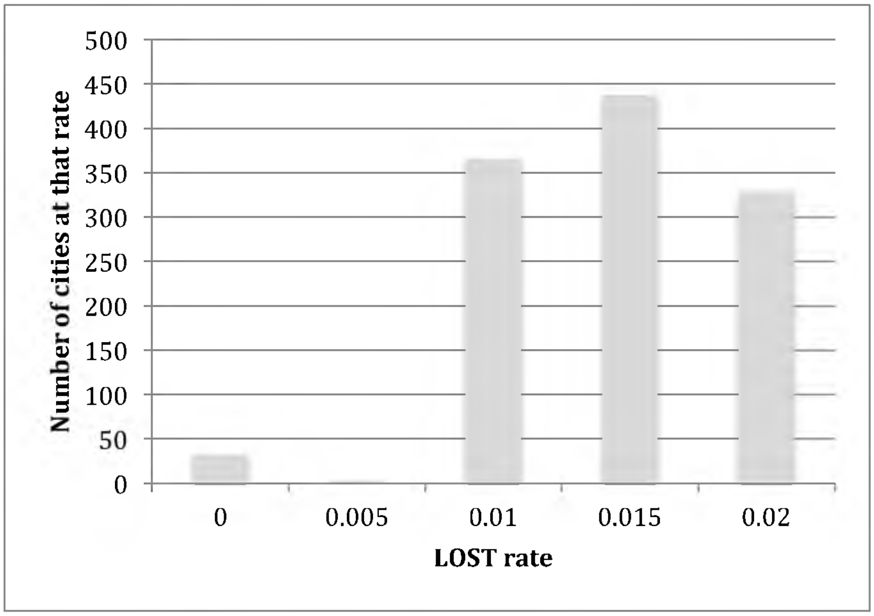


Figure B19: Tennessee rate histograms



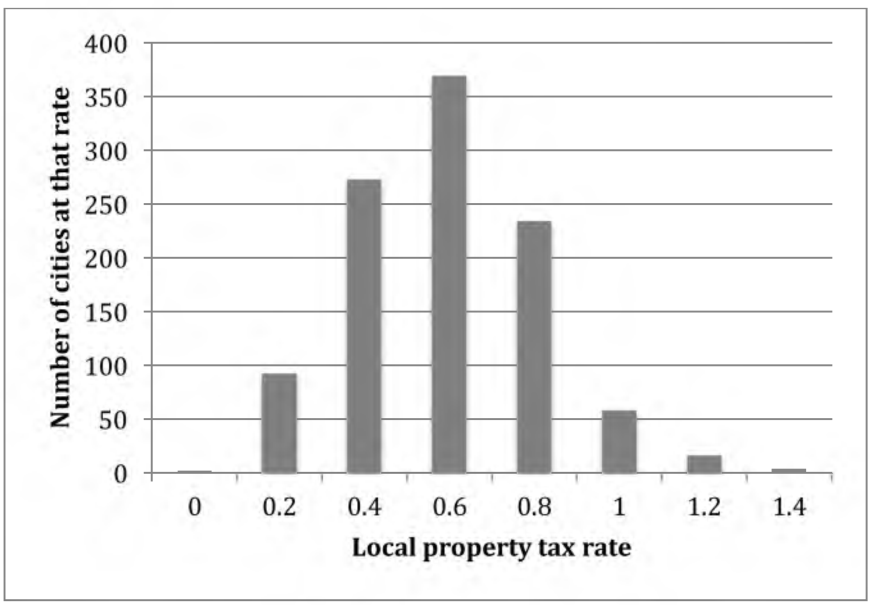
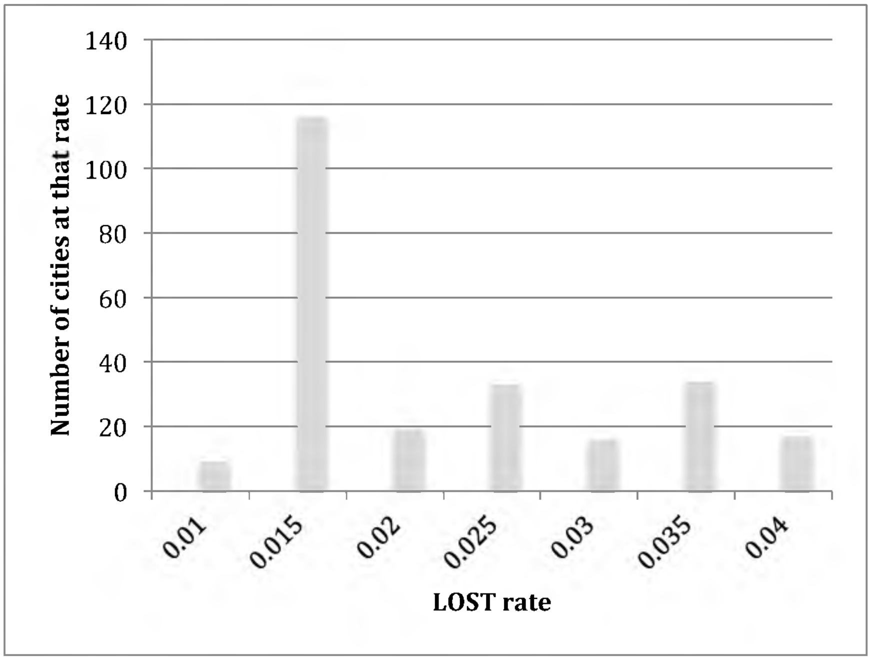


Figure B20: Texas rate histograms



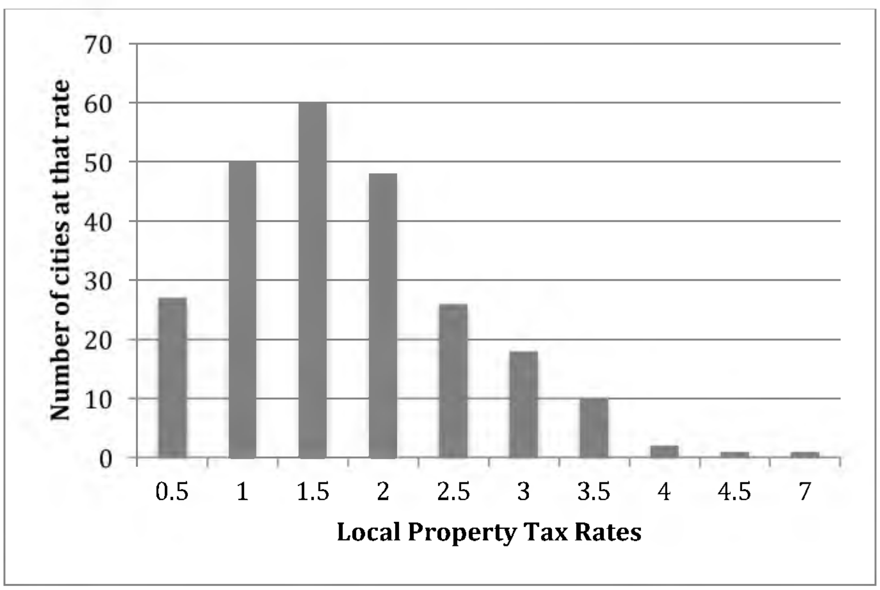
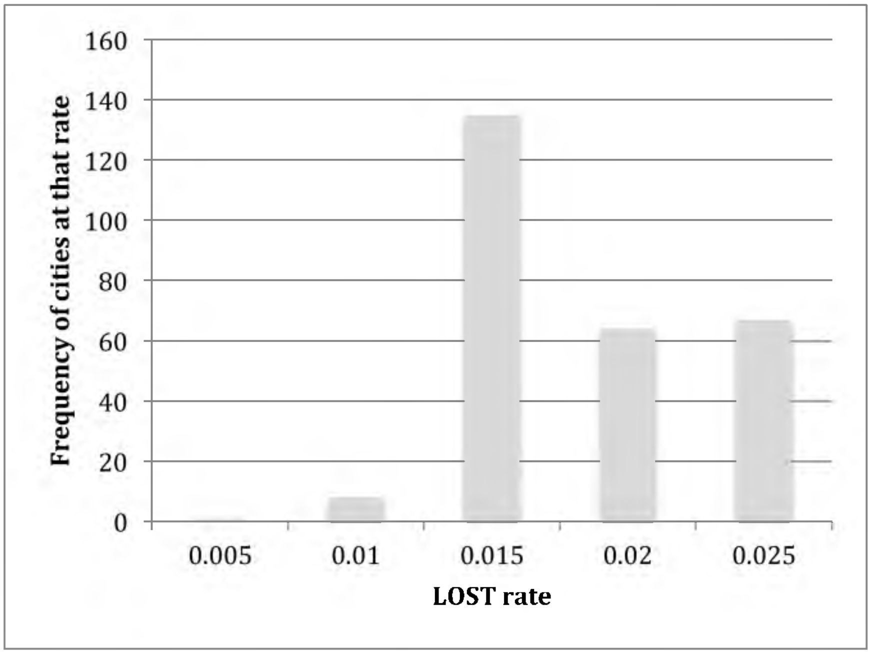


Figure B21: Utah rate histograms



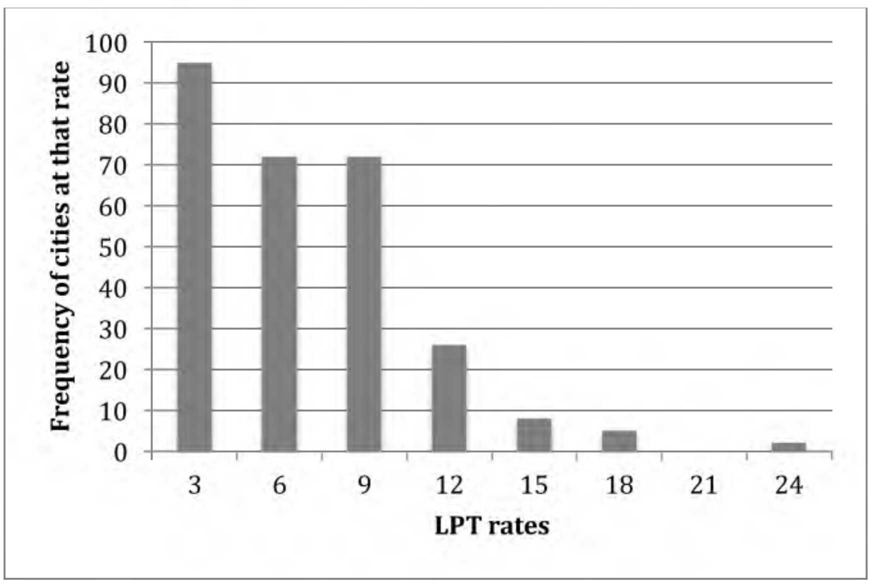


Figure B22: Washington rate histograms

APPENDIX C

ADDITIONAL STATISTICAL TABLES

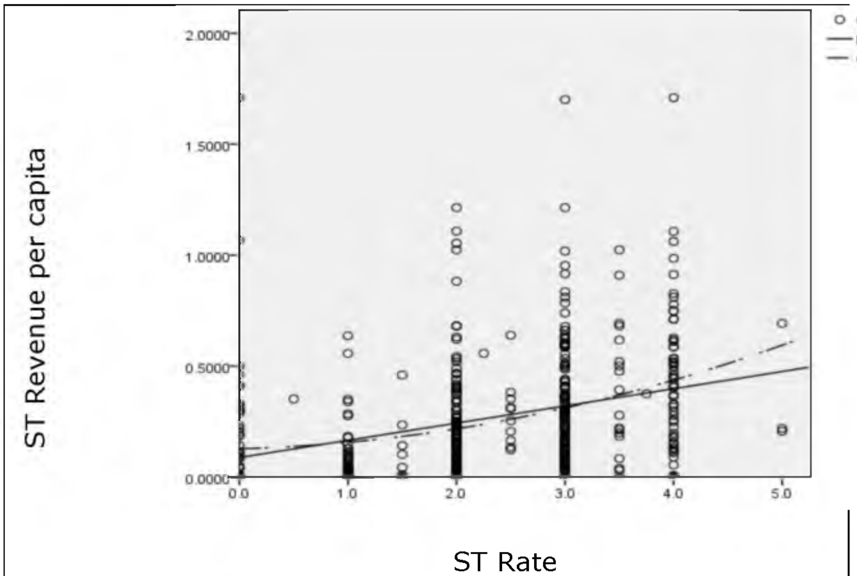
Table C.1: Average correlation scores across all 22 study states for each of the 18 predictive variables

LOST rate average correlation scores		LPT rate average correlation scores	
Near-Neighbor average LOST rate	0.363	Near-Neighbor average LPT rate	0.281
Sales tax revenue per capita	0.335	Distant-Neighbor average LPT rate	0.235
Distant-Neighbor average LOST rate	0.233	Property tax revenue per capita	0.218
Maintenance & operations payments per capita	0.173	Population as a percentage of the metro area	0.131
Average home value	0.171	Municipal population	0.115
Percent voting for Obama in 2008	0.168	Maintenance & operations payments per capita	0.100
Other tax revenue per capita	0.167	Revenue from fees per capita	0.079
Property tax revenue per capita	0.152	Municipal Sales Tax Rate	0.064
Number of neighbors within 10 miles	0.114	Capital outlay payments per capita	0.058
Revenue from fees per capita	0.112	Intergovernmental revenue in per capita	0.050
Municipal population	0.101	Sales tax revenue per capita	0.011
Average household income	0.092	Other tax revenue per capita	0.002
Capital outlay payments per capita	0.092	Outgoing IGR payments per capita	0.002
Population as a percentage of the metro area	0.086	Percent voting for Obama in 2008	-0.022
Outgoing IGR payments per capita	0.068	Percentage of rural population (density)	-0.044
Municipal Property Tax Rate	0.064	Number of neighbors within 10 miles	-0.048
Intergovernmental revenue in per capita	0.049	Average household income	-0.068
Percentage of rural population (density)	-0.193	Average home value	-0.095

Table C1 is the complete results for Table 4.3. Here are all the average predictive scores for all 18 variables for each of the two independent variables across all states.

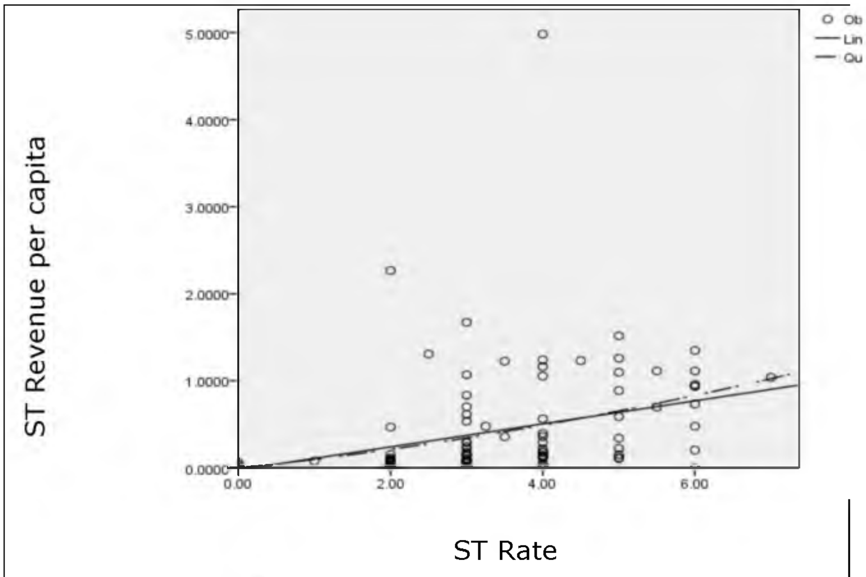
APPENDIX D

RATE-TO-REVENUE DATA



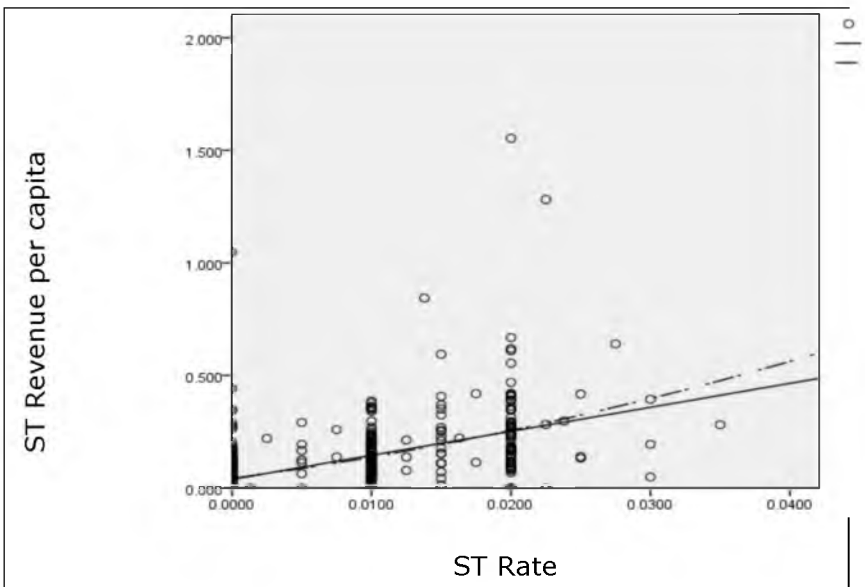
Linear fit r^2	.117

Figure D1: Alabama



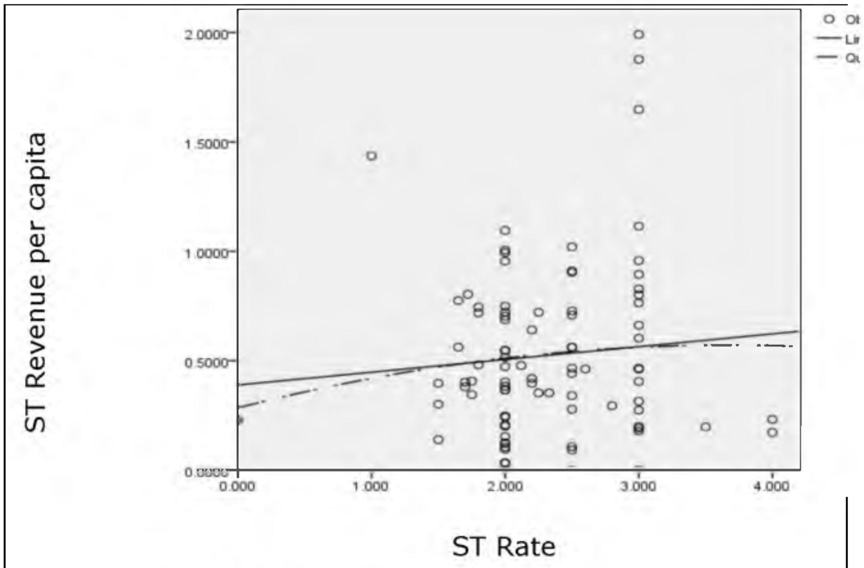
Linear fit r^2	.205

Figure D2: Alaska



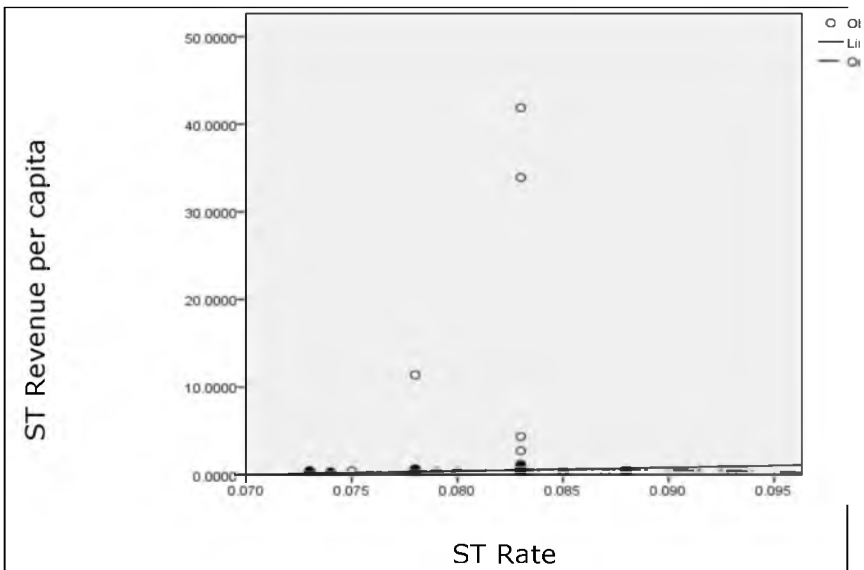
Linear fit r^2	.276

Figure D3: Arkansas



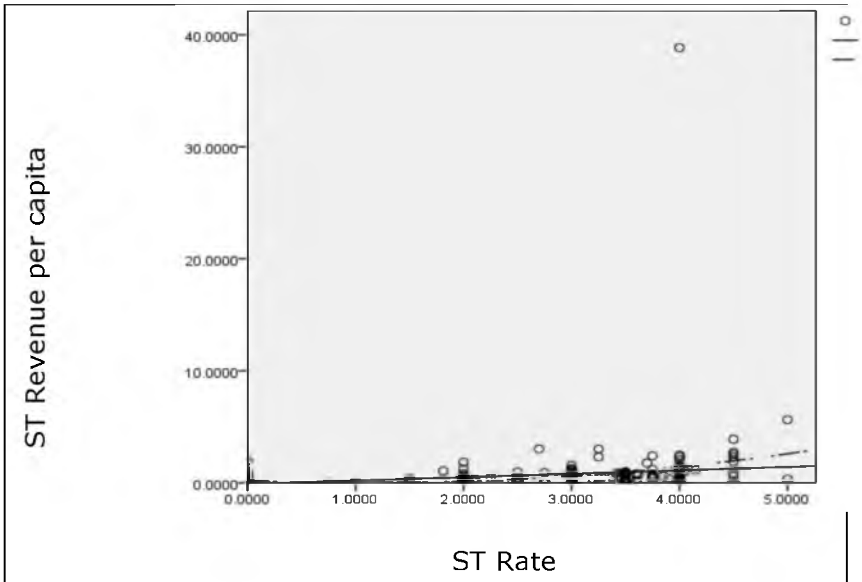
Linear fit r^2	.008

Figure D4: Arizona



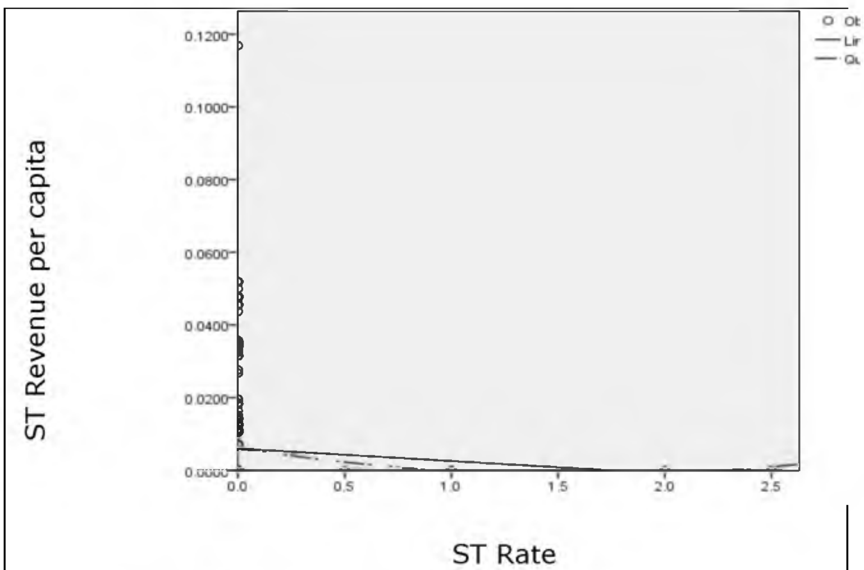
Linear fit r^2	.005

Figure D5: California



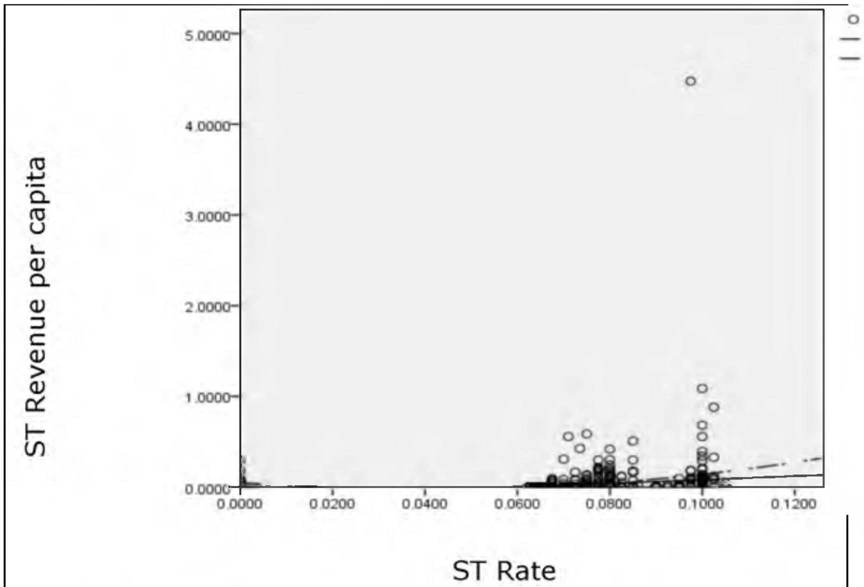
Linear fit r^2	.032

Figure D6: Colorado



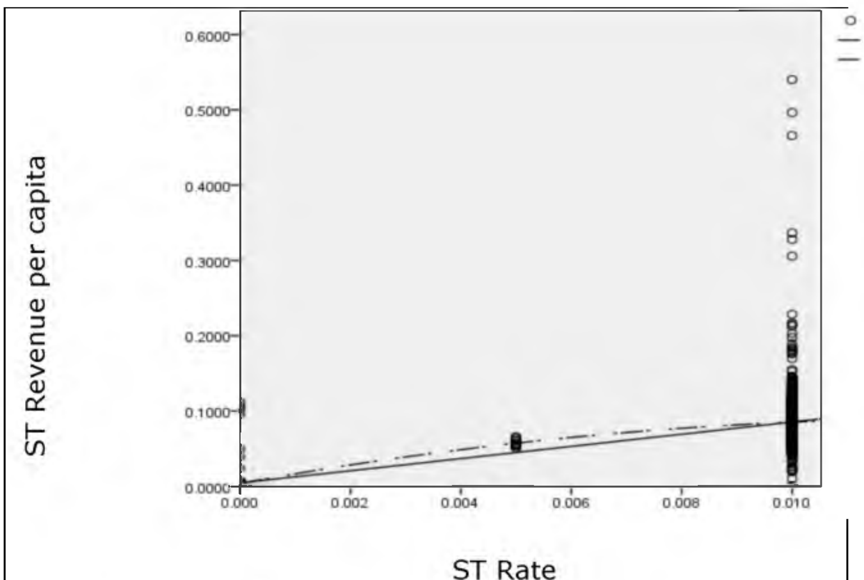
Linear fit r^2	.005

Figure D7: Idaho



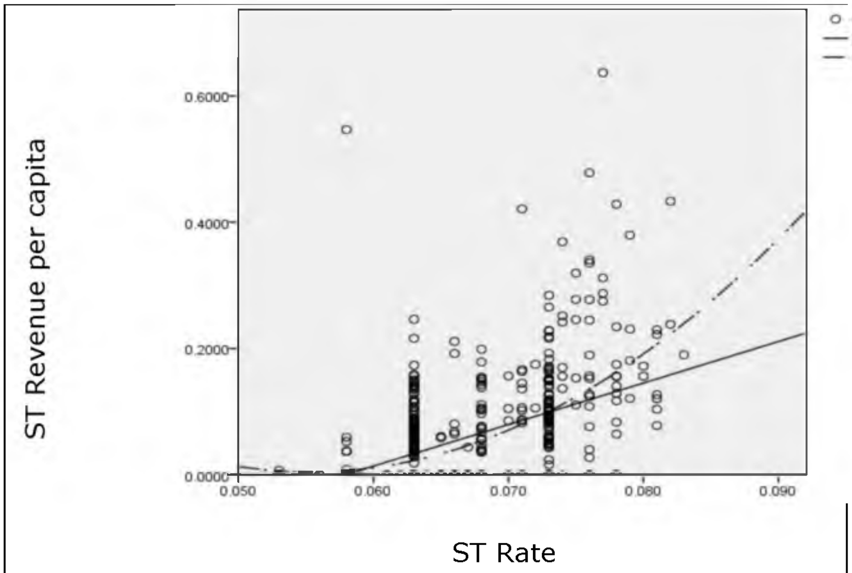
Linear fit r^2	.032

Figure D8: Illinois



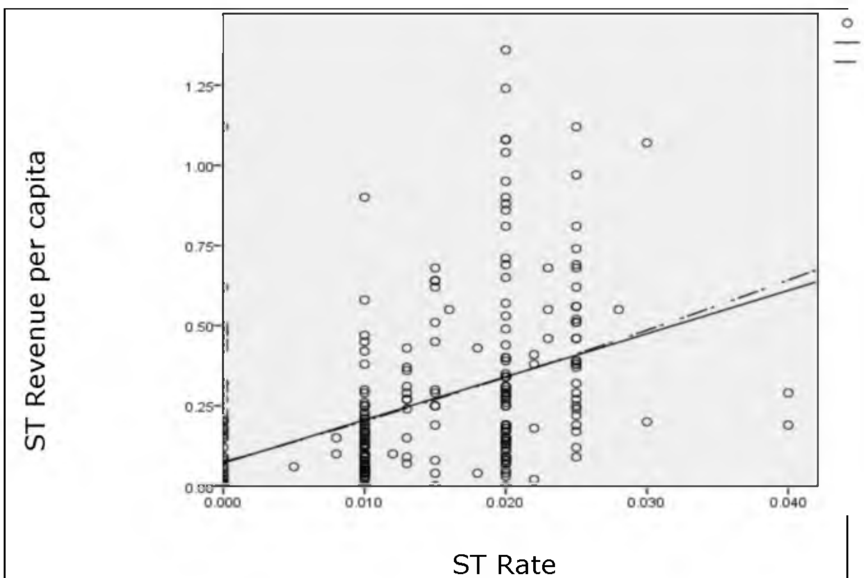
Linear fit r^2	.368

Figure D9: Iowa



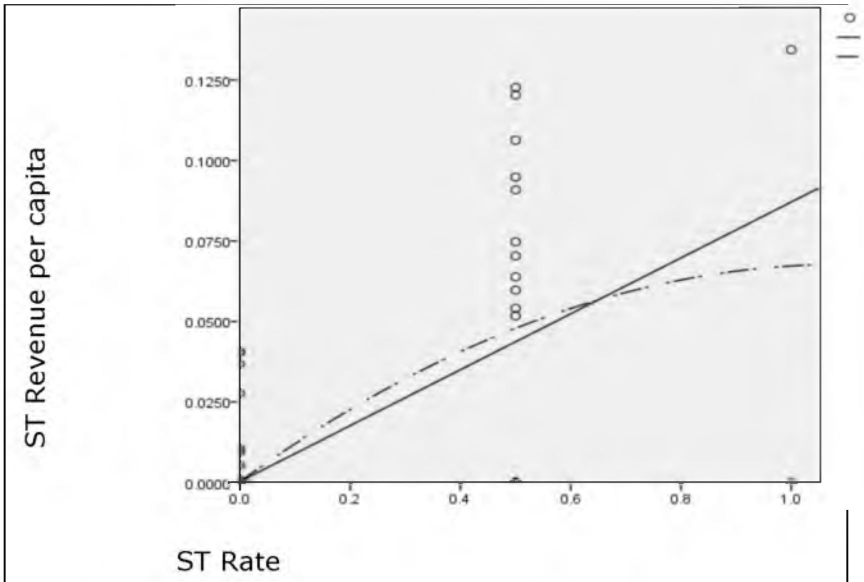
Linear fit r^2	.275

Figure D10: Kansas



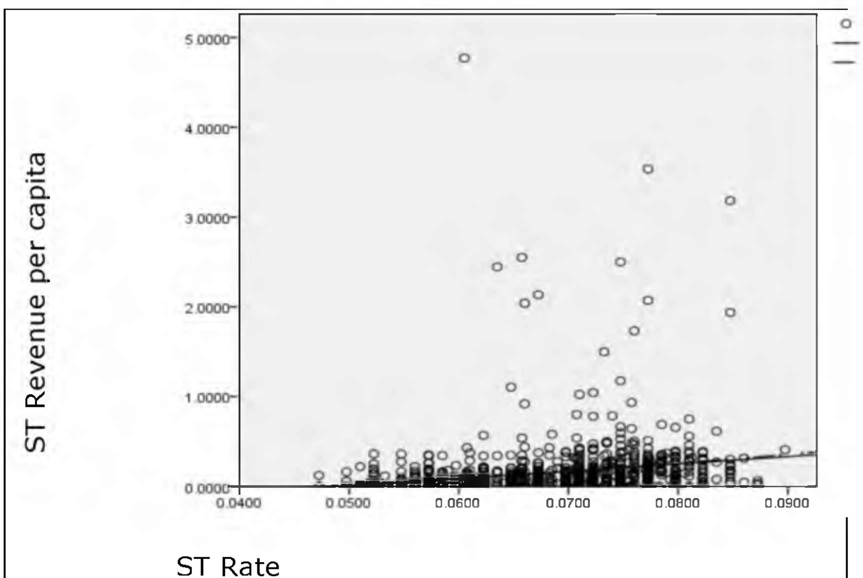
Linear fit r^2	.225

Figure D11: Louisiana



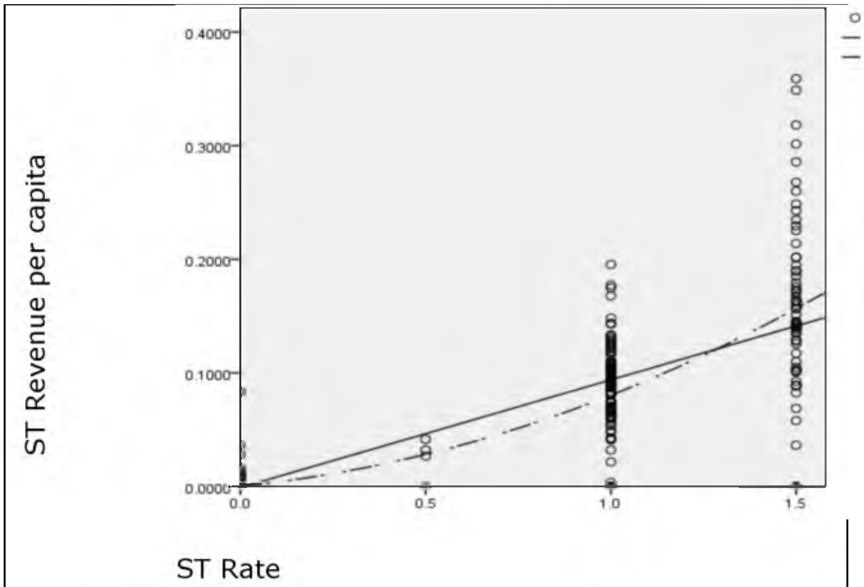
Linear fit r^2	.479

Figure D12: Minnesota



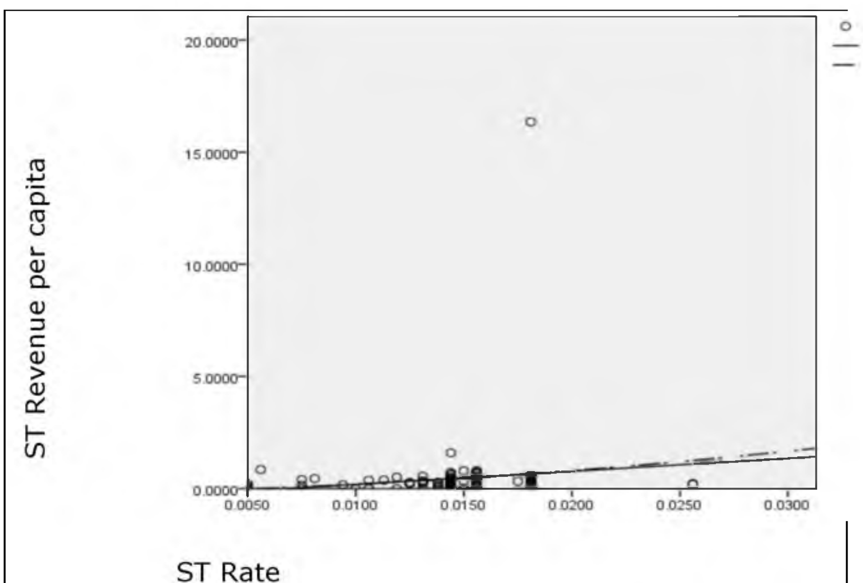
Linear fit r^2	.049

Figure D13: Missouri



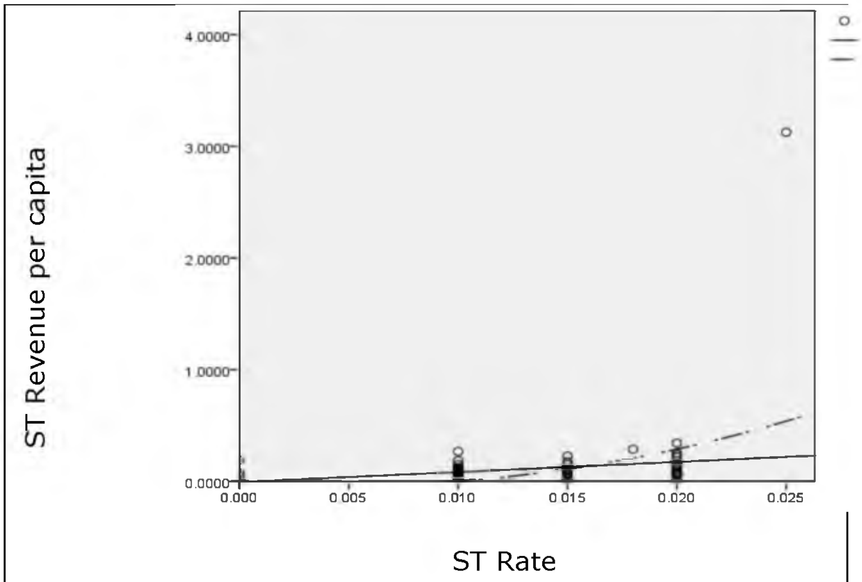
Linear fit r^2	.710

Figure D14: Nebraska



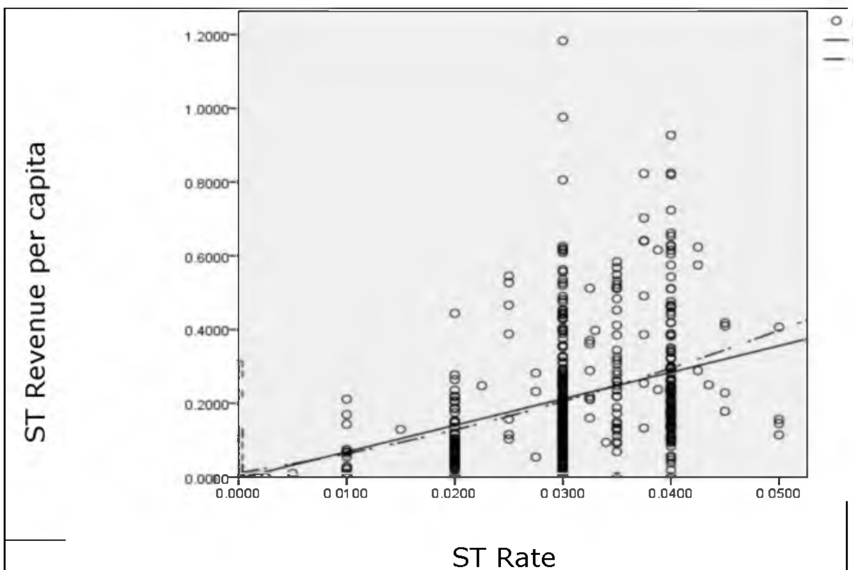
Linear fit r^2	.015

Figure D15: New Mexico



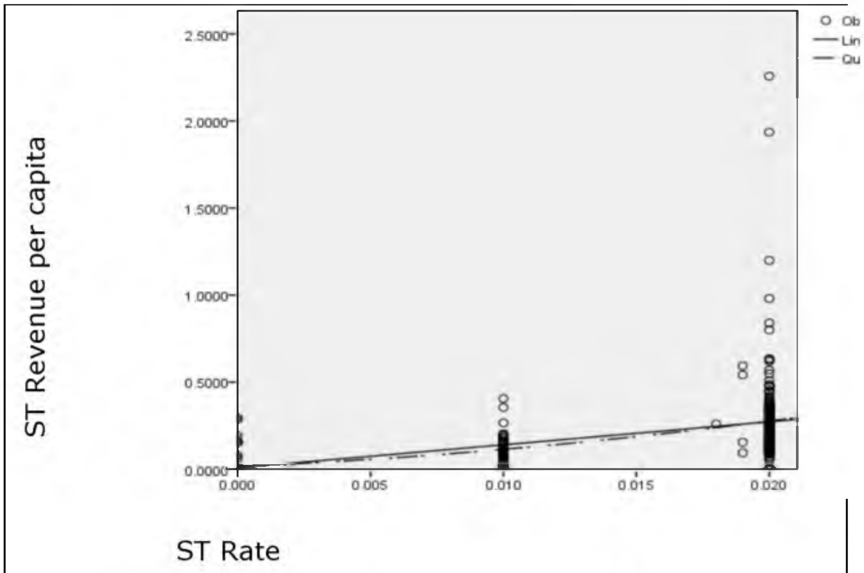
Linear fit r^2	.117

Figure D16: North Dakota



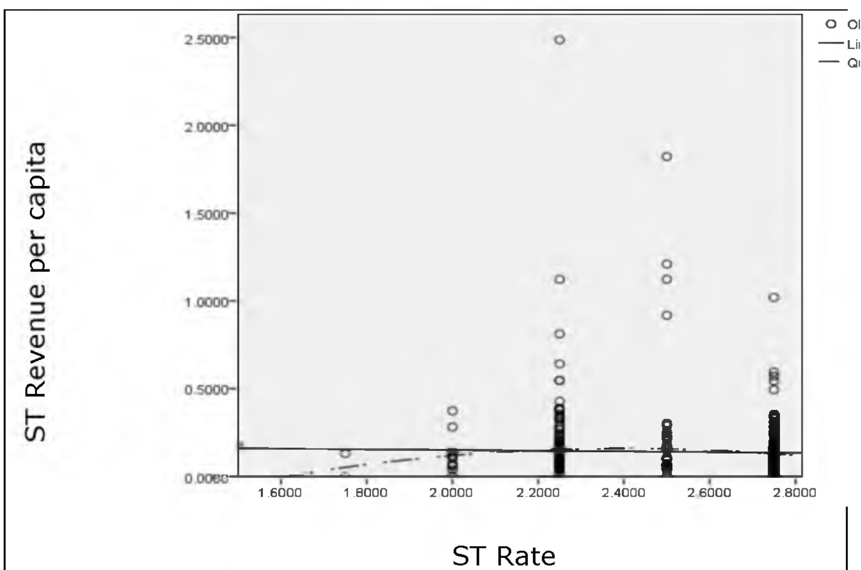
Linear fit r^2	.241

Figure D17: Oklahoma



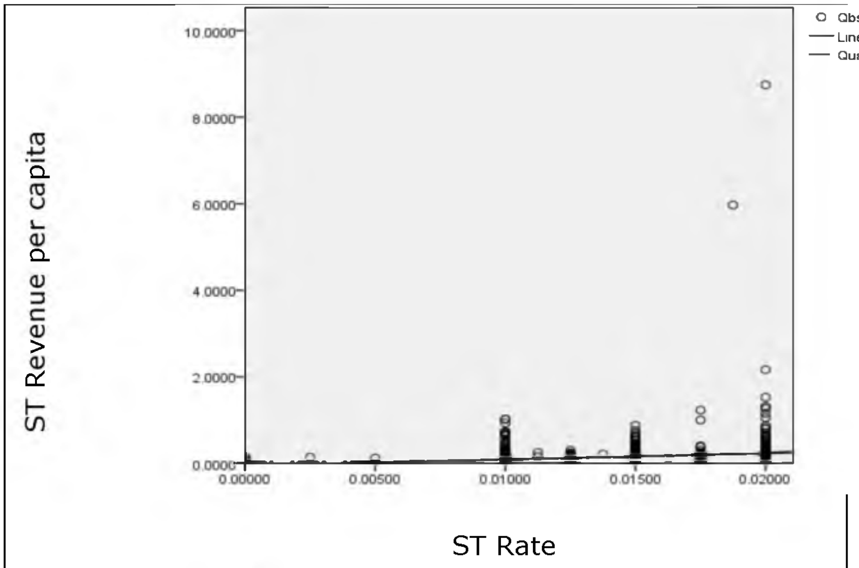
Linear fit r^2	.254

Figure D18: South Dakota



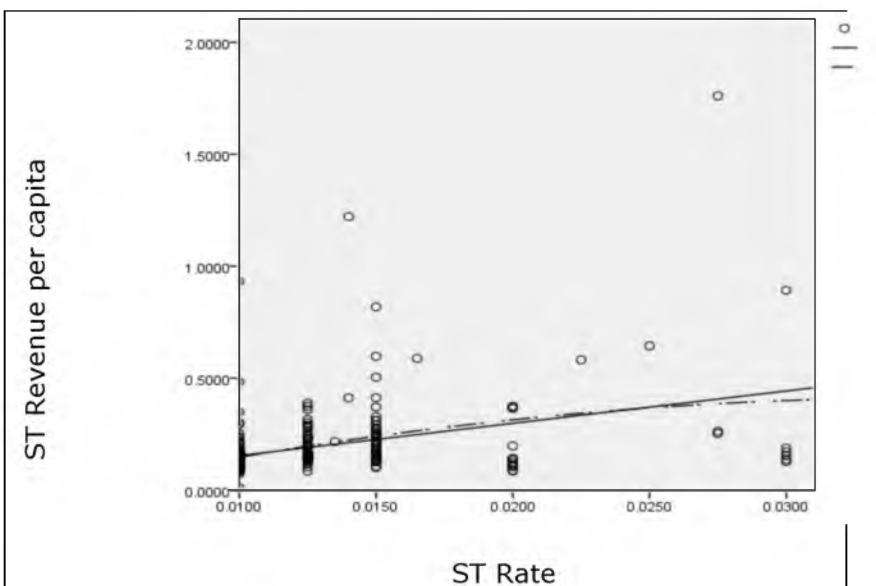
Linear fit r^2	.000

Figure D19: Tennessee



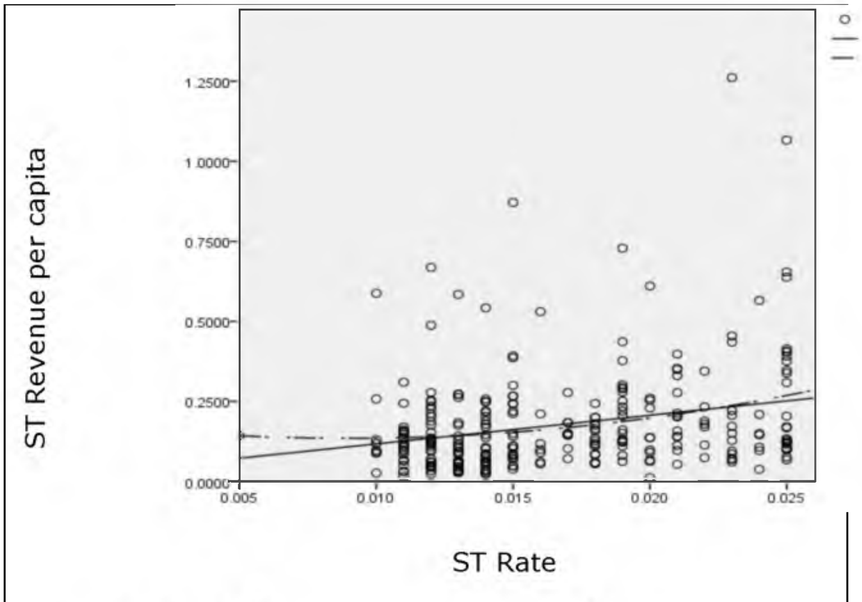
Linear fit r^2	.032

Figure D20: Texas



Linear fit r^2	.132

Figure D21: Utah



Linear fit r^2	.132

Figure D22: Washington

APPENDIX E

VERTICAL CONTROLS SURVEYS

Sales Tax Survey

All questions are applicable to the 2007-2008 fiscal year. If you're unsure whether a rule has changed since 2007-2008, answer with regard to the current conditions. All questions refer to state controls over city behaviors. Any self-imposed municipal limitation is not included. All questions refer to sales taxes on "all" transactions. Some states exempt certain items (the most common being food), but the rates I'm interested in apply to general sales, not the specialty rates that might apply to (among others) alcohol, hotels, or sexually oriented businesses.

	ES	N O
1. Does the state have a municipal base local option sales tax (LOST) general rate? For instance, some states allow their cities to issue a 1% LOST rate, but that "general rate" cannot vary above or below 1%. However, answering, "yes" to this question does not preclude additional LOST options attached to "revenue specific" LOSTs. See question 4 for clarification. This question does not necessarily mean that the state compels a city to levy that LOST only that there is a base rate (question 2). It simply means that if a city in your state levies a LOST, that rate will be at least XX; that levy could be voluntary or compelled.		
1(a). IF NO, what is the range of variance of the "general LOST rate"? For instance, if a city chooses to levy a LOST, it could choose a rate as low as 1% or as high as 2.5%. These "general rates" refer to unrestricted spending lines. See question 4 for clarification.	RATE VARIANCE FROM TO	
2. Does the state require municipalities to levy a minimum LOST?		
2(a). IF YES, what is the "required minimum" LOST rate?	RATE	
3. Does the state allow ALL cities to levy the "general rate" as described above? For instance, some states only allow "resort communities" or "large cities" to levy such general-rate LOSTs.		
3(a). IF NO, describe in as few words as possible, what requirement(s) a city must meet in order to levy the general LOST. *For instance, "resort," "large population" or "home rule city."*	REQUIREMENTS 1. 2. 3.	
4. Does the state allow cities to levy "revenue specific" LOSTS in addition to the "general rate" as in question 1? For instance, many states allow their cities to levy an "airport" or "hospital" sales tax of, say .25%. Again, these "revenue specific" taxes refer to where the money will be spent, not the items being taxed. Please consider all revenue specific LOSTs, even if all cities in the state are not eligible for every LOST.		
4(a). IF YES to 4, how many different LOST options does the state allow for each city? Again, include the total number of different LOSTs, even if not all cities are eligible to levy all LOSTS.	# SPECIFIC LOSTS	
4(b). IF YES to 4, what is the TOTAL rate variance of all the different options available to each city? For instance, if cities were allowed "parks," "hospital," and "transportation" options of .25% each, the total rate variance would be .75%	TOTAL RATE	
5. Is there a state mandated waiting period between each successive change in the LOST rate? These limitations might restrict changes to the general rate within a certain time, or adding more than one specific revenue LOST in a certain time period, or any combination of the two.		

6. Can the general LOST rate be initiated by the city council (or commission) without city residents' approval? *This question is NA if the state mandates a general LOST rate for every municipality; see question 2 above.*		
7. Can the general LOST rate be initiated by the voters (e.g., initiative) without the city leaders' approval? *This question is NA if the state mandates a general LOST rate for every municipality; see question 2 above.*		
8. Does adoption of a general LOST rate need to be authorized by both voters and city leaders? This question is NA if the state mandates a general LOST rate for every municipality; see question 2 above.		
9. Can existing general LOST rates be changed by the city council (or commission) alone—without the voters approval?		
10. Can existing general LOST rates be changed by the voters (e.g., initiative) alone—without the council's approval?		
11. Do existing LOST rate changes need to be authorized by both voters and city leaders?		
12. Can the revenue specific LOST rates be adopted/changed by the city council (or commission) alone? This includes initial authorization of the revenue specific LOST levy. If adoption rules are different than "change existing" rules, the rule regarding "adoption" will be sufficient. In this case, please attach an asterisk to your answer.		
13. Can the revenue specific LOST rates be adopted/changed by the voters (via initiative) alone? This includes initial authorization of the revenue specific LOST levy. If adoption rules are different than "change existing" rules, the rule regarding "adoption" will be sufficient. In this case, please attach an asterisk to your answer.		
14. Do revenue specific LOST rate adoption/changes need to be authorized by both voters and city leaders? This includes initial authorization of the revenue specific LOST levy. If adoption rules are different than "change existing" rules, the rule regarding "adoption" will be sufficient. In this case, please attach an asterisk to your answer.		
15. If any of conditions of questions 6, 8, 9, 11, 12, or 14 (council approval needed for make changes) are true, do changes in the either the general OR revenue specific rates require a vote from a supermajority in the city council or commission? *If the adoption rules are different from the change rules, list the "adoption" change rules with an asterisk by the answer.*		
16. Does a change in LOST rate (either general or revenue specific or both) require approval of any state office? For instance if a city wanted to raise its rate from 1.5% to 1.75%, does it require a vote from the state legislature (or some other office) to do so? This may be in addition to the controls listed in questions 6-12.		
17. Is there a general state rate in addition to the local rate(s)?		
17(a). IF YES, what is this general state rate?	RATE	
18. Are their potentially overlapping additional LOST rates? For instance, many states allow cities and counties to impose their own LOSTs. Please answer "no" if your state allows a county LOST but that LOST is not applicable within municipal borders.		
19. Can multiple cities collectively raise or implement a LOST rate (either general or revenue specific)? *For instance, some states allow cities in an area to impose metropolitan-wide, uniform LOSTs.*		
20. Do changes in a city's LOST rate have to be approved by that city's neighbors? For instance, city X wants to raise its rate from 1.5% to 1.75%. Does X need the approval of any of its neighbors in order to do so?		
21. Does the state require cities to share any of their LOST revenue? For instance, some states require cities to share some portion of their LOST revenue with either their immediate neighbors or to place a portion of their LOST revenue back into a general fund controlled by the state.		
22. Are cities required to hold specific public hearings in order to raise/initiate either general or revenue specific LOST rates? *This could be something as simple as a city council meeting, but many states require changes in LOST to be considered in a public meeting, whereas many other legal changes may not fall under that requirement.*		
23. Does your state attach automatic sunset provisions on local sales taxes? For instance, some states require their cities to put annual or semi-annual votes to the cities to "continue" the current rates. Please answer "yes" even if a votes by the city council alone are required to continue levying sales taxes.		

Property Tax Survey

All questions are applicable to the 2007-2008 fiscal year. If you are unsure about the status of a particular condition in 2007-08, put the current condition. All questions refer to state controls over city behaviors. Any self-imposed municipal limitation is not included. If some city charters require a 2/3 majority, but such a 2/3 majority is not required by state law, the answer to question 15 would be "no." All the following questions refer to general-rate residential property tax rates. Specialty property tax rates, like those imposed/waived on a specific type of residence are not included. For instance, if a city had a 1% general LPT but multi-family dwellings, or had increased rates for multi-family dwellings, those would not be included.

QUESTION	YES	NO
1. Does the state have a maximum residential local property tax (LPT) rate? For instance, some states allow their cities to levy a 1% residential LPT but that general rate cannot vary above 1%. Do not answer, "yes" if the city can, even through difficult means, raise their general rate above a state-mandated minimum. Answer, "yes" if there are revenue-specific additional LPTs that can be imposed by a city in addition to the general (unconstrained) LPT rate (see question 3 for clarification).		
1(a) IF YES, what is the maximum general residential rate? There are many ways to measure this rate. If possible, please give the simplest rate-to-value number. For instance, state X has a 1% ceiling LPT, city Y imposes the maximum tax. A resident owning a $1m home would pay $10,000 in property taxes.	MAXIMUM LPT (please add a note below at the bottom of this survey to clarify this number if necessary)	
2. Does the state have rate limit mechanisms in addition to the maximum rate?		
2(a) Does the state restrict the growth of property taxes through tax expenditure limits (TELs)? This refers to the common practice whereby a city's LPT rates are adjusted every year by a state or city auditor to meet the city's zero-growth budget needs. A resident in this situation would suffer no increase in taxes even if his home increased in value* over the previous year.		
2(b) Does the state restrict the growth of residential property taxes through value growth limits? This is the common practice wherein states impose (for instance) a 1% growth cap per anum on the value of a home. A resident in such a city, even if her home increased in real value by 10% in the course of a year, would be taxed as if her home increased only 1% in value.		
2(c) Other growth limitation mechanisms. Please give a simple two-to-three word reference, I'll look it up.	OTHER LIMITS	
3. Does the state allow cities to levy additional, "revenue specific" LPTs on top of the "general rates?" These additional LPTs refer to the spending item, not the "type" of property being taxed. For instance, some states (even those with TELs) allow cities to create LPT line-item funding for capital construction, others for parks/hospitals/etc.		
3(a) If YES to 3, how many extra "revenue specific" levies does a state allow? If conceivably unlimited, put "unlimited."	# RATE LIMITS	
3(b) IF YES to 3, is there a state mandated rate limit for each extra "revenue specific" levy?		
4. Are all cities in the state treated equally in the number and rate of LPT levies they can impose? For instance, some cities might only allow cities over a certain population to levy either rates above a certain level and/or certain specific revenue levies.		
4(a) IF NO, list the most common requirements (e.g. population, home rule city, etc) for municipalities to impose either general or revenue specific LPT levies.	REQUIREMENTS 1. 2. 3. 4.	
5. Is there a state mandated waiting period between each successive change in the LPT rate(s)? This includes not only changes in one rate but also successive additions in revenue specific rates. A state with such a waiting period might therefore prevent a city from initiating two revenue specific LPTs in one year OR raising one rate twice in two years.		
6. Can the general LPT rate be initiated by the city council (or commission) alone—without city residents' approval?		

7. Can the general LPT rate be initiated by the voters (via initiative) alone—without the city leaders' approval?		
8. Does initiation of a general LPT rate need to be authorized by both voters and city leaders?		
9. Can the general LPT rate be changed by the city council (or commission) without city residents' approval?		
10. Can the general LPT rate be changed by the voters alone (e.g. through initiative)		
11. Does a change of a general LPT rate need to be authorized by both voters and city leaders?		
12. Can revenue-specific LPT rates be initiated/changed by the city council (or commission) without city residents' approval? *If the rate can be changed but not initiated by the council alone, put "no."*		
13. Can the revenue-specific LPT rates be initiated/changed by the voters (via referendum or initiative) alone—without the city leaders' approval? *If the rate can be changed but not initiated by the voters alone, put "no."*		
14. Do changes in revenue specific LPT rates need to be authorized by both voters and city leaders? *This includes initial authorization of the general LPT levy.*		
15. If any of conditions of questions 6, 8, 9, 11, 12, and/or 14 (conditions requiring city leaders' approval) are true, do changes in the either the general OR revenue specific rates require a vote from a supermajority in the city council or commission?		
16. Does a change in LPT rate (either general or revenue specific or both) require approval of any state office? For instance if a city wanted to raise its rate from 1.5% to 1.75%, does it a vote from the state legislature to do so? This may be in addition to the controls listed in questions 6-12.		
17. Are their potentially overlapping additional LPT rates? For instance, many states allow cities and counties to impose their own LPTs. Please answer "no" if your state allows a county, school district, etc. LPTs but those LPTs are not applicable within municipal borders.		
18. Can multiple cities collectively raise or implement a group-wide LPT rate (either general or revenue specific)? For instance, some states allow cities in an area to impose metropolitan-wide, uniform LPTs to fund a unified fire service.		
19. Do any changes in a city's LPT rate have to be approved by that city's neighbors? For instance, city X wants to raise its rate from 1.5% to 1.75%. Does X need the approval of any of its neighbors in order to do so? Answer, "yes" if even one of the LPT rates needs neighbor approval.		
20. Does the state require cities to share any of their LPT revenue? For instance, some states require cities to share some portion of their LPT revenue with either their immediate neighbors or to place a portion of their LPT revenue back into a general fund controlled by the state.		
21. Are there any other municipal offices required by law to approve changes and/or initiation of either the general LPT or revenue-specific LPTs. *For instance, some states require the RDA board to approve LPT changes.*		
22. Does your state attach automatic sunset provision on local property taxes? For instance, some states require their cities to put annual or semi-annual votes to the cities to "continue" the current rates. Please answer "yes" even if a votes by the city council alone are required to continue levying property taxes.		

APPENDIX F

DATA SETS

There five sets of data were collected for this study. These data sets will enable the tests described in the next subsection.

First, the city-by-city general sales and property tax rate data for the 22 states with LOSTs mostly from various state websites (e.g., www.iowa.gov/tax/educate/localoption_rates_sunsets.html) were gathered. States without LOSTS are excluded from this study. Without sales tax rates to make comparisons, property tax rate analysis is less informative. The effective rates for the year 2007 have been compiled.

The year 2007 is important because of the second large set of data in my research, the U.S. Census Bureau's 2007 financial survey of local governments (www.census.gov/govs/estimate/historical_data_2007.html). The data was published in the spring of 2010. For almost every city in the United States, this data set includes detailed information on municipal spending and revenue, as well as some demographic data. The data set also includes basic demographic information from the census bureau (e.g. population) for each of the 22 study states.

Third, basic geographic information systems (GIS) data for each state's municipalities were compiled. These shape files, also available from the U.S. Census Bureau (www.census.gov/geo/www/tiger), give a mathematical representation of the borders of every city in each of the 22 states under scrutiny in this study.

Fourth, the ideological data for each state was collected. Presidential election results from 2008 serve as a proxy for this data. The state-by-state county-level

2008 election results from the New York Times (elections.nytimes.com/2008/results/president/map.html) were the source of this data.

Fifth, local taxation statutes from all the states in the study were gathered. For instance, what changes in increments are allowed? What, if any, are the floor/ceiling rates? How are rate changes proposed and passed into law? This data will enable investigation the vertical controls question posed by this study. This data has mostly been collected by surveying (see appendix E) individuals in each of the 22 states with expertise on local tax rate-setting procedures in each state. Such contacts were made within three general offices/organizations: state offices of legislative research, councils of local governments (interest groups representing/counseling local governments) and state revenue offices.

The spatial variables were calculated through the use of ArcMap. Arcmap generated a list of all the cities within 10 miles of each city in each of the 22 study states. Then, the average sales tax rates of these near-neighbors were calculated. For instance, a list of all the cities within 10 miles of Hoover, Alabama was compiled. Next the average sales and property tax rates for all of Hoover's near-neighbors (<10 miles away) were computed, as it was for every city in Alabama. The average sales and property tax rate of neighbors from 10 to 50 miles was also computed. These four "neighbors' average rates" constitute the core variables of the principal tests used in this study.

ArcMap was also used to discover whether a city is within 10 miles of another state's border. Finally, average standard deviation of both near-neighbor property tax rates and near-neighbor sales tax rates was calculated, a standard deviation for every city's near-neighbors' rates. Metropolitan areas whose property and/or sales tax rates cluster tightly will therefore show lower rate than areas whose rates do not cluster tightly.

The complete list of ≥25 variables for each city is as follows:

- The average sales tax rate of all cities within 10 miles
- The average sales tax rate of all cities between 10 and 50 miles
- The average property tax rate of all cities within 10 miles
- The average property tax rate of all cities between 10 and 50 miles
- The number of neighbors within 10 miles
- Population
- Per capita income
- Average home value
- Average income
- Municipal spending per capita (disaggregated by type: capital outlay, maintenance and operations, intergovernmental payments)
- Municipal revenue per capita (disaggregated by type: intergovernmental grants, sales tax revenue, fees, property tax revenue, and other taxes)
- Population density
- City population as percentage of metro area (what percentage of the total population of the metro area does each city constitute)
- Political ideology of the city
- Dummy variables for each of the states bordering the state in question

REFERENCES

Allers, Maarten A. 2012. "Yardstick competition, fiscal disparities, and equalization." *Economics Letters* 117 (January): 4-6.

Allers, Maarten A., and J. Paul Elhorst. 2005. "Tax mimicking and yardstick competition among local governments in the Netherlands." *International Tax and Public Finance* 12 (August): 493-513.

Alm, James, Michael McKee, and Mark Skidmore. 1993. "Fiscal pressure, tax competition, and the introduction of state lotteries." *National Tax Journal* 46 (December): 463-476.

Ansolabehere, Stephen, and James M. Snyder. 2006. "Party Control of State Government and the Distribution of Public Expenditures." *The Scandinavian Journal of Economics* 108 (December): 547-569.

Aoki, Kenichi, Laurent Lehmann, and Marcus W. Feldman. 2011. "Rates of cultural change and patterns of cultural accumulation in stochastic models of social transmission." *Theoretical Population Biology* 79 (June): 192-202.

Asch, S. E. (1956). "Studies of independence and conformity: I. A minority of one against a unanimous majority." *Psychological Monographs: General and Applied* 70 (9): 1-70.

Asplund, Marcus, Richard Friberg, and Fredrik Wilander. 2007. "Demand and distance: evidence on cross-border shopping." *Journal of Public Economics* 91 (February): 141-157.

Ashworth, John, and Bruno Heyndels. 1997. "Politicians' preferences on local tax rates: an empirical analysis." *European Journal of Political Economy* 13 (September): 479-502.

Arce, Daniel G. 2001. "Leadership and the aggregation of international collective action." *Oxford Economic Papers* 53(January): 114-137.

Baldwin, Richard, Rikard Forslid, and Philippe Martin. 2005. *Economic Geography and Public Policy*. Princeton: Princeton University Press.

Bartik, Timothy J. 1992. "The effects of state and local taxes on economic development: A review of recent research." *Economic Development Quarterly* 6 (February): 102-111.

Bartle, John R. 2003. "Trends in Local Government Taxation in the 21st Century." *Spectrum: The Journal of State Government* 76 (Winter): 26-29.

Bartle, John R., Carol Ebdon, and Dale Krane. 2003. "Beyond the property tax: Local government revenue diversification." *Journal of Public Budgeting, Accounting, and Financial Management* 15 (Winter): 622-648.

Basinger, Scott and Mark Hallerberg. 2004. "Remodeling the competition for capital: How domestic politics erases the race to the bottom." *American Political Science Review* 98 (May): 261-276.

Baskaran, Thushyanthan, and Mariana Lopes da Fonseca. 2013. *The economics and empirics of tax competition: A survey*. No. 163. Discussion Papers, Center for European Governance and Economic Development Research, July. www.econstor.eu/bitstream/10419/76806/1/751539457.pdf

Baybeck, Brady, William D. Berry, and David A. Siegel. 2011. "A strategic theory of policy diffusion via intergovernmental competition." *Journal of Politics* 73 (January): 232-47.

Bednar, Jenna, Thomas Eskridge and Barry Weingast. 2001. "A Political Theory of Federalism." In *Constitutional Culture and Democratic Rule,* ed. John Ferejohn, Jack N. Rackove, and Jonathon Riley. New York: Cambridge University Press, 223-267.

Berry, Frances Stokes. 1994. "Sizing up state policy innovation research." *Policy Studies Journal* 22 (September): 442-456.

Berry, Frances Stokes, and William D Berry. 1990. "State lottery adoptions as policy innovations: An event history analysis." *The American Political Science Review.* 84 (June): 395-415.

Berry, Frances Stokes, and William D. Berry. 1992. "Tax innovation in the states: Capitalizing on political opportunity." *American Journal of Political Science* 36 (August): 715-742.

Berry, Frances Stokes, and William D. Berry. 1994. "The politics of tax increases in the States." *American Journal of Political Science* 38 (August): 855-859.

Berry, Frances Stokes, and William D Berry. 2007. "Innovation and diffusion models in policy research." In *Theories of the Policy Process*, ed. John Sabatier. Boulder, CO: Westview Press, 223-260.

Berry, William D., and Brady Baybeck. 2005. "Using geographic information systems to study interstate competition." *American Political Science Review* 99 (November): 505-519.

Besley, Timothy, and Anne Case. 1995. "Incumbent behavior: Vote seeking, tax setting and yardstick competition." *The American Economic Review* 85 (March): 25-45.

Besley, Timothy, and Michael Smart. 2007. "Fiscal restraints and voter welfare." *Journal of Public Economics* 91 (April): 755-773.

Biegeleisen, J. Alan, and David L. Sjoquist. 1988. "Rational voting applied to choice of taxes." *Public Choice* 57 (April): 39-47.

Blackley, Paul R. and Larry DeBoer. 1987. "Tax base choice by local governments." *Land Economics* 63 (August): 227-236.

Boehmke, Frederick J., and Richard Witmer. 2004. "Disentangling diffusion: The effects of social learning and economic competition on state policy innovation and expansion." *Political Research Quarterly* 57 (March): 39-51.

Bonacich, Phillip, Gerald H. Shure, James P. Kahan, and Robert J. Meeker. 1976. "Cooperation and group size in the N-person prisoner's dilemma." *The Journal of Conflict Resolution* 20 (December): 687-706.

Bordignon, Massimo, Floriana Cerniglia, and Federico Revelli. 2003. "In search of yardstick competition: a spatial analysis of Italian municipality property tax setting." *Journal of Urban Economics* 54 (June): 199-217.

Bordignon, Massimo, Floriana Cerniglia, and Federico Revelli. 2004. "Yardstick competition in intergovernmental relationships: theory and empirical predictions." *Economics Letters* 83 (June): 325-333.

Boyd, Robert.1988. *Culture and the Evolutionary Process*. Chicago: University of Chicago Press.

Boschken, Herman L. 1998. "Institutionalism: Intergovernmental exchange, administration-centered behavior, and policy outcomes in urban agencies." *Journal of Public Administration Research and Theory* 8 (October): 585-614.

Bowler, Shaun, and Todd Donovan. 2004 "Evolution in state governance structures: Unintended consequences of state tax and expenditure limitations." *Political Research Quarterly* 57 (June): 189-196.

Bowler, Shaun, and Todd Donovan. 1995. "Popular responsiveness to taxation." *Political Research Quarterly* 48 (March): 79-99

Bowman, Ann O'M. and Richard C. Kearney. 2012. "Are US Cities Losing Power and Authority? Perceptions of Local Government Actors." *Urban Affairs Review* 48 (July): 528-546.

Boyne, George A. 1996. "Competition and local government: a public choice perspective." *Urban Studies* 33 (May): 703-721.

Brueckner, Jan K. 2003. "Strategic interaction among governments: An overview of empirical studies." *International Regional Science Review* 26 (April): 175-188.

Brueckner, Jan K., and Luz A. Saavedra. 2001. "Do local governments engage in strategic property-tax competition?" *National Tax Journal* 54 (June): 203-229

Burge, Gregory S., and Brian Piper. 2012. "Strategic Fiscal Interdependence: County and Municipal Adoptions of Local Option Sales Taxes." *National Tax Journal* 65 (June): 387-416.

Burge, Gregory, and Cynthia Rogers. 2011. "Local option sales taxes and consumer spending patterns: Fiscal interdependence under multi-tiered local taxation." *Regional Science and Urban Economics* 41 (January): 46-58.

Butler, Daniel M., and Craig Volden. "Learning and Policy Diffusion: Experimental Evidence." (2013). Retrieved August 19, 2013 from http://www.batten.virginia.edu/sites/default/files/fwpapers/Butler,%20Volden,%20DiffExper130507.pdf

Campbell, Angus, Philip E. Converse, Warren E. Miller, and Donald E. Stokes. 1960. *The American Voter*. New York and London: John Wiley & Sons.

Caplan, Bryan. 2001. "Standing Tiebout on his head: Tax capitalization and the monopoly power of local governments." *Public Choice* 108 (July): 101-122.

Carmines, Edward, and James Stimson. 1989. *Issue Evolution: Race and the Transformation of American Politics*. Princeton, NJ: Princeton University Press.

Case, Anne C., Harvey S. Rosen, and James R. Hines. 1993. "Budget spillovers and fiscal policy interdependence: Evidence from the states." *Journal of Public Economics* 52 (October): 285-307.

Chapman, Jeffrey I. 2003. "Local government autonomy and fiscal stress: the case of California counties." *State & Local Government Review* (Winter): 15-25.

Chirinko, Robert S. and Daniel Wilson. 2011. "Tax competition among u.s. states: racing to the bottom or riding on a seesaw?" (July 29, 2011). *CESifo Working Paper Series No. 3535*. Retrieved September 10, 2013 from http://ssrn.com/abstract=1904760

Chicoine, David L., and Norman Walzer. 1986. "Factors affecting property tax reliance: Additional evidence." *Public Choice* 49 (January): 17-28.

Cornia, Gary C., Scott Grimshaw, Ray Nelson and Lawrence Walters. 2010. "The effect of local option sales taxes on local sales." *Public Finance Review* 38 (November): 659-681.

Cornia, Gary C., David L. Sjoquist, and Lawrence Walters. 2004. "Sales use tax simplification and voluntary compliance." *Public Budgeting & Finance* 24 (March): 1-31.

Cromley, Ellen K., and Sara McLafferty. *GIS and Public Health*. New York: Guilford Press, 2012.

Cutler, David M., Douglas Elmendorf and Richard Zeckhauser. 1999. "Restraining the leviathan: Property tax limitation in Massachusetts," *Journal of Public Economics* 71 (March): 313-334.

Dalton, Russell. 2005. "Chapter 2: The nature of mass beliefs," in *Citizen Politics: Public Opinion and Political Parties in Advanced Industrial Democracies, 4th Edition*. Washington DC: Congressional Quarterly.

Dawkins, Richard. 2006. *The selfish gene*. Oxford: Oxford University Press.

Da Silva Costa, José, and Armindo Carvalho. 2013. *Yardstick Competition among Portuguese Municipalities The Case of Urban Property Tax (IMI)*. No. 495. Universidade do Porto, Faculdade de Economia do Porto.

DeHoog, Ruth Hoogland, David Lowery, and William E. Lyons. 1990. "Citizen satisfaction with local governance: A test of individual, jurisdictional, and city-specific explanations." *Journal of Politics* 52 (August): 807-837.

Devereux, M.P., B Lockwood and M. Redoano. 2007. "Horizontal and vertical indirection tax competition: Theory and some evidence from the USA." *Journal of Public Economics* 91 (April): 451-479

Dickson, Del. 2014 *The People's Government: An Introduction to Democracy*. New York: Cambridge University Press.

Dowding, Keith, Peter John and Stephen Biggs. 1994. "Tiebout: A Survey of the empirical literature." *Urban Studies* 31 (May): 767-797.

Downs, Anthony. 1957. "An economic theory of political action in a democracy." *The Journal of Political Economy.* 65 (April): 135-150.

Dixit, Avinash, and Susan Skeath. 1999. *Games of Strategy, 4th Edition.* New York: W. W. Norton.

Dye, Richard F. 2008. "The dynamic between municipal revenue sources and the state-local relationship in New England." *New England Public Policy Center, Federal Reserve Bank of Boston Working Paper* (2008): 08-1.

Dye, Robert F., and Therese J. McGuire. 1997. "The effect of property tax limitation measures on local government fiscal behavior." *Journal of Public Economics,* 66 (December): 469-487

Edmiston, Kelly D., and Geoffrey K. Turnbull. 2003. "Working paper: Local government competition for economic development." *Urban and Regional Analysis Group; Georgia State University* 03-07 (August): 1-30.

Epple, Dennis, and Katherine Schipper. 1981. "Municipal pension funding: A Theory and some evidence." *Public Choice* 37 (January): 141-178

Erikson, Robert, Gerald Wright and John McIver. 1989. "Political parties, public opinion, and state policy in the United States." *The American Political Science Review* 83 (September): 729-756

Fisher, Glenn W. 1996. *The Worst Tax?: A history of the property tax in America*. Vol. 210. Lawrence: University Press of Kansas.

Fisher, Ronald C. 1980. "Local sales taxes: Tax rate differentials, sales loss, and revenue estimation." *Public Finance Review* 8 (1980): 171-188.

Fisher, Ronald C. 2009. "Property taxes for local finance: Research results and policy perspectives. (Reconsidering property taxes: Perhaps not so bad after all.)" *Lincoln*

Institute of Land Policy [Available: Lincolninstitute.edu]

Friedman, James W. 1971. "A non-cooperative model for supergames." *The Review of Economic Studies,* 38 (January): 1-12.

Genschel, Phillip. 2002. "Globalization, tax competition, and the welfare state." *Politics and Society,* 32 (June): 245-275.

Genschel, Philipp, and Peter Schwarz. 2011. "Tax competition: a literature review." *Socio-Economic Review* 9 (March): 339-370.

Gill, H. Leroy, and Donald R. Haurin. 2001. "The choice of tax base by local authorities: voter preferences, special interest groups, and tax base diversification." *Regional Science and Urban Economics* 31 (November): 733-749.

Gladwell, Malcolm. 2000. The Tipping Point: How Little Things Can Make a Big Difference. Boston: Little, Brown.

Graham, Erin, Charles R. Shipan, and Craig Volden. 2013. "The diffusion of policy diffusion research in political science." *British Journal of Political Science* 43 (July): 673-701.

Gray, Virginia. 1973. "Innovation in the states: A diffusion study." *The American Political Science Review* 67 (December): 1174-1185.

Green, Andrew D. 2006. "Life in the fast lane: Transportation finance and the local option sales tax." *State & Local Government Review* 38 (Spring): 92-103.

Grossback, Lawrence J., Sean Nicholson-Crotty, and David AM Peterson. 2004. "Ideology and learning in policy diffusion." *American Politics Research* 32 (September): 521-545.

Heckathorn, Douglas D., and Steven M. Maser. 1990. "The contractual architecture of public policy: A critical reconstruction of Lowi's typology." *The Journal of Politics* 52 (November): 1101-1123.

Henderson, J. Vernon. 1994. "Community choice of revenue instruments." *Regional Science and Urban Economics* 24 (April): 159-183.

Hendrick, Rebecca, Yonghong Wu, and Benoy Jacob. 2007. "Tax competition among municipal governments exit versus voice." *Urban Affairs Review* 43 (November): 221-255.

Henrich, Joseph. 2001. "Cultural transmission and the diffusion of innovations: Adoption dynamics indicate that biased cultural transmission is the predominate force in behavioral change." *American Anthropologist* 103 (December): 992-1013.

Heyndels, Bruno and Jef Vuchelen. 1998. "Tax mimicking among Belgian municipalities." *National Tax Journal* 51 (March): 89-101.

Hoffman, Elizabeth, Kevin McCabe and Vernon L. Smith. 1996. "Social distance and other-regarding behavior in dictator games." *The American Economic Review* 86

(June): 653-660

Inman, Robert P. 1989. "The local decision to tax: Evidence from large US cities." *Regional Science and Urban Economics* 19 (August): 455-491.

Isaac, R. Mark and James M. Walker. 1988. "Group size effects in public goods provision: The Voluntary contributions mechanism." *The Quarterly Journal of Economics.* 103 (February): 179-199

Jacobson, Gary C. 2004. "Chapter 5: Congressional voters." *The Politics of Congressional Elections*. New York: Pearson.

Janelle, Donald G., and Michael F. Goodchild. 2011. "Concepts, principles, tools, and challenges in spatially integrated social science." *The SAGE Handbook of GIS and Hociety.* Thousand Oaks, CA: SAGE: 27-45.

Johnston, Jocelyn M., Michael A. Pagano, and Philip A. Russo Jr. 2000. "State limits and state aid: An exploratory analysis of county revenue structure." *State & Local Government Review* 32 (Spring): 86-97.

Kenyon, Daphne A. 1997 "Theories of interjurisdictional competition." *New England Economic Review* (April): 13-27.

Kenyon, Daphne A. and John Kincaid 1991. Competition Among States and Local Governments: Efficiency and Equity in American Federalism. Washington, DC: The Urban Institute.

Krane, Dale, Carol Ebdon, and John Bartle. 2004. "Devolution, fiscal federalism, and changing patterns of municipal revenues: The mismatch between theory and reality." *Journal of Public Administration Research and Theory* 14 (October): 513-533.

Krishna, Aradhna, and Joel Slemrod. 2003. "Behavioral public finance: tax design as price presentation." *International Tax and Public Finance* 10 (March): 189-203.

Krmenec, Andrew J. 1991. "Sales tax as property tax relief? The shifting onus of local revenue generation." *The Professional Geographer* 43 (March): 60-67.

Ladd, Helen F. 1992. "Mimicking of local tax burdens among neighboring counties." *Public Finance Review* 20 (October): 450-467.

Lawton, Brian A., Ralph B. Taylor, and Anthony J. Luongo. 2005. "Police officers on drug corners in Philadelphia, drug crime, and violent crime: Intended, diffusion, and displacement impacts." *Justice Quarterly* 22 (October): 427-451.

Lewis, Paul G. and Elisa Barbour. 1999. *California Cities and the Local Sales Tax*. Public Policy Institute of California.

Luna, LeAnn. 2004. "Local sales tax competition and the effect on county governments' tax rates and tax bases." *The Journal of the American Taxation Association* 26 (Spring): 43-61.

Luna, LeAnn, Donald J. Bruce, Richard R. Hawkins. 2007. "Maxing out: An analysis of local option sales tax rate increases." *National Tax Journal*. 40 (March): 45-63.

Lyytikäinen, Teemu. 2012. "Tax competition among local governments: Evidence from a property tax reform in Finland." *Journal of Public Economics*. 96 (August): 584-595.

Maggetti, Martino, and Fabrizio Gilardi. 2013. "How policies spread: A meta-analysis of diffusion mechanisms." Retrieved August 19, 2013 from http://www.fabriziogilardi.org/resources/papers/meta-analysis-diffusion.pdf

Mansfield, Edwin. (1961) "Technical change and the rate of imitation." *Econometrica: Journal of the Econometric Society* 29 (October): 741-766.

McLure, Charles E. (1999) "Electronic commerce and the state retail sales tax: A Challenge to American Federalism." *International Tax and Public Finance* 6 (May): 193-224

McKinnon, Ronald, and Thomas Nechyba. 1997. "Competition in Federal Systems: The Role of Political and Financial Constraints." In *The New Federalism: Can the States be Trusted?* ed. John Ferejohn and Barry Weingast. Stanford, CA: Hoover Institution Press, 3-61.

Mendoza, Enrique G., and Linda L. Tesar. 2005. "Why hasn't tax competition triggered a race to the bottom? Some quantitative lessons from the EU." *Journal of Monetary Economics* 52 (January): 163-204.

Meseguer, Covadonga. 2005. "Policy learning, policy diffusion, and the making of a new order." *The Annals of the American Academy of Political and Social Science* 598 (March): 67-82.

Micceri, Theodore. 1989. "The unicorn, the normal curve, and other improbable creatures." *Psychological Bulletin* 105.1 (1989): 156.

Mintz, Jack, and Henry Tulkens. 1986. "Commodity tax competition between member states of a federation: Equilibrium and efficiency." *Journal of Public Economics* 29 (March): 133-172

Morrow, James D. 1994. *Game Theory for Political Scientists.* Princeton, NJ: Princeton University Press.

Mullins, Daniel R., and Phillip J. Joyce. 1996. "Tax and Expenditure Limitations and State and Local Fiscal Structure: An Empirical Assessment." *Public Budget & Finance* 16 (March): 75-101

Nash, John. 1951. "Non-cooperative games." *The Annals of Mathematics.* 54 (September): 286-295.

Nelson, Michael A. 2002. "Using excise taxes to finance state government: Do neighboring state taxation policy and cross-border markets matter?" *Journal of Regional Science* 42 (November): 731-752.

Oates, Wallace E. 1972. *Fiscal Federalism.* New York: Harcourt Brace Jovanovich.

Oates, Wallace E., and Robert M. Schwab. 1988. "Economic competition among jurisdictions: Efficiency enhancing or distortion inducing?" *Journal of Public Economics* 35 (April): 333-354.

Okabe, Atsuyuki, ed. (2010) GIS-based Studies in the Humanities and Social Sciences. CRC Press.

Ostrom, Elinor. 2007. "Institutional Rational Choice: An assessment of the Institutional Analysis and Development Framework." In *Theories of the Policy Process*, ed. John Sabatier. Boulder, CO: Westview Press, 21-64.

Ostrom, Elinor. 1998. "A behavioral approach to the rational choice theory of collective action: Presidential address, American Political Science Association, 1997." *The American Political Science Review* 92 (March): 1-22.

Pagano, Michael A., and Jocelyn M. Johnston. "Life at the bottom of the fiscal food chain: Examining city and county revenue decisions." *Publius: The Journal of Federalism* 30, no. 1 (2000): 159-170.

Page, Benjamin, and Shapiro, Robert. 1983. "Effects of public opinion on policy." *The American Political Science Review* 77 (March): 175-190.

Palfrey, Thomas R; and Howard Rosenthal. 1994. "Repeated play, cooperation and coordination: An experimental study." *The Review of Economic Studies* 61 (July): 545-565

Pemberton, H. Earl. 1936. "The curve of culture diffusion rate." *American Sociological Review* 1 (August): 547-556.

Pogodzinski, J. Michael, and Tim R. Sass (1991). "Measuring the effects of municipal zoning regulations: a survey." *Urban Studies* 2 (August): 597-621.

Popkin, Samuel. 1994. The Reasoning Voter: Communication and Persuasion in Presidential Campaigns (2nd Ed.) Chicago: University of Chicago Press.

Pelissero, John P. and Timothy B. Krebs. 1997. "City council legislative committees and policy-making in large United States cities." *American Journal of Political Science* 41 (April): 499-518.

Powell, Benjamin. 2001. "Competition and monopoly power in local government: An extension of Caplan." *Public Choice* 120 (September): 353-357.

Shipan, Charles R., and Craig Volden. 2008. "The mechanisms of policy diffusion." *American Journal of Political Science* 52 (October): 840-857.

Shipan, Charles R., and Craig Volden. 2012. "Policy diffusion: Seven lessons for scholars and practitioners." *Public Administration Review* 72 (November): 788-796.

Sjoquist, David L., Willam J. Smith, Mary Beth Walker and Sally Wallace. 2007. "An analysis of the time to adoption of local sales taxes: A duration model approach." *Public Budgeting National and Finance* 20 (Spring): 20-40

Sjoquist, David L., Mary Beth Walker, and Sally Wallace. 2005. "Estimating differential responses to local fiscal conditions: A mixture model analysis." *Public Finance Review* 33 (January): 36-61.

Slemrod, Joel and Shlomo Yitzhaki. 2001. "Tax avoidance, evasion and administration." *Handbook of Public Economics,* 3 (January): 1423-1470

Slonim, Robert and Alvin E. Roth. 1998. "Learning in high stakes ultimatum games: An Experiment in the Slovak Republic." *Econometrics* 66 (May). 569-596.

Sokolow, Alvin D. 1998. "The changing property tax and state-local relations." *Publius: The Journal of Federalism 28* (Winter): 165-187.

Stine, William F. 1998. "Explaining the decision to repeal an optional local tax." *Applied Economics* 30 (October): 353-363.

Stine, William F. 2005. "Do budget maximizing public officials increase the probability of property reassessment?" *Applied Economics* 37 (February): 2395-2405.

Tannenwald, Robert (1991). "The US Tax Reform Act 1986 and state competitiveness." In *Competition among States and Local governments*, ed. Daphne Kenyon and John Kincaid. Washington, DC: Urban Institute Press, 177-204.

Tiebout, Charles. 1956. "A pure theory of local expenditures." *The Journal of Political Economy* 64 (October):416-424.

Torralba, Fransisco M. 2004. "New evidence on the effects of sales taxes on retail activity." *Unpublished* Presented at the Annual Conference of the Southern Science Association. New Orleans. [Retrieved August 2, 2007 from Chicago.edu/~torralba]: 1-29

U.S. Advisory Commission on Intergovernmental Relations (ACIR). 1995. *Tax and Expenditure Limits on Local Governments.* Washington, D.C.: ACIR.

van Elk, Michiel, Hein T. van Schie, and Harold Bekkering. 2010. "From left to right: Processing acronyms referring to names of political parties activates spatial associations." *The Quarterly Journal of Experimental Psychology* 63 (August): 2202-2219.

Volden, Craig. 2005. "Intergovernmental political competition in American federalism." *American Journal of Political Science* 49 (April): 327-342.

Volden, Craig, Michael M. Ting, and Daniel P. Carpenter. 2008. "A formal model of learning and policy diffusion." *American Political Science Review* 102 (August): 319-332.

Volden, Craig. 2010. "Failures: diffusion, learning, and policy abandonment." In *American Political Science Association Annual Research Conference. Washington, DC*. Retrieved from http://citeseerx.ist.psu.edu August 10, 2013.

Walker, Jack L. 1969. "The Diffusion of Innovations among the American States." *The American Political Science Review* 63 (September): 880-899.

Walsh, Michael J., and Jonathon D. Jones. 1988. "More evidence of the "border tax" effect: The case of West Virginia, 1979-84." *National Tax Journal* 41(June): 261- 265

Wallis, John J. 2000. "American government finance in the long run: 1790 to 1990." *The Journal of Economic Perspectives* 14 (Winter): 61-82

Wildasin, David E. 1989. "Interjurisdictional capital mobility: Fiscal Externality and a corrective subsidy." *Journal of Urban Economics* 25 (March): 193-212.

Wildasin, David E. 1988. "Nash equilibria in models of fiscal competition." *Journal of Public Economics,* 35 (March): 229-240

Wilson, John D. 1999. "Theories of Tax Competition." *National Tax Journal*. 52 (June): 269-304

Wilson, John D. 1996. "The tax treatment of imperfectly mobile firms: Rent-seeking, rent-protection, and rent-destruction." In *The Political Economy of Trade Policy: Papers in Honor of Jagdish Bhagwati* ed. Robert Feenstra, Gene Grossman, and Douglas Irwin. Cambridge, MA: MIT Press, 1996.

Wu, Yonghong, and Rebecca Hendrick. 2009. "Horizontal and vertical tax competition in Florida local governments." *Public Finance Review* 37 (3): 289-311.

Zaller, John. 1992. *The Origins and Nature of Mass Opinion.* New York: Cambridge University Press.

Zhao, Zhirong. 2005. "Motivations, obstacles, and resources: The adoption of the general-purpose local option sales tax in Georgia counties." *Public Finance Review* 33 (November): 721-746.

Zimmerman, Joseph F. 2002. "Evolving State-Local Relations." *The Book of the States 2002 Edition*: 33-39.

Zimmerman, Joseph F. 2002. "Trends in State-Local Relations." *The Book of the States 2002 Edition*: 28-33.

Zodrow, George R., and Peter Mieszkowski. 1986. "Pigou, Tiebout, property taxation, and the underprovision of local public goods." *Journal of Urban Economics* 19 (May): 356-370