To the Graduate Council:

I am submitting herewith a dissertation written by LeAnn Luna entitled, "Tax competition among local jurisdictions: Changes in sales tax rates of Tennessee counties." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Business Administration.

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Tax competition among local jurisdictions: Changes in sales tax rates of Tennessee counties

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LeAnn Luna

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DEDICATION

To my beloved husband,

John Louis Luna

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ABSTRACT

Competition between governments can be defined as "rivalrous behavior in which each government attempts to win some scarce beneficial resource or to avoid a particular cost" (Kenyon and Kincaid 1991). For example, local governments can try to attract retail sales by lowering sales tax rates and encouraging residents of other jurisdictions to cross border shop. Of course, this predatory behavior must be balanced against governments' desire to raise revenues. Considerable theoretical research has investigated interjurisdictional tax competition, but the subject has received relatively little empirical analysis. This study uses data from Tennessee to examine the extent to which local governments compete and attempt to limit cross border shopping by changing sales tax rates. The study also tests the propensity of local governments to consider neighboring jurisdictions' tax rates in setting their own tax rates and analyzes the responsiveness of sales tax rates to changes of the tax base and vice-versa.

The study finds that the sales tax rates of the home and competing counties will affect the sales tax base of the home county because of the possibility that shoppers will cross borders to take advantage of differences in tax rates between counties. In addition, the results show that local governments do consider the local option sales tax rates of neighboring counties in setting their own tax rates. Depending on the sub-sample, the response of counties to changes in neighbors' tax rates may be due to political or economic factors.

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Chapter 1:

Introduction

Competition between governments can be defined as "rivalrous behavior in which each government attempts to win some scarce beneficial resource or to avoid a particular cost" (Kenyon and Kincaid 1991). The United States' fiscal structure is highly decentralized, with over one third of all fiscal affairs conducted at the state and local levels.[1] The Constitution grants states the power to tax their citizens; states are responsible for setting their own tax rates and bases and collecting and administering their respective taxes. Furthermore, counties, cities, and other local governments have independent taxing powers that vary between states. These multiple levels of governments, which are able to act independently, create a climate of intense competition for businesses and retail sales.

In the United States, some of the most direct competition for retail sales occurs at the county level. Most cities and counties rely almost entirely on property taxes and the local option sales tax for revenues. Of these taxes, the sales tax is the most visible to consumers, appearing as a separate line item on virtually all retail purchases. Further, changes in the sales tax rate are reflected instantly in the cost of retail purchases. Changes in property tax rates will ultimately be reflected in the prices of goods, but the relationship is less direct and is hidden from consumers. For these reasons, this study focuses on sales taxes and sales tax rates. Counties can try to attract retail sales by lowering sales tax rates and encouraging residents of other jurisdictions to cross the

[1] The U.S. has approximately 87,000 different state and local taxing entities.

border and shop in their county. If the county is successful in attracting cross-border shoppers, it will have increased its own tax base and decreased the tax base of its neighbors. This study examines the extent to which counties engage in tax competition and attempt to limit cross-border shopping by changing sales tax rates. In addition, this study tests the propensity of local governments to consider neighboring jurisdictions' tax rates in setting their own tax rates. Finally, the study analyzes the responsiveness of sales tax rates to changes of the tax base and vice-versa.

Few states in the United States rely more heavily on sales taxes for revenue than the state of Tennessee. In 1998, sales taxes provided approximately 76% of state tax revenues[2] and 22% of county revenues are derived from local sales taxes. Each of the 95 counties in the state levies its own sales tax, currently ranging from 1.0% to 2.75%. Therefore, Tennessee has 95 county governments all competing for residents and businesses, many of which border states that have much lower state-level and overall sales tax rates.[3] These border counties face difficult competitive hurdles, particularly for retail sales. The heavy reliance of the state and local governments on sales taxes and the existence of bordering counties with significantly lower overall sales tax rates make Tennessee and its 95 counties an attractive population to study.

Elected representatives face a tradeoff in setting sales tax rates. A tax rate increase, perceived as necessary to finance the current or an increased level of

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[2] Total sales tax revenues includes direct sales taxes on retail sales and other selective sales taxes such as on fuel, alcohol, and tobacco.

[3]Tennessee has approximately 350 municipal governments, and the number can vary every year.

government services, may in fact drive sales across the border and reduce the locality's tax base and sales tax collections. A likely result is that governments must balance between (1) keeping the tax rate low enough to keep the sales at home and (2) having a higher tax rate to fund an increased level of services and risk losing sales tax revenue to the lower tax neighbor as residents shop in the lower taxing jurisdiction.

This study relies on the theoretical framework provided by Mintz and Tulkens (1986), which examines tax competition between two jurisdictions where residents can freely cross the border to purchase the taxed good in the lower taxing jurisdiction. Other studies have empirically examined competition at the state level and the relationship between bordering states' tax and spending policies.[4] The studies generally conclude that neighboring states tend to behave similarly with respect to tax policies and spending levels. While these studies examined tax rates, revenues, and expenditures separately, prior empirical research has failed to consider the endogeneous nature of the tax instrument. That is, they consider the tax rate and the tax base, but not the simultaneity of the two. This study extends prior research in three ways. Prior research has examined tax competition on the state level while this research examines competition between counties. This research also considers the interaction between the tax rates and the tax base and the effect of changes in the tax rate on the tax base. Finally, prior empirical research has analyzed interjurisdictional competition using total tax burdens or expenditures while this study takes a narrower approach and examines the direct effect of sales tax rates on retail sales and on tax rates of neighboring jurisdictions.

[4] See, for example, Case, Hines, and Rosen (1989); Hewett and Stephenson (1983); and Murphy and Izraeli (1997).

The research will assist researchers and policy makers in understanding how sub-national governments determine their tax instrument.[5] A better understanding of tax competition can enhance policy recommendations and coordination between jurisdictions. Cross-border shopping is expected only to increase as mail order and Internet sales continue to boom.[6] Unless new laws change the taxation of these sales, states and local governments will continue to see their tax bases erode to these lower-taxed and potentially tax-free neighbors. Although this study focuses on cross-border shopping in adjacent jurisdictions, the results of the study may have preliminary implications that can be applied to the broader issue of mail order and Internet commerce. Consequently, understanding how jurisdictions react to neighboring jurisdiction's tax rates will continue to gain importance.

This paper is organized as follows: Chapter 2 discusses origin and destination-based taxes, and Chapter 3 discusses interjurisdictional competition and some of the problems associated with it. Chapters 4 and 5 summarize the prior literature and theoretical background, respectively. Chapter 6 presents the hypotheses. Chapter7 describes the model, econometric techniques, and data, and Chapter 8 discusses the findings of the study. Finally, Chapter 9 suggests contributions, extensions, and limitations of this research.

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[5] The tax instrument can be defined as the combination of tax options that a government chooses to finance public expenditures (e.g., various types of taxes and the corresponding tax rates and tax bases).

[6] Jupiter Communications reports that online sales have been rising about 300% per year (Krantz 1998). Forrester Research estimates total purchases in the online retail market in 1999 was $130 million and estimates it to be $563 billion and $1.47 trillion by 2001 and 2003, respectively.

Chapter 2:

Origin versus Destination-based Taxes

Taxes are primarily imposed at the point of production (origin-based) or the location of consumption (destination-based).[7] The point in the chain of production and consumption in which the tax is levied impacts the efficiency of the tax, the tax revenues and tax base of local governments, and the location of consumers and businesses. Economists widely agree that a destination-based or consumption tax results in fewer economic distortions while an origin-based tax is easier to administer. Sales taxes, the topic of the current study, are intended to be destination taxes imposed on consumption. However, because of enforcement limitations, the sales tax often fails as a destination tax, and this failure allows local governments to compete with their neighbors using sales tax rates. The following discussion introduces origin and destination-based taxes and illustrates the failures of the sales tax.

Origin-based taxes are levied in the jurisdiction where production occurs. Examples include corporate income taxes and franchise taxes levied on a firm's assets, payroll, etc. Origin-based taxes introduce significant inefficiencies[8] for businesses because a firm's profitability and competitiveness depend not only on the efficiency of its labor or capital but also on its locality's tax rate. This condition may lead businesses to locate in a low tax jurisdiction even if the company's labor or capital would be more

[7] Taxes may also be imposed at the residence of the individual (residence based); however, these taxes are not considered in this paper.

[8] Inefficiencies are the loss in welfare resulting from changes in behavior (i.e. substitution effect). Refer to Figure 1 for a diagram of the substitution effect.

productive elsewhere. States and local governments in the United States have in some cases engaged in bidding wars for new or relocating companies. Furthermore, origin-based taxes encourage producers to export taxes to other jurisdictions by including a portion of the tax paid in the price paid by consumers. To the extent goods are sold in another jurisdiction with some or all of the local governments' taxes included in the selling price, the tax is paid by consumers who will receive little or no government benefits in exchange for paying the tax.

On the other hand, destination-based taxes are levied in the jurisdiction where consumption occurs. Taxing consumption allows a jurisdiction to determine the tax base and rate depending on the services that residents (i.e., consumers) demand. The level of service demanded does not affect the competitiveness of local businesses.[9] The destination principle also ensures that the tax is collected in the jurisdiction in which government services are provided. On the state and local level, the amount spent on roads, schools, and fire and police protection typically is based on the amount demanded by voters that consume those services. If residents perceive a relationship between the tax level and benefits provided by government, they are likely to perceive the tax level as fair, and governments are more likely to provide an efficient level of government services than if the tax is production based. If the tax is based on production (origin-based), voters may demand a relatively high level of services since taxes are largely paid by producers or businesses, some of which may be based in other states or counties.

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[9] Taxing individuals where they consume a good also can create problems and a potential for cheating. For example, an individual may avoid paying sales tax by using an address in another jurisdiction (e.g., post office box) and having goods shipped to that address.

Sales taxes are intended to be destination-based taxes paid by individuals and businesses on consumption within that jurisdiction. For purchases outside the jurisdiction, border tax adjustments through the use tax are designed to ensure that goods bought across the border are still subject to the tax rate at home. With effective border controls, such as between countries, administering the tax is fairly effective. Each jurisdiction is relatively economically isolated and has more freedom to set tax rates without suffering migration of sales or businesses, at least in the short term. Individuals are theoretically taxed at the rate of the region in which they consume goods. Purchases in another jurisdiction for later consumption will be physically checked at the border and subjected to the home jurisdiction's tax rate. With border controls, cross-border shoppers can evade taxes only by actually consuming goods in another jurisdiction.

However, the ability to freely cross-borders within federalist countries causes a breakdown in the ability of local governments to effectively administer a destination-based tax such as the sales tax. For example, if a consumer makes a purchase across the border, pays the neighboring locality's sales tax rate, and consumes the product at home, the tax becomes an origin-based tax. If this result occurs repeatedly, the home government loses significant amounts of revenue without diminishing its responsibilities to its own residents and businesses. The use tax should mitigate this result, but the use tax laws are routinely ignored, particularly by individuals, and are virtually impossible to enforce. Therefore, without border controls or honest reporting of out of state consumption, administration of the retail sales tax on a destination tax principal is very

difficult.[10] Because retail sales taxes often fail as destination-based taxes, governments may compete with neighboring jurisdictions for sales advantages by adjusting their sales tax rates.

[10]All states imposing sales taxes also impose use taxes. Technically, states apply the use tax to out-of-state purchases, requiring consumers to remit the tax on their purchases made in another state. While use taxes are still owed on these sales, the U.S. Supreme Court effectively blocked states from having the seller collect them unless the out-of-state vendor has nexus in the state. (*National Bellas Hess, Inc. v. Department of Revenue of Illinois*, (386 U.S. 753, 87 S.Ct. 1389 (1967)). This holding was reaffirmed in *Quill Corporation v. North Dakota*, 504 U.S. 298 (1992). Enforcement of the use tax is too costly to administer and is generally ineffective. The Advisory Commission on Intergovernmental Relations estimated the revenue loss to be $4.57 billion in 1994. Tennessee estimated that the state lost $70 million in sales taxes from catalog sales in 1994.

Chapter 3:

Interjurisdictional Competition in Decentralized Governments

Competition occurs between different levels of government (vertical competition) and between governments at the same level (horizontal competition).[11] Governments compete because they want to attract residents and businesses, are trying to prevent businesses or residents from exiting, or simply are trying to match innovations in other jurisdictions (Fisher 1991). In addition, governments often compete because elected officials wish to retain their offices (Case 1993). The competitive tools can include different types of taxes, tax rates, and laws or regulations that favor certain industries or activities, among others. States may use any or all of these tools to compete for businesses and residents. On the other hand, local governments' options are much more limited.

The Advisory Council on Intergovernmental Relations (ACIR) defines interjurisdictional competition as, "the manner in which the free movement of goods, services, people and capital constrains the actions of independent governments in a federal system" (1991). The mobility of consumers and producers in a country with open borders and several levels of government (e.g., federal, state, and local) allows tax competition to occur and causes problems for tax planning by local governments and tax efficiency. When one jurisdiction increases its taxes, consumers and producers can migrate to another relatively lower-taxed jurisdiction, thereby having an effect not only

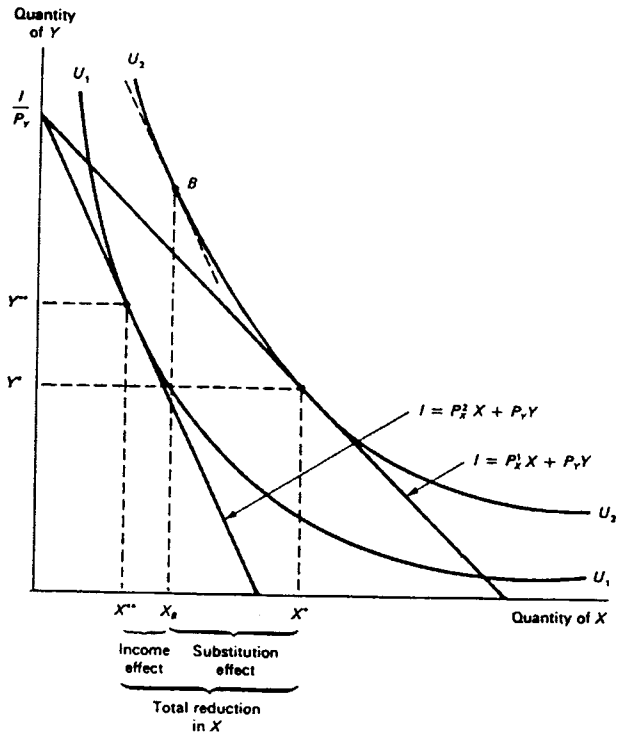
[11] Vertical competition, such as between the federal and state government or between state and local governments is not considered in this research as it generally involves issues relating to authority and power rather than direct competition for residents or businesses.

on the tax-increasing jurisdiction but also on the neighboring one. The free movement of businesses and individuals, therefore, limits a local government's tax and spending level decisions because the effects of tax rate decisions depend on the tax rates of neighboring localities and whether or not the neighbors respond with a tax rate change of their own.

With open borders, such as in the United States, residents can shop or work in another jurisdiction and enjoy the benefits of relatively lower taxes almost immediately. Therefore, the consequences of a tax rate change can occur very quickly, although the actual effect is difficult to predict in advance. Sales tax increases in regions with open borders have three broad effects. First, following a sales tax rate increase, consumers will decrease the quantity of the taxed goods purchased as the price of the commodity is higher, leading to an overall decrease in sales (income effect). Second, consumers will substitute away from the taxed goods whose price has increased relative to the price of lower-taxed or non-taxed goods (substitution effect). Finally, consumers will substitute purchases in the low-tax region for goods purchased in their own tax region (cross-border shopping effect).[12] More specifically, if the tax rate at home is greater than the sum of the tax rate of the neighboring jurisdiction and the transaction costs (e.g., fuel costs, shipping charges, and opportunity costs), shoppers in the home county will have an incentive to cross the border and shop in the neighboring county.

[12] Cross border shopping is a type of substitution effect where individuals substitute a good purchased in one jurisdiction for the same good purchased in another jurisdiction. Refer to Figure 1 for a graphical representation of the income and substitution effects.

Figure 1
Income and Substitution Effects for an Increase in the Price of X



Source: Walter Nicholson, Microeconomic Theory : Basic Principles and Extensions, The Dryden Press (1995), p. 143.

Although the responses of individuals are predictable, the net revenue effect on a jurisdiction is less clear. For example, a tax increase may chase some sales across the border. The decrease in the amount of sales will decrease a jurisdiction's revenue; however, each dollar of sales taxed will produce a larger amount of income since it is being taxed at a higher rate. Therefore, these broad effects make estimating revenues difficult for local governments.

Open borders in a decentralized country also allow jurisdictions to export taxes, or to shift one jurisdiction's tax burden onto nonresidents.[13] For example, if production is taxed at its source, the tax can be built into the price of the product and exported onto nonresidents when the product is shipped to another state.[14] Destination taxes such as sales taxes help curtail the production inefficiencies caused by tax exporting because the tax is not paid until the product reaches the final consumer. In other words, the tax paid does not depend on where the goods and services are produced.

[13] Gade (1990) estimates the effects of burden costs associated with state tax exporting that occurs through federal deductibility provisions. The results show that own price (cross price) elasticities for income, general sales, and motor fuels taxes are negative (positive). Selective sales and license taxes, however, declined as the offset price of motor fuel taxes increased.

[14] The amount of the tax exported to the other jurisdiction depends on the elasticity of production and consumption.

Chapter 4:

Prior Literature

Although tax competition among jurisdictions and the endogeneous nature of a jurisdiction's tax instrument has rarely been studied empirically, several essays have addressed the theoretical issues, primarily using a game-theoretic approach. Many of these theoretical studies focused on the "purely competitive case" where the number of jurisdictions is large and direct competition between individual governmental entities is not possible (see, among others, Hoyt (1991), Wilson (1985, 1986), and Zodrow and Mieszkowski (1986)). These studies generally conclude that competition between regions will lead to lower than optimal taxation and the under provision of local public goods. Other studies have focused on the small numbers case where strategic interactions between one entity and another cannot be ignored (see, among others, Kanbur and Keen (1993), Mintz and Tulkens (1986), and Wildasin (1987)).

Two seminal papers that address theoretical aspects of tax competition are Mintz and Tulkens (1986) and Kanbur and Keen (1993) (hereafter referred to as MT and KK, respectively). Both papers examine efficiency and equilibrium issues arising from tax competition between autonomous fiscal authorities. Specifically, these studies examine the Nash equilibrium in the case of a two-region economy, where each region levies an origin-based commodity tax on a private good to finance a local public good. MT define the Nash equilibrium as the pair of fiscal choices that optimize each region's tax and public good supply, given those of the neighboring region. KK focus on the predicted reaction when one locality is smaller than the other and the tendency of the smaller

locality to become a tax haven. KK define the Nash equilibrium as the tax rate that maximizes the joint revenues of both jurisdictions, subject to the constraint imposed by consumers' freedom to cross-border shop. KK's and MT's papers differ in the following manner:

(1) MT maximize the welfare of the residents of each jurisdiction. KK maximize the tax revenue of each jurisdiction.
(2) KK focus exclusively on the noncooperative behavior when two countries differ in size. The MT model is not constrained by differences in size of competing jurisdictions.
(3) MT place few restrictions on consumer preferences. KK assume the objective function of each jurisdiction includes only public consumption and no private consumption.
(4) KK assume the transportation cost function is quadratic. MT assume that it is increasing and strictly convex.
(5) KK assume the reaction function of the larger country is always increasing. MT assume the reaction function is nonincreasing in which each country's best response must have at least one downward jump.

One of the primary findings of the KK model is that differences in country size exacerbate the inefficiency caused by noncooperative behavior. Their paper provides the theoretical support as to why small countries choose to be tax havens. While the conclusions are important to researchers, the size differential between jurisdictions is just one aspect of tax competition. The maximum local option sales tax rate differential among Tennessee counties is 1.75%. Therefore, some empirical evidence of county size influencing tax rates may exist, but factors other than size also will affect the results of the current study. For example, unlike the KK model, MT specifically consider spending levels and the preferences of individuals, which are essential in examining the actual decisions of local governments. The current paper, therefore, relies primarily on the theoretical models provided by MT, which are discussed in more detail in Chapter 5.

Governments compete for both cross-border shoppers and residents and businesses. The desire for residents and businesses causes jurisdictions to compete using both tax rates and spending levels. In other words, jurisdictions may compete by spending more or less than their neighbors. Some voters, for example, may desire spending on the arts or zoos and are willing to pay higher taxes for these government provided services. Wildasin (1988) compares the Nash equilibrium in which tax rates are the strategic variables to the Nash equilibrium in which public expenditure levels are the strategic variables. Contrary to predictions, the results show that the two types of equilibria do not coincide. Using the theory of Wildasin (1988), this paper will use tax rates and expenditures as the strategic policy variables because only these variables can be manipulated by local governments.

Several previous papers have empirically tested the effects of competing jurisdictions' tax policies on tax revenues, tax rates, and public expenditures without controlling for endogeneity. Hewett and Stephenson (1983) examine the effects of interstate tax competition on tax revenues in Iowa.[15] The authors predict that a tax rate change will affect the tax base through income effects and substitution effects including cross-border shopping. The results indicate that Iowa's tax revenues depend upon their own tax rates and the tax rates of competing jurisdictions. The authors also predict that the revenue effect of a tax rate change will be different if neighboring states respond to the tax change. However, the study does not address whether or not neighboring states do in fact respond or what the competitive response will likely be. This study will explicitly

[15] Rates and revenues examined included personal income tax, sales tax, motor fuel tax, and corporate income tax.

examine the reaction of neighboring jurisdictions to a tax rate change. In addition, the study examines the behavior of counties because governments at this level have fewer competitive options than do states. Counties generally can compete only by changing sales or property tax rates while states have a wider variety of fiscal policy options.

Other studies have examined whether a particular state's tax policies are affected by the tax policies of its neighbors. Case, Hines, and Rosen (1989) find that a state's spending level affects the spending level of its neighbors after controlling for state individual effects, year effects, and correlated random shocks between neighbors. Murphy and Izraeli (1997) investigate determinants of per capita state and local revenues across states and regions. They find that the factors that determine state and local revenues vary geographically because neither residents nor politicians are homogeneous across the regions. However, they also find evidence of the "neighboring state effect" as states grouped into regions exhibit similar tastes with respect to public goods and services. The study found personal income to have the greatest impact on state and local revenues; however, other demographic, political, and economic variables also had an effect. Based on these findings, governments consider personal preferences and the economic climate of their jurisdictions in determining their tax policy.

Most of the above studies examine total revenues from all taxes. The current study will examine only sales taxes and competition for retail sales because previous empirical evidence suggests that local governments compete with neighboring jurisdictions primarily with sales taxes and that different sales tax rates affect the location of retail sales and retail outlets.

Case (1993), among others, examined border states and the political consequences of raising taxes. Her paper, which deals with income taxes, provides evidence that individual states are sensitive to neighboring states' tax rates and changes in those rates. Case (1993) finds that legislators are more likely to raise income taxes when neighboring states have done the same and that voters look at neighboring states to determine whether the tax increase in their own state is appropriate and whether or not to re-elect their governor. Finally, while her paper focuses on the political aspects of tax competition, it provides some evidence that tax competition occurs between states and that the reaction functions are upward sloping.[16] Specifically, she finds that for comparable income classes, states will increase income taxes by 50 cents for each dollar increase in a neighboring state's income taxes. The current study extends Case by examining the sales tax rate reaction function on a local level. The competition for retail sales between counties is more direct than between states and is also subject to short-term cross-border effects.

Several previous essays have dealt empirically with cross-border shopping. For example, McAllister (1961), Hamovitch (1966), Mikesell (1970, 1971), Fisher (1980), Mikesell and Zorn (1986), Fox (1986), and Walsh and Jones (1988) all find evidence that cross-border shopping occurs. In general, the studies conclude that differences in the sales tax rate between bordering localities affect spending patterns and the tax base in those border localities. The impact of sales tax differentials on cross-border shopping has been found to vary from small and insignificant to as much as ten percent of sales. Further, the studies indicate that the effect varies positively with the difference in rates

[16] The reaction function refers to the relativity between region i and region j's tax rates.

between localities. Evidence of the border tax problem was found in large metropolitan areas (Mikesell 1970), small cities (Mikesell and Zorn 1986), and counties (Mikesell 1971, Fox 1986). These studies reinforce the proposition that cross-border shopping should be a major concern to policy makers because the practice has been shown to affect the location of retail sales at the border, which in turn affects each region's tax base and tax revenues.

Prior research also has compared taxes on different commodities to see which ones cross-border shopping impacts most. Mikesell (1971) found that border location is a significant determinant of shopping goods store sales; however, it is not a significant determinant for convenience goods store sales or auto dealer sales.[17] Fisher (1980) found that a tax differential had an impact on food purchases but not apparel for the District of Colombia. Fox (1986) analyzed furniture sales, food at home sales, apparel, and food away from home. He found that furniture sales were the most sensitive to sales tax rate differences. In general, cross border shopping is most likely to occur when the tax savings are greatest.

Fox (1986) found that the localities' overall tax structure also influences the location of retail sales along state borders. Sales taxes had the most influence, state income taxes had minor influences, and targeted (selective) sales taxes and property taxes had zero or small effects on the overall retail activity. Because property taxes are the primary source of revenue for most localities, the finding that property taxes (and other

[17] Mikesell (1971) defines shopping goods stores as general merchandise stores, apparel and accessory stores, and furniture, home furnishings, and equipment stores. Convenience goods stores include food stores, eating and drinking establishments, and drug and proprietary stores.

taxes) had little effect on retail sales suggests that the sales tax rate may be the primary instrument with which local governments compete. However, because of the importance of property taxes to local governments, the current study will control for differences in this variable.

In summary, the prior literature has indicated that jurisdictions compete using both taxes and expenditures and that a relationship exists between tax rates in the home jurisdiction and the tax policies of neighboring jurisdictions. In the case of cross-border shopping and its effect on retail sales and, therefore, the sales tax base of each jurisdiction, the effect of one region's sales tax policy on the neighboring region is direct and observable. The effect on neighboring jurisdictions of changes in income and other taxes is less clear.

Chapter 5:

Theoretical Background

Mintz and Tulkens (1986), assume a two-region economy where each region (i and j) levies an origin-based[18] commodity tax (t) to finance a local public good, denoted as R^i and R^j. Residents of each region can purchase the taxed good either in their own region or in the neighboring region. Taxes are levied on purchases by a resident in his own jurisdiction Q^i_i (respectively Q^j_j) and on purchases in another region Q^i_j (respectively Q^j_i).[19] Consumers supply labor, denoted as X^i (resp. X^j), which is not taxed in each region. The authors assume each region will maximize its own local welfare so that the prevailing tax rate and public good quantity is assumed to be optimal in each region. The budgets must balance in each region so that the amount of public expenditures cannot exceed the taxes collected on domestic purchases and exports. This constraint for region i is:

$$t^i[Q^i_i(t^i, t^j, R^i) + Q^j_i(t^i, t^j)] \geqq R^i$$

While residents of one region can purchase Q in the neighboring region, consumers incur a transaction cost, denoted as ϕ, when they travel from one region to another. MT describe all consumption opportunities for members of region i as

$$(p^i + t^i)Q^i_i + (p^j + t^j)Q^i_j + \phi_j{}^i(Q^i_j) + X^i$$

[18] An origin-based tax is assumed because the destination principal cannot be enforced. Under an enforceable destination tax, residents can cross the borders to shop in neighboring jurisdictions; however, they still will pay the tax rate of their home jurisdiction.

[19] The superscript denotes the region of residence; the subscript denotes the region of purchase.

where p and t designate the unit price and tax associated with each commodity. Consumers of region i will purchase goods from region j until the price of the taxed commodity equals the marginal consumer price, including transportation costs, in region j. Therefore, $p^i+t^i > p^j+t^j+\phi_j^i$ is a necessary condition for a resident in region i to cross-border shop in region j. Conversely, $p^j+t^j > p^i+t^i+\phi_i^j$ is a necessary condition for a resident in region j to cross-border shop in region i.

MT assume the consumer will maximize his or her utility, which is a function of the taxed good purchased in its own region and in the neighboring region, the untaxed good, and the local public good. Each region will find a fiscal optimum (i.e., the pair t^i, R^i) that maximizes the local welfare of its own region, after considering the fiscal choice made by the other region. Therefore, region i's fiscal choice is affected by j's tax choice t^j; however, it is not affected by j's level of public goods, R^j.

The consumer's indirect utility function (V) that maximizes his or her utility function (U), and the public budget constraint are derived respectively as:

$$V^i(t^i,t^j,R^i) \equiv U^i[Q^i_i(t^i,t^j,R^i),Q^i_j(t^i,t^j),X^i(t^i,t^j,R^i),R^i]$$

$$t^i[Q^i_i(t^i,t^j,R^i)+Q^j_i(t^j,t^i)]-R^i \geqq 0$$

The consumer's indirect utility function is maximized subject to the public budget constraint. Substituting, the Lagrangian function (L) is formulated as:

$$L^i(t^i,t^j,R^i) \equiv V^i(t^i,t^j,R^i)+\psi^i t^i[Q^i_i((t^i,t^j,R^i)+Q^j_i(t^j,t^i)-R^i]$$

Where ψ is a Lagrange multiplier.

For the three possible tax regimes (r), the first-order conditions of the Lagrangian function with respect to t^j for are:

$$\begin{array}{ll} \text{for } r=1, (t^i = t^j), & \\ \text{for } r=2, (t^i < t^j), & \dfrac{\partial L_r^i}{\partial t^j} = \begin{cases} 0, \\ \psi_r^i t^i \dfrac{\partial Q_i^j}{\partial t^j} > 0, \\ -\dfrac{\partial U^i}{\partial X^i} Q_j^i + \psi^i t^i \dfrac{\partial Q_i^j}{\partial t^j} \gtrless 0 \end{cases} \\ \text{for } r=3, \ (t^i > t^j), & \end{array}$$

The derivative of L^i with repsect to t^j shows the degree of interdependence between the regions. When region i exports taxes by attracting cross-border shoppers (i.e., $t^i < t^j$: $Q^i_j=0$ and $Q^j_i>0$), a tax increase in j will always benefit region i. However, when region i imports taxes (i.e., $t^i > t^j$: $Q^j_i =0$ and $Q^i_j >0$), an ambiguous result occurs. A negative private consumption effect due to an increase in the tax on imports is offset by a positive public consumption effect due to the increased revenue raised from home purchases.

MT's model, therefore, illustrates several of the key assumptions of the research. First, the welfare of region i is affected by the tax rate of its neighbor. In r = 2, region i's welfare is increased by a tax increase of region j. In r = 3, the effect of i's welfare is unclear because some of i's residents will pay higher taxes. However, what is clear in the model is that an increase in j's tax rate will increase the tax base of region i, another important conclusion in the model. The interdependence of the base on the tax rate (at home and across the border) provides the theoretical support for the model discussed in Chapter 7. Finally, MT provide support the several of the key variables, including own rate, neighbor's rate, tax base, expenditures, and travel costs.

MT propose that there will always be a value of the other region's tax that causes region i to be socially indifferent between two rates—a high one and a low one. In other words, when the tax rate of region j reaches a certain point, region i will find it optimal to undercut region j and lower its tax rate. Region i will take advantage of exporting taxes after region j's tax rate reaches a particular threshold. MT also assume that the reaction function can be non-increasing. The local government may choose to decrease the tax rate if there is a preference for private consumption over public consumption.[20] However, this assumption will not hold if a region maximizes only its fiscal revenue (Kanbur and Keen 1993). Furthermore, if a region places a greater emphasis on the public good than on the private good, a region will take advantage of the neighboring region's tax increase by raising its own tax rate and raising the level of public good provided to its residents. In other words, the response depends on the jurisdictions preference for private or public goods. Therefore, MT show that both differences in tastes as well as strategic behavior can lead neighboring regions to change their respective tax rates. In other words, one cannot look only at tax rates to determine whether tax competition is occurring and whether regions are reacting rationally to their neighbors' tax choices. Regions will elect to have different tax rates for competitive reasons and because one region's citizens demand a different level of government services. The study therefore controls for expenditures and also looks at the changes in rates. Neighboring counties may have different expenditure levels and still react to changes in rates across the border to prevent or encourage cross-border shopping.

[20] Local governments may choose to decrease the tax rate if there is a stronger preference for public goods over private goods; however, a tax decrease is necessary when the region prefers private goods.

Chapter 6:

Hypotheses

The assumption that underlies the theory discussed in Chapter 5 is that governments do not set tax rates in isolation. In other words, for economic and/or political reasons, local governments consider their neighbors' rates when setting their own, and therefore compete at some level with their neighbors for tax revenues. MT show that the reaction to a change in a neighbor's rate can be to increase rates, decrease rates, or leave them the same. In other words, the expectation is that local governments consider their neighbors' rates when setting their own, although the response of a particular local government to a change in its neighbor's tax rates cannot be predicted in advance. More specifically, responses to a neighbor depend on expenditures (Case, Hines and Rosen, 1989), which are affected by tastes and preferences (Murphy and Izraeli, 1997), the competitive relationship between the two counties (i.e. whether or not the home county's tax rates are higher than those of their neighbors) (MT), and the size of the county (KK). The current study includes variables for expenditure levels and demographic differences to isolate the tax competition that may occur.

H1: There is a relation between the sales tax rates of neighboring jurisdictions and the local option sales tax rate.

KK predict that in some circumstances small or less populous jurisdictions will compete by setting tax rates lower than those of their larger neighbors. Alternatively, larger counties will tend to have higher tax rates than smaller neighbors. In the current study, the sample was partitioned into counties included in Metropolitan Statistical Areas (MSA) and non-MSA counties. If the predictions of KK hold true, MSA counties will

raise rates faster or by a higher percentage in response to tax increases by neighboring counties. If this occurs, the coefficient for the neighboring county's sales tax rate will be larger for the MSA sub-sample than that of the non-MSA sub-sample. The following research hypothesis is tested:

H2: The relation between the sales tax rates of neighboring jurisdictions and the local option sales tax rate will be larger for the MSA sub-sample than the relation for the non-MSA sub-sample.

The impact of a neighbor's sales tax rate on the sales tax base is predicted to be positive. If a competing neighboring county raises its sales tax rates, the tax-inclusive cost of its goods increases. The cost increase across the border will make the local good more attractive, which should to lead cross-border shopping, an increase in local sales and an increase in the tax base (Fox, 1986, Mikesell and Zorn, 1986, and Walsh and Jones, 1988), leading to the following hypothesis:

H3: There is a positive relation between the neighbor's local option sales tax rate and the home county's sales tax base.

The extent to which cross-border shopping occurs depends on the tax differential between two jurisdictions and the cost of traveling to the lower taxed jurisdiction (MT and KK). As the costs of traveling increase, the total cost savings from shopping in a lower taxed jurisdiction decrease, reducing the advantage of lower taxes. If a jurisdiction has a neighbor with lower sales tax rates, an increase in travel costs should positively affect its tax base because more of its residents will stay home and shop in the home county instead of traveling to take advantage of lower rates (Fox, 1986 and Walsh and Jones, 1988). Because Tennessee's sales tax rates are higher than its neighbors, the

overall effect of an increase in travel costs should be an increase in the sales tax base. The following hypothesis is proposed:

H4: There is a positive relation between travel costs and the home county's sales tax base.

The decision to set sales tax rates at a certain level depend on many factors, one of which is the amount of revenue that the local government hopes to raise from the sales tax (Wildasin, 1988). To the extent that the desired revenue from the sales tax remains constant, a decrease in the sales tax base because of cross-border shopping is expected to put upward pressure on the sales tax rate.

H5: The home county's sales tax base will negatively affect its local option sales tax rate.

Similarly, if a local government raises its sales tax rate, the tax-inclusive cost of local goods increases. *Ceteris paribus*, a tax increase also increases the tax-inclusive price of a sales taxed good. The amount of the taxed good purchased should decrease because of income, substitution, and cross-border shopping effects, causing the sales tax base to decrease. The following related hypothesis is tested:

H6: There is a negative relation between the local option sales tax rate and the sales tax base.

If expenditures increase, local governments must raise taxes to fund the increase (Wildasin, 1988). Although local governments have several revenue sources, including property taxes, a higher level of expenditures is expected to lead eventually to higher

sales tax rates. The following hypothesis is tested:

H7: There is a positive relation between expenditures and the home county's local option sales tax rate.

If revenue from property taxes or government grants increase and expenditures do not also increase, the revenue required to be collected from the sales tax should decrease. The reduction in required sales tax revenues should have a negative impact on sales tax rates.

H8(a): There is a negative relation between property tax revenues and the home county's local option sales tax rate.

H8(b): There is a negative relation between government grants and the home county's local option sales tax rate.

In addition to the local option sales tax rates, the study also includes variables for state-level sales tax rates for Tennessee and the surrounding states to help isolate competition at the local level. An increase in the Tennessee state-level sales tax rate should have a negative effect on the sales tax base for Tennessee counties because of the increase in tax-inclusive prices for goods sold in Tennessee. The following hypothesis is proposed:

H9: There is a negative relation between the Tennessee state-level sales tax rate and the home county's sales tax base.

Chapter 7:

Model, Econometric Technique, and Data

Model Development:

Jurisdictions have several options at their disposal with which to compete with their neighbors. Among the options to compete is keeping tax rates low and attracting shoppers and businesses to the area (depending on the elasticity of cross-border shopping.) Of course, everything else equal, a low tax rate often means that the services provided by the government also are limited. Another jurisdiction may attempt to attract residents by offering better public services, a favorable business climate, or infrastructure to support growing businesses. In other words, regions compete with their neighbors using both tax rates and expenditures. As Wildasin (1988) points out, the choice of one policy instrument, such as expenditures, is tantamount to the choice of the other (i.e., tax rates).

The difficulty for elected officials is that communities consist of residents with differing tastes and wealth. In addition, unlike privately purchased commodities, the demand for local public goods such as better schools, roads, museums, etc., is not directly observable. However, Bergstrom and Goodman's (1973) seminal paper showed that the demand for local public goods is a function of the tax share, population, income, and socioeconomic characteristics.[21]

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[21]Specifically, $\ln E = C + \alpha \ln t + \sigma \ln n + \beta \ln Y + \Sigma\delta_j X_j + \ln \mu$,
where E = total spending of a municipality on goods and services, t = tax share of the average household, n = number of households in a municipality, Y = average income of taxpayers, and X_j = socioeconomic characteristics. Further, α is the tax price elasticity, σ is the population elasticity, β is the income elasticity, and μ is a random error term.

Most states' constitutions, including Tennessee's, require a balanced budget each year so that total expenditures cannot exceed total revenue. Tennessee counties have similar restrictions. Total tax revenues represent the tax base times the tax rate for each tax imposed in the jurisdiction. Total local revenues include tax revenue, grants received from state and federal governments, and miscellaneous revenue. Specifically,

$$E \leq R \tag{1}$$

$$R = \sum_{i=1}^{N} BiTi + G + O \tag{2}$$

where E = municipality's total public expenditures, R = municipality's total revenues, N = number of taxes imposed, i = the type of tax being imposed, B = taxable base, T = tax rate, G = intergovernmental grants, and O = other sources of revenue. Assuming that local governments derive tax revenues either from the sales tax or the property tax, equation (2) can be stated as:[22]

$$E = R = (\text{Rate*Base})_{\text{sales tax}} + (\text{Rate*Base})_{\text{property tax}} + G + O \tag{3}$$

While local government's primary source of revenue is the property tax, this study is focused on the sales tax for a couple of reasons. First, previous research has indicated no statistically significant association between property tax rates and the location of retail outlets (Fox 1986). Second, the sales tax rate is very visible to consumers, and those consumers can quickly adjust their spending behavior to take advantage of differences in the rate between bordering counties. The influence of the property tax rate is less direct and, therefore, much more difficult to observe empirically.

[22] A reasonable assumption is that local governments spend all their revenues whether to fund current operating needs or to fund a future capital expenditure, so E=R.

Because the current study addresses sales tax competition, equation (3) can be further restated as:

$$E = R = (\text{Sales Tax Rate} * \text{Sales Tax Base}) + \text{Property Tax Revenues} + G + O \quad \textbf{(4)}$$

Given a balanced budget constraint, a region cannot offer higher service levels without collecting relatively higher taxes from residents or non-residents. Local governments cannot directly affect the sales tax base; they can affect tax collections only by altering sales tax rates.

Whether or not lower (or higher) tax rates decrease (or increase) total tax collections is not clear at the outset.[23] Suppose, for example, region i increases its tax rate. Residents of region i likely will decrease the taxable activity in region i, either by shopping elsewhere as long as the savings in taxes exceed the additional transaction costs (cross-border shopping effect) or by substituting non-taxable expenditures for taxable expenditures (substitution effect). However, ceteris paribus, an increase in a county's own sales tax rate should have a negative impact on its tax base (H6).[24]

If region j increases its tax rate, region i can respond in a variety of ways; MT show that the reaction function can be positive, negative, or flat. Three possible responses are discussed. First, region i can keep its tax rate fixed. With the additional shoppers from jurisdiction j, region i's tax base will increase, causing total revenues to increase. Conversely, region i can respond by lowering its tax rate. The net effect on

[23] The Laffer curve has been used to describe the relation between tax rates and tax revenues. The argument is that at high tax rates, a tax rate reduction leads to increased revenue. However, in the relevant range for most rates, a tax rate increase leads to overall increases in tax revenue.

[24] As discussed previously in Chapter 3, the effect of a tax rate change on revenue is unclear because it is difficult to predict income, substitution, and cross-border shopping effects.

revenue under the scenario is unclear. While a lower tax rate in region i will further encourage residents of region j to shop in region i, and therefore increase region i's tax base and tax revenues, region i will be collecting lower taxes from its own residents. Finally, region i can respond by increasing its tax rates. Again, the net effect on revenues is unclear. Additional revenues will be collected from region i's residents as a result of the higher tax rate; however, these residents may now choose to shop in region j for the lower taxed good, which will lead to a decrease in the tax base and lower tax revenues for region i. Importantly, in each of these scenarios, the effect of the neighbor's tax rate change should positively affect i's tax base (H3).

In addition, the effect of a neighbor's local rate on the home county's local rate will also depend on region i's desire for additional tax revenues (H1). If residents are content with current expenditure levels, region i can leave tax rates unchanged or even lower them slightly and collect the same or more sales tax revenue. Alternatively, region i can raise tax rates and, if the relative rates remain nearly equal, fund additional government services without experiencing revenue losses due to cross-border shopping.

These scenarios and the theory developed by MT (1986) and KK (1993) also illustrate that the sales tax rate and the sales tax base are not independent. Public officials face a trade off in setting their tax rates to fund a desired level of public expenditures. On the one hand, the local government wants rates low enough to discourage its own residents from buying goods in another jurisdiction or to encourage nonresidents to cross-border shop. On the other hand, the rates have to be high enough to meet its residents' service delivery demands. The sales tax base may affect the sales tax rate because an

insufficient base may force local governments to increase the sales tax rate to meet demands for public expenditures. At the same time, the sales tax rate may affect the sales tax base by influencing individuals to cross-border shop in the lower taxing jurisdiction.

Therefore, the sales tax rate is a function of desired expenditures, the sales tax base, the neighbor's sales tax rate, and revenues derived from property taxes, intergovernmental grants, and other services. Furthermore, the county's sales tax base is a function of its own and its neighbor's sales tax rates. In addition, since cross-border shopping will occur only when the travel costs are low enough to make it worthwhile, these costs are important determinants of the sales tax base (H4). Specifically,

$$\textit{Sales tax rate} = f(\textit{expenditures, sales tax base, neighbor's sales tax rate, property tax revenues, grant revenue, other services}) \quad \textbf{(5)}$$

$$\textit{Sales tax base} = f(\textit{sales tax rate, neighbor's sales tax rate, transportation costs}) \quad \textbf{(6)}$$

Additional variables are needed to control for other differences between counties. These variables are added to equation (5) and (6) to obtain the final model for the local option sales tax rate (LOCAL), equation (7), and the local sales tax base (BASE) equation (8). The variables are defined in Table 1 (LOCAL) and Table 2 (BASE), which are located in the Appendix. In addition, the sales tax rate has been broken into a local portion and a state portion for both equations so that tax competition at the local level can be isolated from changes occurring at the state level. The following discussion develops the variables for each equation separately.

LOCAL

The tax rate equation (LOCAL) represents the policy choice of the county, and the independent variables are the factors that influence this decision. These include factors regarding the choice of tax rates, services to be financed and other revenue options. Because the study attempts to determine whether counties compete using local option sales tax rates, one of the primary independent variables is the neighboring jurisdiction's local sales tax rate ($NEIGH_{t-1}$). Each county has numerous neighbors, and including the tax rates of all neighboring jurisdictions in the model is not practical and may result in multicollinearity. Therefore, several means of quantifying the neighbor are used. The primary definition used in the study is the adjacent county with the lowest local options sales tax rate. If more than one county has the same local option sales tax rate, the county with the shortest travel distance is selected as the competing neighboring county. A county's response to a neighboring county's rate change may not be instantaneous; therefore, the neighboring county's tax rate is lagged by one year.[25]

As discussed earlier, the local rate depends on the level of desired expenditures that varies from county to county depending on residents' tastes and preferences. For example, Murphy and Izraeli (1997) found that income, age of the population, and political party affiliations are important determinants of state and local revenues and

[25] Prior research does not provide any reason to choose a particular lag. Hewett and Stephenson (1983) used trial and error using a period of one to five years. Hewett and Stephenson (1983) found that sales tax rates lagged three years provided the best results. Case (1993) used a two-year lag for the state income tax; however, she does not explicitly explain how this lag is determined.

For the current study, regressions with lags from 1-5 years were run using both OLS and 2SLS. Lags of 1, 2 and 4 years all performed well in some cases, but a lag of a single year appeared to perform best in the majority of the cases.

expenditures. The expenditure variable (EXPEND) is included to provide information regarding the given service level desired by a county's residents (H7).

The final model also includes additional demographic variables that may predict taste for different tax structures. For example, an older population (OLD) with many of its residents past peak earnings years may prefer income taxes to general sales taxes. On the other hand, urban residents (URBAN) may prefer sales taxes because of the relatively large sales taxable base in more populous cities and because non-residents will pay a portion of the tax bill through cross-border shopping. Also, Murphy and Izraeli (1997) found that as per capita income (INCOME) increases, the level of service demanded also increases, but the preference for sales taxes may decrease or increase. Sales taxes are non-deductible, but the portion of a resident's income spent on sales taxable items decreases as income increases. Counties with a relatively large percentage of children (YOUNG) may require more spending for schools than a county with a large retirement population (OLD). Since taxpayers with school age children benefit disproportionately from an increase in spending for public schools, YOUNG may prefer higher taxes of all kinds relative to other population groups. The demographic variables are included in the final sales tax rate equation (7) to estimate the taste for sales taxes.

This study observes whether tax competition occurs between local governments. However, the total sales tax rate for a jurisdiction consists of the state-level tax and the local option tax. While county governments can control only the local option sales tax rate, they may be influenced by state-level sales tax rates.[26] For example, Mikesell

[26] Until 1984, when the state rate increased from 5% to 6%, Tennessee state law restricted the local option rate to ½ of the state rate. However, beginning in 1984, the maximum local option rate allowed is 2 3/4%.

(1971) found that total taxable sales and sales tax revenue are lower in counties that border states with lower sales tax rates. Tennessee has a higher state-level sales tax rate than does six of eight of its neighbors. Kentucky imposes the same state tax rate of 6% as Tennessee, and Mississippi imposes a state tax rate of 7%; however, neither state has a local option tax. Many of the Tennessee border counties, therefore, may face a unique competitive disadvantage as compared to non-border (interior) Tennessee counties when setting their local sales tax rates. To help control for changes occurring at the Tennessee state level, the state rate for Tennessee (TN) is included in the model. In addition, the model captures the state-level sales tax differential for border counties by including the state sales tax rates for each of the bordering states (AL, AR, GA, KY, MO, MS, NC, VA). These variables help isolate the competition between counties that compete with the local option sales tax rate, rather than state level competition.

Factors other than taxes and expenditures also may affect interjurisdictional tax competition. For example, some counties attract shoppers because they offer a larger selection of retail outlets. Other counties take advantage of their location near popular tourist destinations and use county resources to promote tourism and the tax dollars associated with travelers. In East Tennessee, Knox County's relatively large population allows it to compete with its neighbors by offering a greater selection of retail outlets, including malls and strip shopping centers. Sevier county takes advantage of its location near the Great Smoky Mountain National Park to attract shoppers to the many discount malls located there. However, relatively few dominant counties exist in Tennessee. Only

five have a population base greater than 150,000 people,[27] and the median Tennessee county has a population of approximately 29,000. Therefore, few dominant counties may be able to levy a higher tax than their neighbors because of their size. The population variable (POP) should capture any competitive advantages large counties have over their smaller neighbors.[28] KK (1993) predict that larger jurisdictions will have higher tax rates than smaller neighboring jurisdictions because of the elasticity of demand (H2). The elasticity of demand is greater for small jurisdictions because the potential for nonresidents to shop in a neighboring jurisdiction is larger.

Based on the previous discussion and equation (5), the structural equation for the local option sales tax rate (LOCAL) is specified as follows:

$$\begin{aligned} \mathbf{LOCAL} = {} & \gamma_0 + \gamma_1 (\mathbf{NEIGH}_{it-1}) + \gamma_2 (\mathbf{TN}_t) + \gamma_3 (\mathbf{BASE}_{it}) + \gamma_4 (\mathbf{EXPEND}_{it}) + \\ & \gamma_5 (\mathbf{PROPERTY}_{it}) + \gamma_6 (\mathbf{GRANTS}_{it}) + \gamma_7 (\mathbf{AL}_{it}) + \gamma_8 (\mathbf{AR}_{it}) + \gamma_9 (\mathbf{GA}_{it}) \\ & + \gamma_{10} (\mathbf{KY}_{it}) + \gamma_{11} (\mathbf{MO}_{it}) + \gamma_{12} (\mathbf{MS}_{it}) + \gamma_{13} (\mathbf{NC}_{it}) + \gamma_{14} (\mathbf{VA}_{it}) + \\ & \gamma_{15} (\mathbf{INCOME}_{it}) + \gamma_{16} (\mathbf{URBAN}_{it}) + \gamma_{17} (\mathbf{POP}_{it}) + \gamma_{18} (\mathbf{OLD}_{it}) + \\ & \gamma_{19} (\mathbf{YOUNG}_{it}) + \nu_1 \end{aligned} \qquad (7)$$

BASE

The BASE equation can be thought of as a consumption function for taxable commodities. While a jurisdiction's sales tax rate and expenditure level are determined by fiscal policy, a jurisdiction's sales tax base is determined primarily by economic

[27] Counties with a population exceeding 150,000 people are Davidson County, Hamilton County, Knox County, Robertson County, and Shelby County.

[28] In Tennessee, Sevier County is unique because of its status as a tourist destination and its location near the Smokey Mountains. POP will not capture its competitive advantages completely. However, for the sample as a whole, POP should reflect competitive advantages.

factors.[29] For example a jurisdiction's average income level will affect the tax base. Even though high-income individuals spend a smaller percentage of their income than do their low-income counterparts, taxable consumption is expected to increase as per capital income (INCOME) increases. Similarly, the percentage of the population that is over 65 (OLD) or between the ages of 5-14 (YOUNG) may also affect spending. Young families may spend more on taxable goods such as food and clothing while older individuals may consume more non-taxed goods and services such as health care, legal, and accounting. The percent of the population that is urban (URBAN) is included to capture any differences in the consumption patterns of urban versus rural counties. Finally, the unemployment rate (UNEMPLOY) may affect spending patterns not explained entirely by income. Specifically, unemployed individuals are likely to be more budget conscious than are workers and are clearly unlikely to incur consumer debt except for essential living items.

Other factors that impact the sales tax base may be unique to Tennessee counties that border other states. For example, all states that border Tennessee have a personal income tax while Tennessee does not. Furthermore, unlike Tennessee, some bordering states have revenues from gambling in the form of legalized casinos or state-run lotteries. An individual may have less disposable income to spend because his or her state implements an income tax. Or, the individual may choose to spend his or her disposable income on a lottery ticket rather than goods subject to the sales tax.

[29] State law determines which transactions are subject to the sales tax. Counties cannot manipulate the legal definition of the tax base (i.e., the statutory tax base is the same in all 95 counties).

These differences as they relate to the current study should be captured by the state-level sales tax rates for non-Tennessee counties. Additionally, the state-level sales tax rate will affect the tax base for Tennessee border counties because the rate's effect on the price of goods across the border may encourage or discourage cross-border shopping. Because the impact caused by bordering another state may vary from one state to another, the study uses the state-level sales tax rates for each of the eight border states.

Based on the foregoing discussion and equation (6), the structural equation for the local sales tax base (BASE) is specified as follows:

$$\begin{aligned} \mathbf{BASE} = {} & \beta_0 + \beta_1 (\mathbf{LOCAL}_{it}) + \beta_2 (\mathbf{NEIGH}_{it-1}) + \beta_3(\mathbf{TN}_t) + \beta_4 (\mathbf{AL}_{it}) + \\ & \beta_5 (\mathbf{AR}_{it}) + \beta_6 (\mathbf{GA}_{it}) + \beta_7 (\mathbf{KY}_{it}) + \beta_8 (\mathbf{MO}_{it}) + \beta_9 (\mathbf{MS}_{it}) + \beta_{10} (\mathbf{NC}_{it}) \\ & + \beta_{11} (\mathbf{VA}_{it}) + \beta_{12} (\mathbf{TRAVEL}_{it}) + \beta_{13} (\mathbf{INCOME}_{it}) + \beta_{14} (\mathbf{URBAN}_{it}) + \\ & \beta_{15} (\mathbf{OLD}_{it}) + \beta_{16} (\mathbf{YOUNG}_{it}) + \beta_{17} (\mathbf{UNEMPLOY}_{it}) + \nu_2 \end{aligned} \quad \textbf{(8)}$$

Method:

The system of equations defined above is tested using both ordinary least squares (OLS) and simultaneous equation techniques. While OLS has several desirable properties, the estimators are inconsistent when at least one endogenous variable is also an independent variable in another equation in the system.[30] The estimators under OLS are inconsistent because the endogenous variables are correlated with the disturbance term in that equation as well as with the disturbance term in all other equations. In other words, the endogenous variables cannot be considered as fixed in repeated samples, violating one of the principle assumptions of OLS. In this study, OLS is used first to

[30] In general, theory dictates whether a variable is endogenous to a system of equations; however, the Hausman test (discussed later) is used to verify whether the variables are endogenous. The variables LOCAL, PROPERTY, EXPEND, and BASE are predicted to be endogenous variables.

examine the factors that affect the rate equation (7) and the base equation (8). Because the OLS estimators may be biased in simultaneous equations, this study also will employ the two-stage least squares method (2SLS) and compare the results with OLS.

While a number of methods are available for estimating simultaneous equations, 2SLS is appropriate when estimating coefficients for an overidentifed system of simultaneous equations. The 2SLS coefficient estimators are consistent. In addition, 2SLS performs better than other simultaneous methods (e.g., full information maximum likelihood) when the predetermined variables are highly correlated. Finally, 2SLS is less sensitive to model specification error than are full information maximum likelihood and three-stage least square methods.

2SLS is a special case of the instrumental variables technique. Instrumental variables are used when the independent variables are not independent of the disturbance term. The instrumental variable acts as a "proxy" for the explanatory variable; however, it is uncorrelated with the disturbance term. Finding the proxy can be a problem; however, 2SLS helps overcome this problem by combining all exogenous variables to create a combined instrumental variable. In the first stage, the endogenous variables are regressed using OLS on all predetermined variables in the system of equations. This step yields the reduced form of the original equations and provides fitted values for the endogenous variables. In the second stage, the estimated values for the endogenous variables are used as instrumental variables and substituted into the original equations.

Fixed Effects:

In addition to using 2SLS, the model also includes fixed effects as an additional econometric technique to test the robustness of the model. The sample includes 95 Tennessee counties over a 17-year time period. Panel data control for individual heterogeneity, alleviate aggregation bias, and improve efficiency (Kennedy, p. 231). Pooling the data where the county and time differences are ignored, however, can result in model specification error (i.e., heterogeneity bias). To account for the unobservable county specific and time period effects, a fixed effects or random effects model is required. A fixed effects model is appropriate when the sample is focused on a specific number of counties, and the study is not concerned with making inferences about counties excluded from the sample. Since the sample consists of all Tennessee counties, a fixed effects model is the proper econometric technique. The county fixed effects represent the economic, political, social, and geographical differences of each county that are assumed to remain constant over time. The time fixed effects represent economic changes over the time period but are assumed to be the same across counties. The pooled regression is a fixed effects version of equations (7) and (8) that includes a dummy variable for each year (base year is 1977) and for each county (base county is Anderson).[31] This specification controls for the time differences and cross sectional differences between jurisdictions. Equations (7) and (8) are estimated using fixed effects for time, fixed effects for time and county, and without any fixed effects.

[31] The first year and county, 1977 and Anderson, respectively are chosen for simplicity. Other years and counties were tested and had no impact on the results.

Hausman Test:

If no simultaneity problem exists, the OLS estimators are consistent and efficient. If the 2SLS method is applied when no simultaneity exists, this method will yield estimators that are consistent but inefficient. On the other hand, if simultaneity does exist, OLS will be inconsistent, while the 2SLS method will be both consistent and efficient.

The Hausman test is used to test whether LOCAL, BASE, PROPERTY, and EXPEND are endogenous variables. In general, local governments have two ways to raise revenue to fund expenditures: property taxes and sales taxes. LOCAL and PROPERTY may be endogenous because the revenue derived from one source will affect their decision to change tax rates for the other; therefore, sales tax revenues depend on property tax revenues and vice-versa. If sales taxes are chosen to fund service levels, EXPEND and LOCAL may be endogenous as higher levels of expenditures require a higher sales tax rate. In addition, simultaneity should exist between LOCAL and BASE; these variables are predicted to have an effect on the other, depending on the amount of cross-border shopping.

The Hausman test specifies whether the endogenous variables are correlated with their respective equation error terms. The results of the Hausman test show that simultaneity exists between LOCAL and BASE (p-value =.023) and between LOCAL

and EXPEND (p-value = .036);[32] however simultaneity is not present between LOCAL and PROPERTY (p-value = .348).[33] One explanation for PROPERTY not being considered endogenous to the system is that PROPERTY may be endogenous to sales tax revenues but not to the sales tax rate.

Identification:

The identification problem arises when using simultaneous equations if the same set of data can estimate different sets of models. If the estimate of the structural parameter does in fact estimate that parameter and not something else, the parameter is considered to be identified. To assess identifiability, order and rank conditions must be checked. The rank condition was checked for the data and is met for both equations since the number of linearly independent rows of that matrix is equal to the number of endogenous variables minus one.

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[32] The effect of expenditures (EXPEND) on LOCAL is examined using both OLS and 2SLS. The model is also tested with time and county fixed effects and without fixed effects. The effect of EXPEND on LOCAL is discussed in Chapter 7.

The model is tested by adding expenditures (EXPEND) in its reduced form as a third equation. Since the study is primarily concerned with the endogenous nature between LOCAL and BASE, the results of EXPEND are not presented in the tables. A positive sign is expected, indicating that an increase in the neighboring jurisdiction's local option sales tax rate will results in an increase in own the own county's expenditures (H7). The results for NEIGH, however, are mixed and make interpretation of the results difficult. In general NEIGH has no effect on EXPEND. NEIGH is positive and statistically significant only for the MSA sub-sample when county fixed effects are excluded from the model and negative and statistically significant in the non-MSA and border sub-samples when county fixed effects are omitted. For all other scenarios, NEIGH is positive and not significant.

PROPERTY and GRANTS are positive and statistically significant for all model variations and sub-samples, indicating that increases in these other revenue sources will result in increases in expenditures. In general, INCOME, POP, and YOUNG and positive and OLD is negative. These results suggest that the younger populace and more populated areas prefer government services while the older populace does not. TRAVEL is also positive and statistically significant for most model variations, indicating an increase in travel costs will lead to and increase in expenditure levels.

[33] The model was also tested by adding PROPERTY in its reduced form as a third equation. In general, the results of this model were not as good as the model that excluded PROPERTY.

The order condition is necessary but not sufficient.[34] It is used to determine if an equation is overidentified, given that the rank condition holds. Identification states that the number of excluded predetermined variables in an equation must be greater than or equal to the number of included endogenous variables minus 1. In other words, at least one exogenous variable must exist in each equation that is not included in the equation of interest for the system to be identified. Thus, for an equation to be identified, it must contain information that is not included in the other equation. In the rate equation, TRAVEL, and UNEMPLOY are excluded predetermined variables. In the base equation, GRANTS, PROPERTY, and POP are excluded predetermined variables. Equation (7) is exactly identified whereas equation (8) is overidentified, making in the entire system overidentified. An overidentified equation may have more than one solution, and several estimates of one or more structural coefficients may exist. This means that there is no unique solution for the structural parameters in the overidentified equation. However, an underidentified equation cannot be solved because it is not possible to obtain estimates of the structural estimates.

Data Sources, Sample, and Variables:

The previously described model is estimated for all 95 counties in Tennessee. Data are collected for a 17-year period, beginning with fiscal year 1977. Tennessee state and local sales tax rate information is obtained from the Tennessee Department of Revenue. Sales tax rate information for the eight states that border Tennessee (Arkansas,

[34]In most cases, the order condition is sufficient.

Georgia, Alabama, Kentucky, Virginia, North Carolina, Missouri, and Mississippi) was obtained directly from the respective state governments.

Information for the local sales tax base, computed by dividing local sales tax revenues for each county by its respective local option sales tax rate, is gathered from Tennessee Department of Revenue, *Monthly Statement of Revenue Collections*, Collection Report by Counties - Local Sales Tax. Tennessee county revenue, including property taxes and federal and state grants is obtained from *County and Municipal Finances,* Comptroller of the Treasury, Division of Local Finance. The sales tax base, property tax revenues, grants, and per capita income are adjusted for inflation by dividing the nominal amount by the price index for gross domestic product, obtained from WEFA. In addition, to control for differences in size of counties, these variables have also been divided by the population for the respective county.

Demographic information is obtained from a variety of sources. Personal income is reported annually by the U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Measurement Division, Regional Economic Information System. Urban population is defined by the Bureau of the Census and includes all persons living in urbanized areas, and in places of 2,500 or more inhabitants outside urbanized areas. County population estimates, population by age and the percent of urban population are obtained from the U.S. Department of Commerce, Bureau of the Census, Census of Population and Housing. Because census data are only collected every ten years, population data are obtained for 1970, 1980, and 1990 and all other years are interpolated. For 1991-1993, population is assumed to grow similarly to that during

the period 1980-1990. Finally, the annual unemployment rate is collected from the Tennessee Department of Employment Security.

The travel cost has two components: distance and price. The distance component is computed by measuring the number of miles between the county seats using the Yahoo.com driving direction function; the price component represents the Internal Revenue Service standard mileage rate for the respective year. The total travel cost (TRAVEL) is equal to the mileage multiplied by the IRS standard mileage rate.

Chapter 8:

Findings

This chapter presents the empirical results of the data analysis; reference tables are included in the Appendix. Results for the LOCAL and BASE equations are discussed using both OLS and 2SLS. In addition, the results are reported using no fixed effects, fixed effects for time, and fixed effects for time and county.

Although the models include many variables, the results of interest are those central to the hypotheses outlined in Chapter 6. Theory developed by KK(1993) and MT(1986) predicts that local governments will compete with their neighbors using tax rates at their disposal, in this instance sales tax rates. Competition occurs because a rate higher or lower than their neighbors will cause cross-border shopping and affect the sales tax base of the home and competing jurisdictions. In either case, the neighboring local option rate should influence the home rate.

The hypotheses are initially tested using equations (7) and (8) with the pooled sample. In addition, because counties that border other states may face different competitive pressures than interior counties, the full sample is partitioned into border and interior counties and the tests are run separately for each group. Similarly, counties included in one of Tennessee's six Metropolitan Statistical Area's (MSA) also may behave differently than rural counties; therefore, tests are also run separately for a sample that partitions MSA and non-MSA counties into separate groups. The results for each of the tests are presented in Tables 5-6 (pooled), 7-10 (border versus interior counties) and 11–14 (MSA versus non-MSA counties).

Chow tests are performed for the LOCAL and BASE equations to examine whether the two sub-samples (i.e. border/interior and MSA/non-MSA) are drawn from the same population as the pooled sample; the F-test results are presented in Table 15. The results indicate that the pooled and partitioned samples are not drawn from the same population when county fixed effects are excluded. However, when county fixed effects are included in the model, the results indicate that the pooled and partitioned results are from the same population. Since the results differ depending on whether county fixed effects are included in the model, all findings for LOCAL and BASE are presented for the pooled and partitioned sub-samples.

The primary variables of interest for the equation estimating the local option sales tax rate for the home county (LOCAL) include the neighbor's local option sales tax rate (NEIGH), the home county's sales tax base (BASE), expenditures (EXPEND), property tax revenues (PROPERTY), and state and federal grants (GRANTS). For the BASE equation, the primary variables of interest are NEIGH, LOCAL, and travel costs (TRAVEL). These variables are discussed in some detail below. A somewhat abbreviated discussion of the control variables (e.g. state variables and demographic variables) will follow.

Effect of NEIGH on LOCAL:

H1 predicts that local governments consider the tax rates of their neighbors when setting their own tax rates, although the sign of NEIGH was not predicted in advance. In general, the coefficients for NEIGH are positive and highly significant for most model specifications except for the border county sub-sample (discussed below). Furthermore,

results are generally consistent using both OLS and 2SLS. Local governments therefore do appear to take neighbors' rates into account when setting their own rates, and the positive sign of the coefficient indicates that local governments raise sales tax rates in response to tax increases by their neighbors. This may mean that a neighbor's tax rate constrains a local government's ability to raise rates. Alternatively, local governments may find that a rate increase by a neighbor makes it politically easier to raise tax rates at home. H1 is accepted for the pooled sample.

This result is consistent with both KK (1993) and MT (1986). KK (1993) argue that the reaction function is always increasing when a jurisdiction is trying to maximize its revenues. MT (1986) also show that the reaction function can be positive, though it can also be negative or flat. A jurisdiction may be taking advantage of the neighboring jurisdiction's rate increase to increase its own rate, enabling it to provide additional public goods and services to its residents. Local governments also may find it politically easier to raise rates because their neighbor has done so, which is consistent with Case (1993) who also provided evidence of an increasing reaction function. Case finds that state governments will raise taxes by 50 percent of the tax increase by the neighboring jurisdiction. This study's results provide evidence that local governments will increase local option rates by 7 to 21 percent of the tax increase of the competing neighboring region (pooled sample, Table 5). The coefficients of NEIGH are higher for the interior (18-33 percent) and MSA (28-31 percent) sub-samples (Tables 7 and 11, respectively) but lower for the non-MSA sub-sample (8-14 percent, Table 12) than those of the pooled sample.

One interesting result for the LOCAL equation with the border (Table 7) versus interior (Table 8) partitioned sample is that NEIGH is positive and highly significant using OLS for the interior sample but not significant for the border sub-sample in any model iteration. NEIGH is not significant for the interior sub-sample using 2SLS with fixed effects. In addition, parameter estimates for NEIGH decrease as fixed effects are added to the model.

Overall, these results may indicate that interior counties use an increase in their neighbors' tax rates as an opportunity to raise rates their own rates because the generally small difference in total rates prevents significant competition. For the border counties, state rates will often come into play and cause the total tax differential to be relatively large, with Tennessee border counties almost always having higher total rates. Because of the sometimes large state tax rate differential, the local option rate of the competing county (which is often an out-of-state county) may not be a significant factor in determining a Tennessee border county's local option rate. Also, fewer rate increases for out-of-state border neighbors occur because some do not collect local option sales taxes, and less variation is present in the data.

Based on the theory developed by KK, H2 predicts that NEIGH will be larger for the MSA sub-sample than for the non-MSA sub-sample. For both MSA (Table 11) and non-MSA (Table 12) sub-samples, NEIGH is positive and significant in most model iterations. In general, when county effects are added to the model, NEIGH is not significant because county fixed effects explain most of the variation in the model. Interestingly, the coefficients for NEIGH for the MSA sub-sample are two to three times

higher than those for the non-MSA sub-sample. In other words, large counties raise their rates three times faster than do smaller counties in response to tax increases of their neighbors.[35] The positive and relatively large coefficient of NEIGH for the MSA sub-sample provides support for H2 and is consistent with KK who show that the reaction function is always upward sloping.[36]

Effect of NEIGH on BASE:

H3 predicts that an increase in the neighbor's sales tax rate (NEIGH) will positively affect BASE, because non-residents will cross the border to tax advantage of lower tax-inclusive priced goods in the home county. For the pooled sample, NEIGH is positive and significant using OLS when time and county fixed effects are included and using 2SLS with no fixed effects and time fixed effects, indicating that increases in the neighbor's tax rate cause the sales tax base of the home county to increase (Table 6). These results indicate that a one percent increase in the neighbor's tax rate will cause the home county's tax base to increase by approximately $3.80-$7.90 per resident. These results support H3 for the pooled sample.

The results for the partitioned samples are mixed. For the border sub-sample (Table 10), NEIGH is unambiguously positive and highly significant for all model variations. The results indicate that as the neighboring county increases its local option sales tax rate, the own county's sales tax base increases, a result consistent with

[35] A t-test was performed to compare NEIGH for the MSA and non-MSA sub-samples. Results show that the average neighbor's tax rate for MSA and non-MSA counties are significantly different at the 5% level.

[36] KK also show that the small jurisdiction's reaction function will kink at some point where it is indifferent between a high and a low tax rate.

expectations. While the coefficients are slightly higher using OLS, the result is robust to both the model specification and to the statistical method employed. Even though Tennessee borders states with lower total sales tax rates than those in Tennessee, the statistically significant coefficient for the border sample is surprising given that border counties do not apparently compete with their neighbors using sales tax rates (Table 8). In other words, for the border counties, changes in the neighbors' tax rates significantly affect consumer behavior and therefore the tax base, an economic response, but local governments do not consider the tax base effects in setting their own tax rates.[37] These results lend support to the notion that BASE effects are economic, but that the response of local governments to the economic impact of neighbors' rate changes is political.

For the interior sub-sample (Table 9), NEIGH is positive and significant only in the OLS model using time and county fixed effects. In all other model variations, NEIGH is highly significant and negative using both OLS and 2SLS, indicating an increase in the neighbor's local option sales tax rate will reduce the home county's sales tax base. This result is inconsistent with the theory and with H3. For interior counties, factors other than the neighbor's sales tax rate are affecting BASE. Larger interior counties may draw shoppers to their counties and away from smaller neighbors without regard to differential sales tax rates. In addition because the tax differential between interior counties is generally small, non-tax factors will have a relatively larger impact on the base than they will for the border counties. For example, Sevier County has a

[37] However, because NEIGH is defined as the adjacent county with the lowest local option rate (as opposed to the lowest total tax rate) in many cases, the "competitor" is a not Tennessee neighboring county. Sensitivity testing for NEIGH are discussed later.

relatively high local option sales tax rate (2.75% in 1997), but has clearly experienced a shopping explosion because of its discount malls and location near the Smokey Mountains. The OLS model with county fixed effects may account for some of these other factors affecting the base.

The effect of NEIGH on BASE for the MSA/non-MSA sub-samples is mixed, making it difficult to place confidence in the coefficients. For the MSA sub-sample, NEIGH is negative and significant using 2SLS but when county fixed effects are added to the model, NEIGH is positive and significant using both OLS and 2SLS (Table 13). This latter result is consistent with theory, indicating that an increase in the neighbor's sales tax rate will result in an increase in the sales tax base of the home county. The negative coefficient is contrary to expectations, however, and indicates that the base will decrease as neighboring jurisdictions increase their sales tax rates. For the non-MSA sub-sample, NEIGH is generally negative and significant but positive when county fixed effects are added to the model (Table 14). Because the results are mixed depending on the model specification, it is difficult to place confidence in the estimates. H3 is therefore rejected for the MSA and non-MSA sub-samples.

Alternative Definitions of NEIGH :

While each county in Tennessee has several neighbors, knowing which neighbor is the primary competitor is difficult to define and to observe. Therefore, alternative definitions of NEIGH were used to test whether the definition of neighbor's tax rate affects the local sales tax rate and the local sales tax base.

First, NEIGH is defined using the average local option tax rate for all neighboring jurisdictions, weighted based on population. By using a weighted average, no single county is selected as the primary competitor, and all surrounding neighboring counties are assumed to compete in some way. The results for LOCAL for the pooled sample using the weighted average are very similar to those reported using the original definition of NEIGH (the lowest local option rate). NEIGH is significant and positive in all model specifications when both OLS and 2SLS methods are used with the exception of 2SLS with fixed effects.[38] On the other hand, NEIGH is positive and significant in the BASE equation only when OLS with no fixed effects is used and is not significant in any of the 2SLS models. These results indicate that neighboring jurisdictions' local sales tax rates do not have a significant effect on the local sales tax base of the home jurisdiction. For the border/interior sub-sample, NEIGH is positive and significant (p-value < .05) in explaining LOCAL for both the border and interior sub-samples when OLS is used, and the results are robust to all model specifications. When 2SLS is used, NEIGH is not significant for either sub-sample. These results are not materially different from those previously reported using the lowest local option rate.

A second way to define the neighboring jurisdiction is to use the lowest total sales tax rate as opposed to the lowest local option sales tax rate. Kentucky and Mississippi do not have a local option sales tax rate; therefore, when the lowest local option rate is used, counties that border these two states will never "compete" with another Tennessee county (unless it also borders another state other than Kentucky or Mississippi). Since these

[38] The coefficients on NEIGH using a weighted average are larger than those when NEIGH is defined using the smallest local option tax rate. The coefficients range from .24 to .38 for OLS and .23 to .31 for 2SLS.

bordering counties' competitors will never have a change in their local option rate, the tests are performed defining NEIGH as the lowest total sales tax rate (state plus local option rate) for the adjacent counties. This definition may change the competitor for counties bordering states with local option sales tax rates.

The results using the minimum total sales tax rate are consistent with the findings discussed previously using the minimum local option sales tax rate. Coefficients for NEIGH in explaining LOCAL, however, are smaller, ranging from .02-.08 and .05-.10 for OLS and 2SLS, respectively. NEIGH is positive and significant for both OLS and 2SLS models that exclude county fixed effects for the pooled sample. In addition, NEIGH is significant for interior counties but not for the border sub-sample; the results are robust to both model specification and statistical techniques.

Effect of TRAVEL on BASE:

The extent that cross border shopping occurs depends on the tax differential between counties and the costs of traveling from one county to another. H4 predicts that as travel costs increase, cross border shopping will decrease, which should on balance increase the tax base of Tennessee counties. For the border counties, TRAVEL is positive and significant using OLS (no fixed effects and time fixed effects only) and 2SLS (time fixed effects only), indicating that an increase in travel costs will increase the home county's sales tax base, consistent with H4. Even though TRAVEL is not significant in every model specification, some evidence exists that as travel costs increase, individuals residing along state borders will shop more at home and less in

neighboring counties, increasing the home sales tax base. TRAVEL is insignificant in all iterations for the interior counties, supporting the premise the local option rate difference is too small to incur the additional travel costs to cross-border shop and that other factors dominate the decisions to cross-border shop. These results are not surprising given that the total tax differential along Tennessee's state lines can be much larger than those along the borders of the interior counties.

TRAVEL also is positive and significant (with no fixed effects and with time fixed effects only) for the pooled sample and for MSA sub-sample, but not significant for any iteration in the non-MSA sub-sample.[39] Higher travel costs, therefore, may reduce retail activity for MSA counties, but TRAVEL has no statistical effect on BASE for non-MSAs where a smaller number of retail outlets are present. This result is not surprising given that consumers will cross-border shop for two reasons – to take advantage of lower tax rates, or a larger or different selection of retail goods. If travel costs increase, the marginal benefit of lower tax rates and better selection will decrease, potentially decreasing cross-border shopping activity.

Effect of BASE on LOCAL:

H5 predicts that BASE will have a negative effect on LOCAL. In other words, if the sales tax base declines, governments will raise rates to make up for the revenue losses caused by the decreasing tax base. If the other sources of revenue (i.e. property taxes and grants) and expenditures remain constant, sales tax rates must increase to fund increased

[39] See Tables 6, 9-10, and 13-14.

revenue needs. For the pooled sample using 2SLS, BASE is positive (p-value < .1); in all other model variations BASE is insignificant (Table 5). The positive coefficient is contrary to predictions and H5. However, one possible explanation is that as economic activity and retail sales increase, local governments may choose to increase the sales tax rate to tax advantage of the larger sales tax base. Policymakers may find it more acceptable to bear the political costs of raising the rate when the revenues gained are larger. KK, in fact, predict that larger counties will have higher tax rates than smaller counties (H2).

For the border/interior sub-samples, the effects of BASE on LOCAL are mixed and depend on the sub-sample and the model specification (Tables 7-8). Using OLS, BASE is positive for the interior sample (not supporting H5) but negative for the border sample (consistent with H5). These results may not be surprising, particularly if cross-border shopping is more prevalent in border counties than in interior counties. The loss in sales, therefore, would be larger along the border, so border counties may try to maximize revenues by keeping rates competitive with their neighbors. In other words, as the base declines, border counties may be hesitant to raise rates and further erode the tax base. At the same time, for interior counties the impact of the base on the rate from cross-border shopping may not be directly observable because of the smaller rate differential.

The results of BASE change when 2SLS is used. BASE is positive and significant for the border sub-sample when time fixed effects are included in the model, indicating a decrease in the sales tax base will cause a decrease in the local option sales

tax rate. The positive coefficient using 2SLS is contrary to expectations and H5. BASE is insignificant for all variations of the 2SLS model for the interior counties using 2SLS, indicating that a change in the sales tax base has no effect on the local option rate. Because the results vary depending on the statistical technique, definitive conclusions are difficult to make for the border/interior sub-samples using 2SLS.

In general, the effect of BASE on LOCAL is positive for the MSA sub-sample (Table 11) but negative for the non-MSA sub-sample (Table 12) when OLS is used.[40] BASE is negative and significant for the non-MSA counties in all model variations using OLS and 2SLS with no fixed effects. Since the BASE measures total taxable retail activity, the negative coefficient for the non-MSA counties is consistent with the prediction that smaller counties will lower rates in response to an increase in the tax base in an effort to compete with larger neighbors. The positive coefficient for the MSA counties also is not surprising. KK (1993) predict that larger counties, i.e., those with larger populations and a greater concentration of business activity, will have higher tax rates. In other words, as business activity increases (BASE) for large counties, LOCAL also increases. In simple terms, as retail outlets increase and the tax base in large counties increases, local governments will raise rates to take advantage of the higher base. In large counties, the larger selection of outlets will outweigh higher tax rates. Examples are malls in the Nashville area or the outlet stores in Sevier County. At the

[40] Average per capita sales tax base varies significantly between counties. On average, counties included in the MSA (non-MSA) sub-sample have a per capita sales tax base of $4,293 ($3,043). The average per capital sales tax bases for Tennessee's four largest counties are: Davidson, $8,722; Knox, $7,166; Hamilton, $6,456; Shelby, $5,980.

margin, the county will gain more revenue from an increase in rates than the loss in revenue resulting from cross-border shopping.

Effect of LOCAL on BASE:

H6 predicts that an increase in LOCAL will have a negative effect on BASE because the increase in local sales tax rates increases the tax-inclusive price of local goods. The increase in prices is expected to reduce the demand for local goods, causing a decrease in taxable sales and the sales tax base. For the pooled sample, LOCAL is significant (p-value <.05) and negative using 2SLS with no fixed effects and with fixed effects for time, and but positive and marginally significant (p-value<.1) using 2SLS with fixed effects for time and county (Table 6). In the other model variations of the pooled sample, LOCAL is insignificant. Because both the sign and the statistical significance of LOCAL depend on the statistical model, for most cases in the pooled sample H6 is rejected.

For the border/interior partitioned samples (Tables 9-10), LOCAL is positive and significant in all model variations for the interior sub-sample, but negative and significant with OLS for the border sub-sample (and not significant using 2SLS). For the border counties, increases in the local rate appear to drive sales to lower taxed neighbors, consistent with expectations. Therefore H6 is accepted for the border sub-sample using OLS, but is rejected for the interior sub-sample.

The biggest difference between the model variations arises between OLS and 2SLS for the interior sub-sample. The coefficients for LOCAL are much larger for 2SLS

for all specifications when compared to those using OLS. LOCAL is significant in the OLS and 2SLS models with no fixed effects and with time fixed effects; however, when county fixed effects are added to the model, LOCAL becomes marginally significant for both OLS and 2SLS. The surprising positive coefficient for the interior counties, indicating that an increase in the local rate increases the base, also appears in the MSA partitioned sample. For the MSA sub-sample (Table 13), LOCAL is positive and highly significant using both OLS and 2SLS (except when county fixed effects are added to the model) but negative and significant for the non-MSA sub-sample using OLS (and not significant using 2SLS).

The positive coefficient for LOCAL for the interior and MSA counties is contrary to predictions and H6. The theory predicts that the sales tax base will decrease with an increase in rates as cross-border shopping becomes more prevalent. As discussed previously, the total tax differential between counties is smaller for interior counties than for border counties and an increase in the local sales tax rate may not cause cross-border shopping since non-tax factors are likely to dominate the decision. Similarly, the larger selection available in MSA counties may dominate the shopping decision without regards to higher sales tax rates. H6 is not supported for the interior and MSA counties.

Effect of EXPEND on LOCAL:

Tax revenues from all sources must at least equal expenditures if the balanced budget constraint is met. If expenditures increase, given that other sources of revenue remain constant, sales tax collections, and therefore sales tax rates, must increase to fund

higher expenditure levels. Accordingly, H7 predicts that government expenditures will have a positive effect on LOCAL. For the pooled sample and all sub-samples, EXPEND is positive and highly significant using OLS, and positive but generally not significant using 2SLS. The coefficient was higher for interior and MSA counties compared to the coefficients for border and non-MSA counties. This result is consistent with previous findings that interior and MSA counties are more likely to use the sales tax than are border and non-MSA counties. In general the results are consistent with expectations, and H7 is accepted.

Effect of PROPERTY and GRANTS on LOCAL:

In the LOCAL equation, the coefficients for property tax revenues (PROPERTY) and grants (GRANTS) are predicted to be negative (H8(a) and H8(b), respectively), suggesting that as revenues from these sources increase, local governments decrease sales tax rates because they need less sales tax revenue. For the pooled sample (Table 5) and portioned sub-samples (Tables 7-8, 11-12), PROPERTY is negative and significant in nearly every model variation using OLS, consistent with H8(a), but only in limited cases using 2SLS. For the partitioned samples the results are less robust, but are negative and significant in several model variations for each sub-sample. The results for GRANTS are similar, i.e., generally negative and significant using OLS and 2SLS, supporting H8(b) (although the coefficients are not significant in any model variation for the MSA sub-sample). These results are consistent with the expectation that if alternative revenue

sources increase, reliance on the sales tax decreases, resulting in generally lower sales tax rates. Accordingly, H8(a) and H8(b) are not rejected.

Effect of State Sales Tax Rates on LOCAL and BASE:

The Tennessee state sales tax rate and the state sales tax rates of neighboring states are predicted to influence local governments' sales tax rate decisions. The state rate (TN) is positive and highly significant (p-value <.001) in the LOCAL equation using both OLS and 2SLS for the pooled and partitioned samples with two exceptions.[41] Some may predict a zero or a negative coefficient for the state tax rate if they believe the state and counties are competing for the same sales tax base and sales tax revenues. If there is an overall limit to the amount of sales tax revenues that can be generated, the local government may have less capacity to raise sales tax rates if the state has done so.

The pooled results, however, show that county governments raise local option sales taxes from 31 cents to 36 percent for each one percent increase by the state (Table 5).[42] In addition, with the exception of the coefficient of TN for the border county sub-sample using 2SLS, the coefficients range from .25-.35 (Tables 7-8, 11-12) for all other sub-samples. One explanation for the positive coefficient is when the state raises its sales tax rate, local governments that previously were taxing at the statutory maximum may increase their rates because of the tax increase by the state. In Tennessee for most of the

[41] TN is not statistically significant in the non-MSA and border sub-samples using 2SLS.

[42] TN must be removed from the model when fixed effects for years are added to the model. Any variation being explained by TN is picked up by the year fixed effects as this variable varies only across time and not across counties.

sample years, the maximum local option rate was equal to one-half of the states sales tax rate. In other words, if the state's rate was 4%, the maximum local option rate allowed by state law was 2%. Therefore, if the state raises its rate by 1%, counties whose local option rates were previously at the maximum allowed level could raise their rates by 0.5%. This appears to be a reasonable explanation since the coefficients are approaching .5, the statutory maximum for local governments.[43]

Furthermore, the sales tax base in Tennessee has eroded over time with generally untaxed services and prescription drugs comprising an increasing proportion of economic activity. The sales tax base is determined at the state level; therefore, both the state and local governments have been forced to increase rates just to keep sales tax revenues from declining. Also the heavy reliance on sales taxes by Tennessee relative to its neighbors, and the emergence of mail order shopping, may have increased cross-border shopping (in a broader sense of the word) and caused further erosion in the sales tax base.

In addition to having an effect on local tax rates, H9 predicts that TN will have a negative effect on the sales tax base (BASE). With two exceptions, TN is negative and highly significant for the pooled (Table 6) and partitioned samples (Tables 9-10, 13-14), indicating that an increase in the state sales tax rate causes a decrease in the sales tax base. TN is robust to both OLS and 2SLS, but the 2SLS coefficients are larger than those using OLS. One interesting finding is that an increase in the Tennessee sales tax rate decreases the tax base of all Tennessee counties, regardless of the sample partition. Even

[43] Using a t-test, all coefficients for TN are statistically lower than 0.5 with the exception of the coefficient for the border county sub-sample using 2SLS. This suggests that counties do not move to the higher rates that are allowed.

interior counties with no nearby competing counties in other states suffer a significant loss in the sales tax base using both OLS and 2SLS. One possibility is that increases in the state rate cause Tennessee residents to turn to mail order vendors. Equally troubling for state and local governments, consumers also may switch consumption to non-taxed services as rates increase.

The models also include variables for the state-level sales tax rates of bordering counties. For both the BASE and LOCAL equations, if a Tennessee county borders another state, the variable takes the value of that state's sales tax rate for that particular year. Otherwise, the variable is zero.[44] The results for LOCAL are located in Table 5 (pooled sample), Table 8 (border/interior sub-samples), and Tables 11-12 (MSA/non-MSA sub-samples). In general, the neighboring state tax rates are positive for the pooled and partitioned sub-samples, indicating that neighboring state rates have a positive effect on local option sales tax rates in Tennessee. Interestingly, several of the coefficients for the border sub-sample are negative. Apparently border counties do not use sales tax increases by other states as an opportunity to raise their own rates, perhaps because in most cases even after a bordering state raises its rates, the Tennessee border county will still have a higher overall rate than their neighbor.

The state rate variables are included in the BASE model because the state-level tax rates may have an effect separate from local option rates. The results for the BASE equation are presented in Tables 6 (pooled sample), 9-10 (border/interior sub-samples)

[44] The neighboring state tax rate variables are dropped from the model when fixed effects for county are included. These are county only varying variables, and the county fixed effects should explain all of the variation of these variables.

and 13-14 (MSA/non-MSA sub-samples). For the pooled sample the significant coefficients are positive, with one exception, indicating that an increase in bordering states' sales tax rates increase the sales tax base. The results are even more robust for the border county sub-sample with the NC, MO, MS, AL, and KY variables all positive and generally highly significant. Not surprisingly, the coefficients for the border county sub-sample, where cross border shopping is most prevalent, are larger than those of pooled sample and all other sub-samples.

Effect of Demographic Variables on LOCAL and BASE:

Demographic variables are included in the LOCAL and BASE equations to help estimate various demographic group's views regarding tax rates and tax structures and the tastes for sales taxable commodities. INCOME, URBAN, OLD, and YOUNG are included in both the LOCAL and BASE equations. UNEMPLOY is included only in the BASE equation; POP is included only in the LOCAL equation.

One surprising finding is that for the LOCAL equation, the sign of INCOME is negative for most of the models, indicating that as per capita income increases, sales tax rates decrease.[45] Whether the sign is positive or negative depends on tastes for tax structures and rates as income increases. EXPEND and INCOME have only a 0.070 correlation, so per capita expenditures do not appear to increase substantially with increases in income. However, INCOME has a correlation of .624 with PROPERTY (p-

[45] The results for the partitioned samples are mixed. The results are positive for the border sub-sample using OLS but negative using 2SLS. For the non-MSA sub-sample, the results are also mixed depending on the model specification. For MSA counties and non-MSA counties, the coefficient is negative.

value <.001), which indicates that the taste for property taxes increases with income. Alternatively, in higher income areas, the property tax base is higher and governments prefer to take advantage of that high base to raise taxes. For the BASE equation, INCOME is positive and highly significant for all sub-samples, indicating that the sales tax base increases with a rise in per capita income. The result is not surprising since spending on taxable commodities should increase as income increases.

The effects of URBAN on LOCAL depend on the specification of the model. For the pooled sample and border counties, the results are mixed; URBAN is positive using OLS but negative using 2SLS. Interestingly, for the non-MSA counties, URBAN is positive using both OLS and 2SLS. Residents of Tennessee's smaller counties appear to prefer sales taxes more as they become more urbanized. URBAN has a positive and statistically significant effect on BASE for virtually all model specifications and for all sample partitions, indicating that the Tennessee counties' sales tax bases increase with a rise in urbanization.

For the LOCAL equation, the coefficients on YOUNG and OLD are generally both negative in all models but only statistically significant using OLS. However, for the pooled sample and the MSA sub-sample, OLD is positive and statistically significant when time and county fixed effects are added to the model. This suggests a stronger preference among retirees for sales taxes. The generally negative coefficients for YOUNG, on the other hand, indicate that counties with a large number of younger children prefer taxes other than sales taxes. Because younger families generally spend a

higher percentage of their incomes on food, clothing and other taxable commodities, the preference for other taxes is not irrational.

Whether or not OLD and YOUNG affect BASE depends on the specification of the model. The coefficient of OLD is positive for all samples except non-MSA counties, indicating that individuals over the age of 65 spend more of their income on sales taxable goods or simply have higher disposable incomes.[46] YOUNG is statistically significant in all specifications; however, the results are mixed. The coefficient is generally negative, but when county fixed effects are added to the model, the sign reverses and becomes positive. The positive sign is more believable because, as discussed above, the younger populace is expected to spend a higher percentage of their money on sales taxable goods. However, the mixed results prevent a conclusive interpretation.

Surprisingly, the unemployment rate, UNEMPLOY, is generally positive and significant in the pooled and partitioned BASE models using both OLS and 2SLS when time fixed effects are present. For most other variations of the model, UNEMPLOY is not significant. The high negative correlation between UNEMPLOY and INCOME may indicate that the variation is already being explained by INCOME. One would expect that as the unemployment rate increases, income and spending would decrease and cause a decrease in the sales tax base. One possibility is that UNEMPLOY may be measuring a shift from spending on entertainment and non-taxed services to sales-taxed essentials such as food and clothing.

The effects of POP on LOCAL are negative for the pooled and border samples,

[46] OLD is negative and significant for the non-MSA sub-sample using both OLS and 2SLS.

but positive for the MSA counties, and positive and significant for non-MSA counties (only using 2SLS and no fixed effects). The only partitioned sample with a negative coefficient is the border county sub-sample. Therefore, it appears that the border counties are dominating the results of the pooled sample, perhaps because the presence of lower taxed neighbors across state lines constrain border counties' ability to raise sales tax rates. For all sub-samples other than border, the coefficient is positive or not significant, consistent with the predictions of KK (1993) that larger counties will have higher tax rates.

Summary of Findings:

Several econometric techniques are used to examine the effect of various factors on local governments' sales tax rates and sales tax bases. 2SLS helps overcome the problems associated with simultaneous equations because of the endogeniety that exists between LOCAL and BASE. OLS has the advantage of being simpler and is presented for comparison purposes. Additional econometric techniques include adding fixed effects for time and county in the models. In general, the results did not differ when time fixed effects are added to the model, however, when county fixed effects are added, many of the variables became insignificant, indicating that these variables have no independent effect.

As discussed previously, the predictions central to the study are that counties will compete with each other for sales tax dollars by manipulating sales tax rates either to encourage non-residents to buy taxable goods in their county or to prevent its own

residents from shopping in neighboring counties. In addition, the study expects that the sales tax rates of the home and competing counties will affect the sales tax base of the home county because of the possibility that shoppers will cross borders to take advantage of differences in tax rates between counties. In simpler terms, a competing neighbor's sales tax rate may affect the home county's sales tax rate and sales tax base. The study included several control variables in an attempt to isolate the rate and base effects.

The findings provide some support for these expectations. For the LOCAL equation, NEIGH is positive and significant in every model except for the border county sub-sample, and the results are fairly consistent using both OLS and 2SLS. Therefore, local governments appear to consider their neighbors rates when setting their own rates, consistent with H1. Counties may be actively competing for sales tax dollars or simply following the political lead of their neighbors. In addition, the results also indicate that MSA counties raise rates more in response to changes in neighbors' rates than do non-MSA counties, consistent with H2.

The findings for the border sub-sample are not significant, indicating that border counties do not react to changes in their neighbors' rates and that the reaction function for this sample is flat. For border counties, factors other than sales taxes may simply dominate the decision. Alternatively, the differential across state lines may be large enough that an incremental change in NEIGH does not change the competitive posture of Tennessee border counties. Also, because two neighboring states do not allow for local option rates, there are fewer tax rate changes in the sample for border counties to react to

and that can be statistically measured. Both of these factors would cause the reaction function to be flat.

In the BASE equation, NEIGH is positive and significant for the pooled model and for the border sub-sample, indicating that for these samples, when neighbors increase their sales tax rates, the home county's sales tax base increases as shoppers are crossing the border to take advantage of the comparatively lower rates. The results are consistent with H3. However, for the interior and MSA sub-samples, NEIGH is negative and significant. (NEIGH is not significant for the non-MSA sub-sample.) For these sub-samples, determinants of the base depends more on factors such as selection, convenience, etc., than on the neighbor's local option sales tax rate. In fact, the neighbor may be raising rates because better retail options in the MSA counties, for example, may have caused the tax base in the neighbor to decline.

Travel costs were expected to positively affect the sales tax base because increased travel costs reduce the advantage of buying goods in a lower taxed neighbor. For the border and MSA sub-samples, the results are as expected, and consistent with H4. However, TRAVEL is not significant for interior and non-MSA counties. Border and MSA counties generally have higher rates than their neighbors and therefore likely lose local sales to lower taxed jurisdictions. As travel costs increase, more local residents appear to stay home to shop because of the reduced advantage of crossing borders.

While BASE is predicted to have a negative effect on LOCAL (H5), the results are mixed across the models. In the pooled, interior and MSA samples (border and non-MSA samples), increases in the BASE were positively (negatively) associated with

increases in the local option sales tax rate. Border and non-MSA counties are more susceptible to losing sales to cross-border shopping than are the MSA and interior counties. For these samples, governments may be keeping rates low to prevent additional erosion of the base. For MSA counties, with large retail operations and sales tax bases, governments may raise rates to take advantage of the higher base. In other words, a tax increase has a higher revenue payoff and may be politically easier to accomplish. Interior counties face less tax competition because the rates between neighbors will generally be small. For these governments as well, a tax increase can accomplish revenue-raising objectives without undue losses to cross-border shoppers.

A county's own sales tax rate (LOCAL) affects BASE differently depending on the sub-sample. The coefficient is negative for border counties and non-MSA counties, indicating that an increase in a county's own rate will cause a decrease in the county's tax base, consistent with H6. The positive coefficients for MSA and interior counties are contrary to predictions and inconsistent with H6. It appears that the better retail selection in MSA counties, and the generally small sales tax rate differential between interior counties, causes non-tax factors to dominate purchasing decisions.

As expenditures increase, local governments are expected to increase sales tax rates to fund the increased expenditure levels (H7). For all sub-samples, EXPEND is positive and significant in some model variations, indicating that higher expenditures do put upward pressure on local sales tax rates. The results are consistent with H7. Similarly, H8(a) and H8(b) predict that increases in other sources of revenue

(PROPERTY and GRANTS in the current model) will put downward pressure on local sales tax rates. The results are consistent with expectations and the hypotheses.

H9 predicts that an increase in the Tennessee sales tax rate will decrease the tax base of Tennessee counties because the tax-inclusive price of all goods sold in Tennessee increases. The results indicate that TN is positive and significant regardless of the sample. In other words, an increase in the state's sales tax rate decreases the base of all Tennessee counties, even those without nearby out-of-state competitors. H9 is therefore accepted.

Chapter 9:

Contributions, Limitations, and Extensions

This study differs from the prior literature in three important ways. First, the current study directly considers the endogeneity of the tax policy decision. The study examines how jurisdictions simultaneously select their policy instrument (i.e., tax rates or expenditure levels) when their choice will be affected by the amount of cross-border shopping. Prior studies failed to control for the relation between the tax rate, base, and expenditure level, which may result in material bias and inaccurate conclusions. Second, the study offers a unique setting that allows the presence of tax competition between jurisdictions to be directly tested. Unlike other types of taxes analyzed in previous studies, sales taxes can be manipulated at the local level. Therefore, they have a direct and measurable impact on the tax base of both competing regions. Further, other taxes do not appear to have an impact on cross-border shopping and the tax base of competing regions. In other words, the competition for retail sales at the local level using sales tax rates as the vehicle for competition will be relatively unaffected by confounding factors. Finally, unlike prior research that has focused on tax competition at the state level, this study provides evidence of competition at the local level.

This research also has a number of limitations. First, the results may not be generalizable to other local governments in other states. Because Tennessee relies heavily on sales taxes and has no individual income taxes,[47] further research should be done to see whether similar results are found in states with different predominating tax

[47] Tennessee does have a tax on certain dividend and interest income greater than $2,500 per year for married couples, but it has many exemptions and raises a relatively small amount of revenue.

structures (e.g., income tax, value-added tax, and property tax). Most local governments, including Tennessee counties, rely most heavily on property taxes for revenues, and the current research does not examine the effects of differences in property tax rates on interjurisdictional competition for residents or businesses.

Prior research suggests that localities can rationally decide to raise or lower tax rates as a competitive response to a tax change in a neighboring locality. Theory predicts that this reaction depends on whether the individual locality's goal is to maximize revenue or maximize utility of its citizens. These assumptions, however, are not observable. Further research, therefore, is warranted to understand governments' motivations.

As Case (1993) demonstrated, tax rate increases have an important political component that the model cannot adequately capture for such a large sample. For example, political factors may prevent elected officials from raising tax rates even if that course of action is in the best economic interests of the county. Conversely, a tax decrease may be motivated by politicians seeking election or reelection rather than by tax competition. A potential extension of this study is to consider the political affiliation of a county's Representative or Senator to determine if this is a factor in setting tax rates. Additionally, a telephone interview with the finance chair of a MSA county commission revealed that the particular body was aware of but did not explicitly consider the tax rates of its neighbors when setting its own sales tax rates. The Commissioner indicated that border counties were more likely to be affected by neighboring rates. A comprehensive survey of local government officials might better reveal the factors that these politicians

consider when setting sales tax rates. Additional research is needed to completely understand the factors that affect tax competition.

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Appendix

Table 1
Variable Definitions
Dependent Variable: LOCAL - Equation (7)

Variable	Definition
LOCAL	Local option sales tax rate for county i in year t.
$NEIGH_{t-1}$	Local option sales tax rate for the neighboring county of county i lagged by one year. The neighbor is identified as an adjacent county with the lowest local option sales tax rate and the lowest travel distance from county i.
BASE	Per capita local sales tax base for county i in year t, computed by dividing sales tax revenues by the local option sales tax rate for county i divided by population in county i.
EXPEND	Per capita local expenditures for county i in year t.
PROPERTY	Per capita property tax receipts for county i in year t.
GRANTS	Per capita grant revenues received from federal and state governments for county i in year t.
TN	Tennessee state sales tax rate in year t.
AL	Dichotomous variable that equals the Alabama state rate in year t for observations that border the state of Alabama, zero otherwise.
AR	Dichotomous variable that equals the Arkansas state rate in year t for observations that border the state of Arkansas, zero otherwise.
GA	Dichotomous variable that equals the Georgia state rate in year t for observations that border the state of Georgia, zero otherwise.
KY	Dichotomous variable that equals the Kentucky state rate in year t for observations that border the state of Kentucky, zero otherwise.
MO	Dichotomous variable that equals the Missouri state rate in year t for observations that border the state of Missouri, zero otherwise.
MS	Dichotomous variable that equals the Mississippi state rate in year t for observations that border the state of Mississippi, zero otherwise.
NC	Dichotomous variable that equals the North Carolina state rate in year t for observations that border the state of North Carolina, zero otherwise.
VA	Dichotomous variable that equals the Virginia state rate in year t for observations that border the state of Virginia, zero otherwise.
INCOME	Per capita income for county i in year t.
URBAN	Percent of the county i considered urban.
POP	Population in county i in year t.
OLD	Percent of the population over age 65 in county i in year t.
YOUNG	Percent of the population between the ages 5-14 in county i in year t.

Table 2
Variable Definitions
Dependent Variable: BASE - Equation (8)

Variable	Definition
BASE	Per capita local sales tax base for county i in year t, computed by dividing sales tax revenues by the local option sales tax rate for county i divided by population in county i.
LOCAL	Local option sales tax rate for county i in year t.
$NEIGH_{t-1}$	Local option sales tax rate for the neighboring county of county i lagged by one year. The neighbor is identified as an adjacent county with the lowest local option sales tax rate and the lowest travel distance from county i.
TN	Tennessee state sales tax rate in year t.
AL	Dichotomous variable that equals the Alabama state rate in year t for observations that border the state of Alabama, zero otherwise.
AR	Dichotomous variable that equals the Arkansas state rate in year t for observations that border the state of Arkansas, zero otherwise.
GA	Dichotomous variable that equals the Georgia state rate in year t for observations that border the state of Georgia, zero otherwise.
KY	Dichotomous variable that equals the Kentucky state rate in year t for observations that border the state of Kentucky, zero otherwise.
MO	Dichotomous variable that equals the Missouri state rate in year t for observations that border the state of Missouri, zero otherwise.
MS	Dichotomous variable that equals the Mississippi state rate in year t for observations that border the state of Mississippi, zero otherwise.
NC	Dichotomous variable that equals the North Carolina state rate in year t for observations that border the state of North Carolina, zero otherwise.
VA	Dichotomous variable that equals the Virginia state rate in year t for observations that border the state of Virginia, zero otherwise.
TRAVEL	Distance in miles from county i to the neighbor of county i multiplied by the IRS mileage rate for year t.
INCOME	Per capita income for county i in year t.
URBAN	Percent of the county i considered urban in year t
UNEMPLOY	Percent of county i unemployed in year t
OLD	Percent of the population over age 65 in county i in year t.
YOUNG	Percent of the population between the ages 5-14 in county i in year t.

Table 3
Descriptive Statistics

Variable	Mean	Std. Dev.	Median	Minimum	Maximum
TN	4.841	.907	5.000	3.000	7.000
LOCAL	1.404	.857	1.500	0.000	2.750
$NEIGH_{t-1}$	.922	.712	1.000	0.000	2.250
BASE	46.792	22.232	42.567	0.000	180.889
EXPEND	7.373	1.984	7.208	1.380	22.225
PROPERTY	1.853	.679	1.714	.621	6.253
GRANTS	4.036	1.448	3.950	.506	9.672
INCOME	133.162	129.767	30.714	64.238	303.870
URBAN	28.900	23.719	26.500	0.000	99.300
POP	43.423	84.750	24.471	4.000	849.568
OLD	13.599	2.445	13.544	7.245	22.125
YOUNG	15.107	1.586	15.012	10.500	28.832
UNEMPLOY	9.115	4.214	8.200	1.750	38.200
DISTANCE	29.985	12.883	28.100	12.400	99.100
TRAVEL	6.699	3.138	6.680	2.108	27.748

Table 4
Correlation Matrix

	TN	LOCAL	$NEIGH_{t-1}$	BASE	PROPERTY
TN	1				
LOCAL	.241	1			
$NEIGH_{t-1}$	.300	.261	1		
BASE	.108	.112	.131	1	
PROPERTY	.277	.091	.139	.408	1
GRANTS	.178	-.005	-.065	-.492	-.134
INCOME	.530	.300	.302	.618	.624
URBAN	.001	.077	.038	.726	.382
POP	.042	.101	-.075	.528	.436
OLD	.113	.013	.017	-.168	-.242
YNG	-.444	-.289	-.242	-.232	-.135
UNEMPLOY	-.180	-.004	-.078	-.274	-.291
DISTANCE	.046	.064	-.169	-.035	-.062
TRAVEL	.330	.225	-.023	.003	.040
EXPEND	.314	.132	.021	-.083	.358

	GRANTS	INCOME	URBAN	POP	OLD
GRANTS	1				
INCOME	-.372	1			
URBAN	-.664	.599	1		
POP	-.380	.462	.641	1	
OLD	.298	-.191	-.329	-.309	1
YNG	-.042	-.342	-.117	-.101	-.453
UNEMPLOY	.041	-.424	-.284	-.211	.040
DISTANCE	.072	-.041	-.121	-.136	-.081
TRAVEL	.145	.151	-.112	-.114	-.033
EXPEND	.741	.070	-.282	-.056	.082

	YNG	UNEMPLOY	DISTANCE	TRAVEL	EXPEND
YNG	1				
UNEMPLOY	.230	1			
DISTANCE	.149	.052	1		
TRAVEL	-.041	-.006	.927	1	
EXPEND	-.130	-.102	.063	.173	1

Table 5
Results Using OLS and 2SLS
Dependent Variable: LOCAL - Equation (7)

	OLS			2SLS		
i=95 n=1,615	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**
Variable	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
$NEIGH_{t-1}$	.1822***	.1446***	.0666***	.2091***	.1389***	.4395
BASE	-.0006	-.0000	-.0004	.0173	.0109*	-.0980
EXPEND	.0789***	.0763***	.0375***	.5745***	.1951	.9900
PROPERTY	-.1159***	-.1103***	-.0586**	-.6414***	-.2338	-.5884
GRANTS	-.1191***	-.1211***	-.0619***	-.7405***	-.2759	-1.1878
INCOME	-.0012*	-.0026***	.0028**	-.0087***	-.0065***	.0069
URBAN	.0007	.0012	.0102***	-.0115*	-.0047**	.0538
POP	-.0004***	-.0003**	.0018	-.0014***	-.0007***	.0163
OLD	-.0156***	-.0110**	.0467***	-.0027	-.0117	.1822
YOUNG	-.0401***	-.0260**	.0007	-.0219	-.0149	.0679
TN	.3096***	N/A	N/A	.3618***	N/A	N/A
AL	-.0084	.0163	N/A	-.1085***	-.0507*	N/A
AR	.0846***	.0721***	N/A	.1819***	.1073***	N/A
GA	.0331***	.0289**	N/A	.1271***	.0583**	N/A
KY	.0391***	.0284***	N/A	.0475***	.0309***	N/A
MS	.0518***	.0393***	N/A	.1042***	.0527***	N/A
MO	.0723***	.0605***	N/A	-.0497	.0128	N/A
NC	.0113	.0069	N/A	.1138	-.0472**	N/A
VA	.0418***	.0291**	N/A	-.0634*	-.0547*	N/A
R^2	.334	.363	.632	.133	.296	.125

***, **, * indicates significance at the .01, .05, .1 levels, respectively

Table 6
Results Using OLS and 2SLS
Dependent Variable: BASE - Equation (8)

	OLS			2SLS		
i=95 n=1,615	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**
Variable	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
$NEIGH_{t-1}$	.0649	1.2817	3.7891***	7.8728**	6.0513**	1.0993
LOCAL	-.1117	.6214	.0372	-38.6286**	-27.1657**	43.6855*
TRAVEL	.2710**	.4427***	-.1533	.9610***	.8317***	.0470
INCOME	.2391***	.3088***	.2347***	.2052***	.2593***	.3284***
URBAN	.5397***	.5079***	.5351	.6023***	.5694***	.0718
UNEMPLOY	-.0166	.7547***	.0389	.4828**	.9513***	-.2934
OLD	.5670***	.2192	1.7248***	-.0402	.1214	-.2580
YOUNG	-.8782***	-1.4872***	1.2625***	-2.4960**	-2.3568***	1.5101**
TN	-4.3982***	N/A	N/A	5.9121	N/A	N/A
AL	1.0698***	1.1508***	N/A	.9929	1.0174**	N/A
AR	-1.8566***	-1.7888***	N/A	-.0773	-.5535	N/A
GA	-1.2060**	-1.0371**	N/A	-.3128	-.4918	N/A
KY	-.4552	-.1501	N/A	1.1873	.8216	N/A
MS	-.0121	.3239	N/A	1.7073**	1.3350**	N/A
MO	2.2313***	2.6908***	N/A	6.1723***	5.2165***	N/A
NC	3.9242***	3.3629***	N/A	3.8114***	.2608	N/A
VA	-.9054*	.2748	N/A	.2483	.3687	N/A
R^2	.633	.651	.906	.450	.540	.703

***, **, * indicates significance at the .01, .05, .1 levels, respectively

Table 7
Results Using OLS and 2SLS
Dependent Variable: LOCAL – Interior Counties

	OLS			2SLS		
i=53 n=901	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**
Variable	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
$NEIGH_{t-1}$	.3270***	.2745***	.1757***	.2439*	.2294	.2256
BASE	.0024**	.0033***	.0019	.0493	-.0163	-.0156
EXPEND	.0944***	.0901***	.0707***	1.012	.6762	.2840
PROPERTY	-.0776**	-.0652**	.0200	-.7516	-.5969	-.0495
GRANTS	-.1255***	-.1220***	-.0687**	-1.310	-.9252	-.3456
INCOME	-.0038***	-.0049***	-.0051***	-.0202	-.0072	-.0041
URBAN	-.0012	-.0009	.0104***	-.0261	.0070	.01763
POP	-.0003	-.0003	.0012	-.0104	-.0028	.0036
OLD	-.0005	.0051	.0067***	-.0256	.0215	.1305
YOUNG	-.0234**	-.0102	.0554***	-.0413	-.0497	.0662
TN	.2773***	N/A	N/A	.3452**	N/A	N/A
AL	N/A	N/A	N/A	N/A	N/A	N/A
AR	N/A	N/A	N/A	N/A	N/A	N/A
GA	N/A	N/A	N/A	N/A	N/A	N/A
KY	N/A	N/A	N/A	N/A	N/A	N/A
MS	N/A	N/A	N/A	N/A	N/A	N/A
MO	N/A	N/A	N/A	N/A	N/A	N/A
NC	N/A	N/A	N/A	N/A	N/A	N/A
VA	N/A	N/A	N/A	N/A	N/A	N/A
R^2	.333	.371	.611	.051	.152	.534

*, **, *** indicates significance at the .01, .05, .1 levels, respectively

Table 8
Results Using OLS and 2SLS
Dependent Variable: LOCAL – Border Counties

	OLS			2SLS		
i=42 n=714	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**
Variable	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
$NEIGH_{t-1}$	.0463	.0142	.0005	-.0525	-.0520	-.3200
BASE	-.0029***	-.0026***	-.0044**	.0484	.0204**	.1106
EXPEND	.0309**	.0303**	.0192	.3693	.4197	-1.7742
PROPERTY	-.1617***	-.1681***	-.1368***	-.4590	-.5253	1.1900
GRANTS	-.1060***	-.1159***	-.0818***	-.4401	-.5627	1.6539
INCOME	.0047***	.0033***	.0015	-.0154	-.0112	-.0125
URBAN	-.0020*	-.0014	.0090*	-.0194	-.0085***	-.1329
POP	-.0006***	-.0006***	.0009	-.0005	-.0000	-.0056
OLD	-.0503***	-.0468***	-.0140	-.0540	-.0183	.1037
YOUNG	-.0610***	-.0491***	-.0418***	-.0748	-.0300	.0174
TN	.2782***	N/A	N/A	.5617	N/A	N/A
AL	-.0594***	-.0608	N/A	-.1745**	-.1499*	N/A
AR	.0187	.0126	N/A	.0821	.0270	N/A
GA	-.0120	-.0095	N/A	.0520	.0368	N/A
KY	.0171*	-.0203**	N/A	-.0301	-.0381*	N/A
MS	.0164*	.0010	N/A	.0044	.0010	N/A
MO	.0470***	.0419**	N/A	-.1079*	-.0750	N/A
NC	-.0305*	-.0271	N/A	-.2549*	-.1460**	N/A
VA	.0006	-.0230	N/A	.0337	.0212	N/A
R^2	.482	.500	.688	.113	.231	.058

*, **, *** indicates significance at the .01, .05, .1 levels, respectively

Table 9
Results Using OLS and 2SLS
Dependent Variable: BASE – Interior Counties

	OLS			2SLS		
i=53 n=901	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**
Variable	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
$NEIGH_{t-1}$	-3.2455***	-2.3659**	5.3127***	-43.6535**	-29.447**	.1316
LOCAL	4.0657***	5.3011***	1.4842*	130.5161**	107.2064**	41.1431*
TRAVEL	.0968	.2150	-.0449	-.81513	.3332	.3269
INCOME	.2026***	.2575***	.2965***	.4360***	.5947***	.4341***
URBAN	.6097***	.5906***	.0673	-1.3211*	.4050***	-.5844
UNEMPLOY	-.1878	.6135***	.0653	.4745***	1.3559**	-.1273
OLD	.4240**	.0075	2.0088***	.8793	-.4784	-1.5088
YOUNG	-1.5414***	-2.1292***	1.3175***	2.6208	-.7639	-.8520
TN	-3.4210***	N/A	N/A	-34.2706**	N/A	N/A
AL	N/A	N/A	N/A	N/A	N/A	N/A
AR	N/A	N/A	N/A	N/A	N/A	N/A
GA	N/A	N/A	N/A	N/A	N/A	N/A
KY	N/A	N/A	N/A	N/A	N/A	N/A
MS	N/A	N/A	N/A	N/A	N/A	N/A
MO	N/A	N/A	N/A	N/A	N/A	N/A
NC	N/A	N/A	N/A	N/A	N/A	N/A
VA	N/A	N/A	N/A	N/A	N/A	N/A
R^2	.706	.720	.901	.134	.196	.728

*, **, *** indicates significance at the .01, .05, .1 levels, respectively

Table 10
Results Using OLS and 2SLS
Dependent Variable: BASE – Border Counties

	OLS			2SLS		
i=42 n=714	No Fixed Effects	Time Fixed Effects	Time and County Fixed Effects	No Fixed Effects	Time Fixed Effects	Time and County Fixed Effects
Variable	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
$NEIGH_{t-1}$	3.5925**	6.3657***	2.3255***	3.1944**	5.7866***	2.2900***
LOCAL	-5.7978***	-6.4798***	-2.0367**	-1.2464	-.2280	4.6065
TRAVEL	.3802**	.6931***	-.1550	.2747	.5349**	-.1770
INCOME	.3667***	.5223***	.1333***	.3566***	.5058***	.1236***
URBAN	.3945***	.2997***	1.4988***	.3933***	.2986***	1.4764***
UNEMPLOY	.2846**	1.1489***	.1210	.2088	1.0282***	.0692
OLD	.3959	-.0503	.7956**	.6131	.2475	.7713**
YOUNG	.0617	-.8478	.8382**	.3560	-.4484	1.236**
TN	-6.1538***	N/A	N/A	-7.3033***	N/A	N/A
AL	1.1950**	1.1167**	N/A	1.4301**	1.4260**	N/A
AR	-1.2639*	-1.3332**	N/A	-1.1704*	-.3804***	N/A
GA	-.7205	-.6501	N/A	-.6033	-.5115	N/A
KY	.3578	.8337*	N/A	.3971	.8610*	N/A
MS	3.3984***	1.1577***	N/A	.5217	1.0689**	N/A
MO	15.0022***	4.2966***	N/A	3.0434***	3.7775***	N/A
NC	3.7382***	2.7524***	N/A	3.9925***	3.0891***	N/A
VA	.1212	1.0714	N/A	.2103	1.1568*	N/A
R^2	.572	.611	.931	.566	.602	.926

*, **, *** indicates significance at the .01, .05, .1 levels, respectively

Table 11
Results Using OLS and 2SLS
Dependent Variable: LOCAL – MSA Counties

	OLS			2SLS		
i=27 n=459	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**
Variable	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
$NEIGH_{t-1}$	.3138***	.2791***	.0100**	.2963***	.2845***	.1727
BASE	.0013	.0016*	.0010	-.0011	-.0053	-.0233
EXPEND	.0848***	.0774***	.0455***	-.1315	.1546	-1.0142
PROPERTY	-.1756***	-.1758***	-.0806	-.2489	-.2779**	.4827
GRANTS	-.0376	-.0223	-.0442	-.2264	.1682	1.2190
INCOME	-.0022**	-.0029**	.0003	-.0019	-.0030*	.0214
URBAN	-.0008	.0000	.0034	.0002	.0030	.0564
POP	.0003	.0005	.0021	.0001	.0009	.0020
OLD	-.0126	-.0099	.1671***	-.0035	.0025	.3995
YOUNG	-.0296*	-.0013	.1027***	-.0265	.0183	.2343
TN	.2664***	N/A	N/A	.2731***	N/A	N/A
AL	.0659**	.0641**	N/A	.0645*	.0996***	N/A
AR	.1734***	.1527***	N/A	.1600***	.1329***	N/A
GA	.0575***	.0494**	N/A	.0604**	.0267	N/A
KY	.1183***	.1062***	N/A	.1029***	.0850**	N/A
MS	-.0041	-.0247	N/A	.0280	-.0659	N/A
MO	Note 1	Note 1	N/A	Note 1	Note 1	N/A
NC	.0519***	.0562***	N/A	.0605	.1051***	N/A
VA	.2090***	.1964***	N/A	.2155***	.2055***	N/A
R^2	.526	.550	.706	.498	.501	.160

*, **, *** indicates significance at the .01, .05, .1 levels, respectively
Note 1: Model with county fixed effects is not full rank with MORATE; therefore, MORATE and has been dropped from the model.

Table 12
Results Using OLS and 2SLS
Dependent Variable: LOCAL – Non-MSA Counties

	OLS			2SLS		
i=68 n=1,156	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**
Variable	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
$NEIGH_{t-1}$	.1231***	.0821***	.0018	.1367**	-2.8564	2.445
BASE	-.0056***	-.0040***	-.0050***	-.0681***	.6340	-1.3851
EXPEND	.0504***	.0443***	.0346***	.2007	-15.2621	1.704
PROPERTY	-.1227***	-.1130***	-.0742**	-.1911	13.2665	-2.1909
GRANTS	-.0917***	-.0842***	-.0418*	-.1850	18.0587	-2.5419
INCOME	.0026***	.0006	-.0037***	.0138***	-.0100	.2116
URBAN	.0002	.0008	.0148***	.0215***	-.1481	-.1041
POP	.0024	.0024	.0009	.0319***	.2089	.6553
OLD	-.0140**	-.0062	.0177	.0365*	-.2403	.5837
YOUNG	-.0392***	-.0336***	-.0319**	-.0450**	.1520	1.0933
TN	.2524***	N/A	N/A	-.0028	N/A	N/A
AL	-.0383***	.0450***	N/A	-.0278	1.3397	N/A
AR	.0316	.0238	N/A	-.0288	-.5939	N/A
GA	-.0139	-.0061	N/A	-.1572***	1.2289	N/A
KY	.0155*	.0061	N/A	.0167	-.9188	N/A
MS	.0381***	.0280***	N/A	.0241	.7319	N/A
MO	.0872***	.0738***	N/A	.1988***	.2749	N/A
NC	.0156	.0100	N/A	.0855**	-.1145	N/A
VA	-.0120	-.0307	N/A	-.0730*	-.4566	N/A
R^2	.339	.367	.627	.140	.001	.002

*, **, *** indicates significance at the .01, .05, .1 levels, respectively

Table 13
Results Using OLS and 2SLS
Dependent Variable: BASE – MSA Counties

	OLS			2SLS		
i=27 n=459	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**
Variable	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
$NEIGH_{t-1}$	-1.6220	-.1951	3.9471***	-16.2534***	-9.3211**	5.3824*
LOCAL	8.2468***	11.0721***	1.4279	50.6694***	40.7539***	-14.8105
TRAVEL	1.363***	1.7304***	.2333	.9048*	1.5941***	.2638
INCOME	.2140***	.4033***	.3172***	.3702***	.5630***	.3413***
URBAN	.7610***	.7157***	1.9678***	.6985***	.6410***	2.056***
UNEMPLOY	.3988	4.344***	.5357	.3129	4.9811***	.1846
OLD	.7134	.1032	6.8970***	1.4732*	.5918	9.8092*
YOUNG	-.0420	-1.5359*	3.3526***	1.7220	-1.0311	5.1778
TN	-1.6050	N/A	N/A	-14.4592***	N/A	N/A
AL	4.9724***	3.3294**	N/A	-.0459	-.3921	N/A
AR	-3.2365**	-2.8480*	N/A	-31.2294***	-7.6800***	N/A
GA	-4.3280***	-4.3333***	N/A	-5.0628***	-4.6861***	N/A
KY	-4.0872***	-3.8728***	N/A	-9.5037***	-7.2301***	N/A
MS	1.5958	-1.7618	N/A	-1.4755	-1.4852	N/A
MO	Note 1	Note 1	N/A	Note 1	Note 1	N/A
NC	4.7485***	1.2031	N/A	2.5212	-1.1611	N/A
VA	-3.6169***	-2.683**	N/A	-10.5037***	-6.7344***	N/A
R^2	.627	.678	.932	.514	.612	.914

*, **, *** indicates significance at the .01, .05, .1 levels, respectively
Note 1: Model with county fixed effects is not full rank with MO; therefore, MO has been dropped from the model.

Table 14
Results Using OLS and 2SLS
Dependent Variable: BASE – Non-MSA Counties

	OLS			2SLS		
i=68 n=1,156	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**
Variable	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**	**Coefficient**
$NEIGH_{t-1}$	-1.4673**	-.5563	1.8113***	-2.3327**	-1.9975*	1.6591
LOCAL	-2.2825***	-1.8057**	-1.7687***	-4.1090	11.4358*	-26.5574
TRAVEL	-.1030	.0231	.0246	-.2214	.2453	-.0878
INCOME	.2618***	.3324***	.1947***	.2505***	.3211***	.0878
URBAN	.5060***	.4716***	.2733***	.4974***	.4462***	.6281**
UNEMPLOY	-.1700**	.3028***	-.0420	-.2764**	.1341	.1501
OLD	-.1929	-.4937***	-.1276	-.1111	-.3856**	.3273
YOUNG	-.6751***	-.9080***	.5207*	-.3520	-.2852	-.4061
TN	-4.3200***	N/A	N/A	-5.6428***	N/A	N/A
AL	.4006	.5048*	N/A	.6529*	1.0723**	N/A
AR	-1.0031*	-.9372	N/A	-.9780	-.8684	N/A
GA	-.9041	-1.0233**	N/A	-.8307	-.9052	N/A
KY	-.1237	.1245	N/A	-.2181	-.0141	N/A
MS	.1272	.1230	N/A	.3997	.3618	N/A
MO	1.5974***	1.9484***	N/A	.9237	.6781	N/A
NC	2.1076***	1.8436***	N/A	2.1295***	1.8583***	N/A
VA	-.7852*	-.2582	N/A	-.7359	-.0412	N/A
R^2	.663	.681	.886	.648	.626	.750

*, **, *** indicates significance at the .01, .05, .1 levels, respectively

Table 15
Chow Tests
F-Statistic Results

	LOCAL			BASE		
	No Fixed Effects	**Time Fixed Effects**	**Time and County Fixed Effects**	**No Fixed Effects**	**Time Fixed Effects**	**Time and County Fixed Effects**
Border/Interior Sub-Sample	8.04***	2.94***	.37	5.1***	3.71***	.98
MSA/Non-MSA Sub-Sample	8.26***	4.02***	.76	13.4***	10.5***	2.56***

*, **, *** indicates significance at the .01, .05, .1 levels, respectively

VITA

LeAnn Luna was born LeAnn Lampshire on August 10, 1965 in Houston, Texas. She graduated from Lafayette High School (Lafayette, LA) in 1983. That same year, she enrolled at Southern Methodist University where she received a Bachelor of Business Administration in May 1987. Proceeding to graduate school, LeAnn received a Master in Taxation at the University of Denver College of Law in June 1988. After graduation, she worked as a tax accountant in both public and private accounting and became a Certified Public Accountant in 1990. In August 1996, she returned to graduate school to obtain the Doctor of Philosophy degree in business administration at the University of Tennessee. She is currently an assistant professor of accounting at the University of North Carolina – Wilmington.