The Effects of Local Option Sales Taxes on Consumer Spending: Cross-Tier Elasticities and Tax Competition

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Abstract

Nearly one-third of US states currently allow both county and municipal governments to impose local option sales taxes (LOSTs) on retail transactions within their jurisdictions. These LOSTs have complex multi-jurisdiction and multi-tier dimensions in the presence of local tax competition. We investigate cross-tier tax elasticities using geocoded LOST rate and revenue data for Oklahoma municipalities and counties from 1990 to 2006. We find significant cross-tier effects in a variety of panel data specifications including levels, first differences, and random trends. Additionally, we find that accounting for local tax competition reveals important nuances in the interpretation of cross-tier and own-rate elasticities. The ability of municipal governments to influence LOST revenues by changing LOST rates is constrained by competitive pressures and proximity to regional retail centers. Understanding these nuances is important for states considering new local revenue sources such as those afforded by LOST authorization.

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1. Introduction

A local option sales tax (LOST) is a general retail sales tax imposed at a sub-state jurisdiction level where the proceeds are returned to the local jurisdiction of the purchase location.[1] LOSTs are well entrenched in the landscape of state and local government finances in the US: they are authorized in thirty-three states and contributed over 55 billion dollars worth of local government tax revenues in 2005-06.[2] Not only do LOSTs provide vital local revenue sources, they also introduce complex multi-jurisdiction and multi-tier dimensions. Sixteen states currently authorize general LOSTs at both the municipal and county level.[3] Figure 1 highlights the heavy proportional reliance on LOST revenues in these states relative to the US average.[4]

Recent widespread economic turmoil has led to a situation where an alarming number of states are facing budgetary shortfalls. According to a recent USA Today article (Schmit, 2008):

> "Twenty-nine states bridged budget shortfalls when they enacted budgets for fiscal 2009…Since then, new gaps have opened up in at least 15 states."

Given these extraordinary fiscal conditions, it is likely that financially strapped state and local governments are going to be increasingly investigating new sources of revenues (Dye, 2008). Furthermore, historical evidence suggests that states experiencing budgetary crises are more likely to turn to expansion of sales tax rates and/or coverage as opposed to increasing state income taxes or local property taxes. (Brunori, 2007) Hence, LOSTs may offer an attractive and feasible option for the states that currently have, to date, limited or no LOST implementation. However, many facets multi-jurisdictional local sales taxation are not well understood. LOST rate decisions can impact own government revenues as well as those of other jurisdictions, including competing, neighboring, and higher or lower tiers of government.

Much of the related literature investigates single-tiered dimensions of tax policy. For instance, spillover models (e.g., Baicker, 2005; Case, Rosen and Hines, 1993) and tax

[1] Local excise taxes, such as a hotel or recreation levy, are classified separately, even though they often serve the same purpose of generating funds for local expenditures.
[2] A small number of additional states authorize local sales taxes but either do not allow local governments discretion over rates or only allow a subset of jurisdictions to qualify (e.g., home rule designated cities) See the National Conference of State Legislatures (NCSL, 2008 and 1997) for an overview of recent state-local fiscal policy trends and details about local option taxes. Brunori (2007) also presents a general overview of LOSTs in the US.
[3] Mu and Rogers (2005) highlight variations in local autonomy associated with LOST implementation across states. A small number of states impose mandatory uniform level municipal LOSTs. Alaska allows local LOSTs but has no state sales tax.
[4] Data are from the US Census, Division of Governments, "State and Local Government Finances by Level of Government and by State: 2005-06" July 1, 2008 update.

competition models (e.g., Rork, 2003; Luna, 2004; Rork and Wagner, 2008) generally analyze interactions between states, counties, or municipalities separately. The limited research on multi-tiered fiscal interdependence typically focuses on state-local issues (Luna et al., 2007; Hill 2005) rather than county-municipal interdependencies.[5] This gap in the literature is surprising given the widespread use of multi-tiered LOSTs and the continued importance of LOST revenues.

We focus on county-municipal fiscal interactions from a municipal government perspective. Our unique dataset allows us to control for potential state-local fiscal impacts so as to isolate county-municipal fiscal interactions.[6] Isolating county-municipal fiscal interactions is important given that the primary motivation of LOSTs is the granting of fiscal autonomy to local governments. This investigation uses annual LOST rate and revenue data from 1990 to 2006 for Oklahoma counties and municipalities. Oklahoma serves as an excellent test case for several reasons. First the tax base is uniform for state, county and local LOSTs. Second, Oklahoma's state sales tax rate has not changed since 1990, allowing us to control for potential impacts of state sales tax rate changes on local government budgets. Third, nearly all Oklahoma municipalities imposed a LOST during our study period, reducing concerns about self-selection bias related to implementation decisions. Fourth, the effects of LOSTs on consumer spending patterns are best estimated in an environment where LOST revenues play an important role: LOST revenue as a percentage of local tax revenues is higher in Oklahoma than any other US state, save Louisiana and Arkansas. Finally, there is sufficient variation in both municipal and county LOST rates during the study period to empirically estimate reactions to each type of change. In addition, the panel nature of the data allow for the construction of models that control for potential omitted variable bias and that facilitate investigation of possible endogeneity issues.

We find that when tax competition factors are ignored, intriguing patterns emerge from empirical specifications which include the municipal LOST base in levels and first difference forms as the dependent variable. Consistent with our theoretical predictions, we find that increases in both municipal and county level sales tax rates reduce consumer spending. The

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[5]One of the few empirical investigations of multi-tiered LOSTs is Mu and Rogers (2005) who find states with multi-tiered LOSTS to be more fiscally decentralized.

[6] Two practical difficulties arise in trying to obtain reliable estimates of the effects of state tax rate changes on municipal tax bases. First, state rate changes are infrequent compared with the number of changes in county and municipal rates. Second, it is impossible to separate the effects of a change in state sales tax rate from the effects of time varying unobservable factors that are also expected to influence consumer spending across all municipalities.

effect of county level increases on municipal sales tax bases is consistently found to be stronger (i.e., larger in magnitude) and more significant than the effect of equivalent municipal level tax increases. The differential magnitudes of effects across implementing level, however, do not persist when tax competition measures are introduced.

We account for tax competition factors by considering LOST rates relative to those prevailing in the nearest retail center as well as the weighted average in the home county. In both cases, we find that competitive pressures influence own-rate and cross-tier LOST elasticities. Consistent with the theory developed in Section 2, distance serves as a buffer that mitigates competitive pressures. Finally, in our first differenced and random trends models we investigate changes in relative LOST rate differentials as being conforming (moving closer to the competition) or nonconforming (changing or enhancing relative competitive position). We find LOST rate changes that only lesson differentials with respect to the competition (without changing a municipality's relative competitive position) have minimal impacts on municipal revenues.

We conclude by discussing the implications of our work, given the continued and potentially increasing reliance on LOST revenues in the US. In particular, there are salient implications concerning fiscal inequality among urban, suburban, and rural localities within states, as well as how cross-tier elasticities and local tax competition affect the incentives (and ability) of local governments to attract retail activity.

2. Multi-tiered LOST Effects: Theoretical Framework

We now develop a simple theoretical framework that considers the effects of LOST in a setting where both municipal and county level governments have autonomy over rate setting decisions and tax a common retail base. It examines the nature of vertical and horizontal fiscal interactions in this environment and directly comments on the importance of tax competition effects.

2.1. Municipal Sales Tax Base

In states allowing multi-tiered taxation of retail sales, LOSTs are levied on top of state and other authorized local sales taxes. Thus, for any given purchase in municipality *i*, a consumer pays a total sales tax rate equal to the sum of the state rate ($\tau_{s,i}$), county rate ($\tau_{c,i}$), and municipal rate (τ_i) imposed at the purchasing location. During any year, municipal revenues (r_i) are equal to $\tau_i \bullet BASE_i$, the municipal sales tax base.

$BASE_i$ should be inversely related to τ_i because the municipal tax rate increases the cost of taxed purchases within the municipality relative to taxed purchases made outside the municipality and to non-taxed purchases (made anywhere else). Thus, changes in τ_i have both a direct and an indirect (via the impact on the base) effect on municipal revenues. Together these constitute own tax rate elasticity with respect to municipal revenues.

> **Proposition 1:** Own-rate municipal LOST increases (decreases) should have a negative (positive) effect on the municipal base and a less than (greater than) proportional effect on municipal LOST revenues.

The ability of consumers to alter shopping destinations (tax base mobility) in a multi-tiered tax environment additionally creates complex cross-tier elasticity dynamics. Notably, $BASE_i$ can be influenced by tax policy changes made by jurisdictions *outside its control*. Vertical effects arise from higher level governments that encompass municipal boundaries ($\tau_{s,i}$, $\tau_{c,i}$). Horizontal effects stem from policy choices made by governments lying outside jurisdictional boundaries (τ^*_j and $\tau^*_{c,j}$) as often highlighted in tax competition models. We now briefly discuss some insights from previous investigations concerning both vertical and horizontal fiscal effects and develop our own theory regarding competitive environments where both are present.

2.2. Cross-Tier (Vertical) Fiscal Interactions

Vertical fiscal spillovers result from multiple levels of government having taxing authority over a common (geographical) tax base. Keen and Kotsogiannis (2002) and Madies (2008) are two recent contributions to a reasonably well developed literature demonstrating that vertical fiscal externalities have important implications for optimal levels of taxation in a federation.[7] However, only a scant literature investigates the implications of fiscal externalities occurring at the sub-state level.[8] Moreover, the nature of fiscal interactions between county and municipal governments in the context of a multi-tiered taxation system remains entirely unexplored. In the context of LOSTs, changes in $\tau_{c,i}$ influence the relative price of consumption within a given municipality and are expected to have an inverse relationship with $BASE_i$.

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[7] Specifically, both investigations discuss how vertical and horizontal effects can create opposing distortions.
[8] For example, Luna et al. (2007) and Hill (2005) both consider the spillover effects of county rate adoptions in a state-county cross-tier interaction setting.

Proposition 2: County LOST increases (decreases) should have a negative (positive) effect on the corresponding municipal base(s) and, in turn, on municipal LOST revenues.

To the extent that $\tau_{c,i}$ is expected to effect $BASE_i$, multi-tiered LOST environments introduce the possibility of vertical fiscal spillovers.[9] We find no *a priori* reason to assume $\tau_{c,i}$ and τ_i should influence the municipal base in an identical manner.

Political economy factors may affect consumer preferences over adoption and eventual responses to tax rate changes made by different levels of local government. The extent to which consumers benefit from the spending associated with the sales tax revenue streams is expected to play an important role. It is possible that the extent to which consumers supported (i.e., voted for) the rate increase may affect their later tax avoidance behavior. Presumably, consumers should be less averse to paying LOST taxes they recently supported and/or that they associate more directly with the local public services provided in their community. The larger the implementing jurisdiction, the more the common-pool problem applies to voter adoption and subsequent consumer responses. Consumers may feel a greater attachment to the public services provided by their municipal government (municipal bias) than to services provided by the county government. The distribution of the benefits from county government spending is not expected to uniformly benefit urban, suburban, and rural areas. In fact, a reasonable conjecture is that county government spending disproportionately benefits rural residents since they most frequently use the transportation routes connecting rural areas of the county to urban and suburban centers of economic activity. Hence, it is possible that consumers may have stronger preferences for avoiding the incidence of $\tau_{c,i}$ than for avoiding the incidence of τ_i. A municipal bias implies that $BASE_i$ may be *more sensitive* (i.e., decrease more) to increases in the applicable $\tau_{c,i}$ than to changes in τ_i.

Additionally, the costs of tax avoidance is expected to play a role in determining consumer reactions to changes in τ_i and $\tau_{c,i}$. Because counties are larger than the constituent municipalities, on average, we expect consumers must drive longer distances (incurring higher costs) to reach a lower tax jurisdiction to avoid paying an increase in $\tau_{c,i}$ compared with an equivalent increase in τ_i. For relatively small purchases, it is unlikely that these costs are worth the tax savings. For large purchases (either due to the price of a good or the number of goods

[9] Other ways that higher order governments can influence tax revenues of lower governments include (but are not limited to) specific tax and expenditure limits, LOST rate limits, and limiting the use of certain tax instruments.

purchased at one time), however, the potential savings in sales taxes may outweigh travel costs. Simply put, the larger the taxing jurisdiction, the greater the costs of tax avoidance, and the larger the purchase needs to be before consumers find avoidance worthwhile. Hence, this factor leads $BASE_i$ to be *less sensitive* to changes in the applicable $\tau_{c,i}$ than to changes in τ_i (i.e., increases in τ_i would reduce $BASE_i$ by greater amounts than for similar changes in $\tau_{c,i}$), ceteris paribus. Because tax avoidance costs and political economy factors work in the opposite direction, we have no *a priori* reason to expect increases in $\tau_{c,i}$ would cause $BASE_i$ to decline more or less than a similarly sized increase in τ_i. Furthermore, tax competition and agglomeration economies complicate the analysis as discussed below.

2.3. Within-Tier (Horizontal) Fiscal Interactions

Wilson (1999) provides a survey of the extensive literature focusing on fiscal interactions among jurisdictions competing for a mobile tax base. We present a straightforward model of tax competition that is consistent with the primary conclusions of this literature. Consider an increase in either $\tau_{c,i}$ or τ_i, holding all other municipal and county LOSTs constant. This creates a change in the *relative* effective tax rates across municipalities. An increase in $\tau_{c,i}$ would lower a municipality's competitiveness relative to municipalities outside its home county. Similarly, an increase in τ_i would lower a municipality's competitiveness relative to other municipalities in both the same and different counties.

> **Proposition 3:** The level of LOSTs in a municipality *relative* to shopping opportunities in alternative jurisdictions should have a significant effect on the municipal base, and in turn, on municipal LOST revenues. Higher (lower) LOST rates than the competition will decrease (increase) consumer spending in the municipality.

The extent to which tax competition effects play a role in determining $BASE_i$ is expected to be influenced by the geographic configuration of alternate shopping opportunities (spatial competition) as well as consumer agglomeration externalities.

Due to the existence of consumer agglomeration economies, consumers will be drawn to distant regional shopping centers over closer, smaller venues (Fotheringham, 1985; Abdel-Rahman, 1990). This demand side pull resulting from offering greater product variety offsets the influence of distance on shopping decisions.[10] For this reason, our investigation focuses on differentials between a municipality and the nearest regional retail center (defined in Section 3) but also considers other specifications of spatial tax competition.[11] The larger the change in the tax rate differential between their local community and that of the nearest regional retail center, the greater will be the likelihood of consumers shifting purchases to locations outside their home jurisdiction. Notably, regional centers are not confined to be only in the largest urban areas, but are specified so as to include rural retail centers as well.[12]

In terms of fiscal spillovers, the commonality (or lack thereof) of county boundaries between a municipality and its nearest regional center is important to account for when investigating LOST elasticity.

> **Proposition 4:** The county LOST rate ($\tau_{c,i}$) is likely to have less of an effect on $BASE_i$ for municipalities that lie in the same county as the nearest regional center compared with municipalities that lie in a different county than its nearest regional center.

Thus, in subsequent empirical models that introduce tax competition effects, we allow county rates to differentially affect $BASE_i$ depending on this important distinction.

Tax rate differentials are obviously important when analyzing the influence of changes in LOST rates on $BASE_i$. In addition however, positional changes or changes in the relative rate differentials between a municipality and its regional center are also important. Consider two types of changes. Conforming changes arise when a municipality lowers or raises it LOST rate, but the change moves τ_i in the direction of the LOST rate in *i*'s regional center, $\tau_{r,i}$. Theory suggests that the effect of this type of change should be minimal since they are movements toward, but not beyond, the competition. Non-conforming changes, in contrast, occur when movements towards the competition *do* flip the relative standing and when movements are towards more extreme rate positions. Switches in relative standing occur when τ_i goes from either below to above or from above to below $\tau_{r,i}$. The relative competitive position becomes more extreme when τ_i moves either farther above or farther below $\tau_{r,i}$.

[10] Brülhart, et al. (2007) highlight the offsetting nature of agglomeration economies and tax rate differentials in terms of firm location decision.

[11] Another possible specification is the ratio of the home municipal rate and the minimum rate in the adjacent counties (Ballard and Lee, 2007). Our major conclusions hold when we represent spatial tax competition using the simple and weighted average of total LOST rates in the county to represent the competitive tax rate differential.

[12] Zhao and Hou (2008) and Snodgrass and Otto (1990) both consider rural retail centers in their analysis of fiscal disparity in a LOST setting. Neither investigation considered cross-tier rate-revenue relationships however.

Proposition 5: Non-conforming LOST changes should have relatively larger impacts on $BASE_i$ than conforming LOST changes.

To demonstrate the importance of tax competition effects, Section 4 includes results from models that both ignore and include measures of tax competition, to reveal the differences.

3. Empirical Specification and Data Description

3.1. Panel Data Specification

The equilibrium level of total spending within municipality *i* at time *t* ($BASE_{i,t}$) depends on a wide range of factors. Conceptually, these factors can be grouped into two initial categories: 1) time-invariant factors that affect consumer spending in a municipality expressed as a vector X_i (i.e., have a constant or level effect), and 2) time-varying factors that affect consumer spending in a municipality. Modern panel data techniques allow our empirical work to obtain consistent estimates of the effects of variables falling into the latter category even while variables in X_i remain unobservable. Additionally, we further broaden our consideration of time-varying factors to include three vectors: $T_{i,t}$, $T^*_{i,t}$, and Y_t. $T_{i,t}$ contains the county and municipal level LOST tax rates (τ_i, $\tau_{c,i}$) levied on purchases in municipality *i*. $T^*_{i,t}$ contains a set of variables that relates the variables in vector $T_{i,t}$ to the corresponding tax rates employed by their competition for retail customers. Finally, Y_t represents a vector of variables that change over time but exert a uniform effect on consumer spending across all municipalities. Hence, a reduced form semi-log model explaining consumer spending levels that does not capture the importance of competition effects can be expressed as:

$$\ln (BASE_{i,t}) = \alpha X_i + \beta T_{i,t} + \delta Y_t + e_{i,t} \qquad (1a)$$

While the inclusion of competition effects introduces $T^*_{i,c,t}$ and results in:

$$\ln (BASE_{i,t}) = \alpha X_i + \beta T_{i,t} + \gamma T^*_{i,t} + \delta Y_t + e_{i,t} \qquad (1b)$$

Equations (1a) and (1b) are easily estimated using a fixed effects (FE) approach using regression models that include municipality specific dummy variables to effectively control for unobserved variables falling into X_i and annual time dummies to control for unobserved variation in Y_t. Under this specification, all tax related variables found in either $T_{i,t}$ or $T^*_{i,t}$ enter directly as levels in the estimated equation.

Alternatively, equations (1a) and (1b) can be first differenced, defining the FD approach with and without inclusion of competition effects, respectively, as:

$$\% \Delta BASE_{i,t} = \beta\Delta T_{i,t} + \delta\Delta Y_t + \Delta e_{i,t} \quad (2a)$$

and

$$\% \Delta BASE_{i,t} = \beta\Delta T_{i,t} + \gamma\Delta T^*_{i,t} + \delta\Delta Y_t + \Delta e_{i,t} \quad (2b)$$

Note the X_i vector has dropped out entirely from first differencing so that area specific dummy variables are not present, while unobserved factors that vary over time (Y_t) are still controlled for using annual dummies. Here, values in either vector of tax rate related variables most frequently take the value of zero, deviating only when year-to-year changes occur. Both approaches are expected to produce consistent estimation of the effects of LOSTs on municipal tax bases.

The FE and FD approaches exhibit several strengths. First, they are straightforward to estimate and easy to interpret. In addition, they should effectively control for any potential misspecification bias due to unobserved heterogeneity between municipalities coming from 1) community specific factors that do not vary over time, and 2) time varying factors that influence consumer spending but are common to all areas. It is, however, possible that some unobserved factors that influence consumer spending patterns vary across *both time and place*; that is, over time *within* municipalities. If these unobserved factors are systematically correlated with both current tax rates and bases, it is possible that the FE and FD approaches could yield biased estimates. While we suspect this category of omitted variables exists, we have no *a priori* reason to suspect they would be systematically correlated to changes in LOST rates over time. Additionally though, it is possible that reverse causality may play a role in defining the rate-base relationship. That is, the current level of consumer spending in a jurisdiction could influence the likelihood of future rate changes. If reverse causality is present, care must be taken to ensure estimation procedures are capable of producing unbiased estimates of the effects of the tax rates on $BASE_{i,t}$. We follow two distinct paths to ensure our final conclusions are not based on results that suffer from potential bias from either source. First, we run models that allow for *municipal specific trends in the tax base over time* by estimating a random trends (RT) model.[13] The RT models are simply equations (2a) and (2b) with the municipality specific dummy variables reintroduced:

$$\% \Delta BASE_{i,t} = \alpha X_i + \beta\Delta T_{i,t} + \delta\Delta Y_t + \Delta e_{i,t} \quad (3a)$$

and

[13] The first use of the random trends approach that we are aware of comes from Papke (1994), where similar endogeneity issues regarding non-random enterprise zone designations were present.

$$\% \Delta BASE_{i,t} = \alpha X_i + \beta \Delta T_{i,t} + \gamma \Delta T^*_{i,t} + \delta \Delta Y_t + \Delta e_{i,t} \quad (3b)$$

Under this specification, first differencing the data controls for unobserved heterogeneity in *levels*, while the included municipal fixed effects are expected to control for unobserved heterogeneity in *systematic trends over time within communities*. For example, under the RT approach, an unobserved factor that was exerting pressure on both the tax base and LOST rates to rise over time would not introduce bias into the estimation procedure, since the trend in changes over time for the tax base would be a starting point and only *further deviations* from that trend are used to identify LOST effects. Secondly, we investigate the potential for endogeneity bias by carrying out strict exogeneity tests on our FE and FD models. These tests should reveal whether or not endogeneity bias related to reverse causality is a problem.[14] The results of testing various runs suggest we are obtaining consistent estimates from these approaches.

Another important econometric issue that arose when estimating all of our models is that both heteroskedasticity and serial correlation were consistently detected in the residuals.[15] We therefore report standard errors robust to both arbitrary serial correlation and heteroskedasticity that are obtained using the fully robust "cluster" option in stata, specifying the standard error to be clustered at the municipality level.

3.2. Sales Taxes in Oklahoma

Oklahoma sales taxes (state, county, and municipal) are levied as a percentage of gross receipts from the sale or rental of tangible personal property and from the provision of certain services. The tax base includes most retail sales as well as some business purchases of non-retail

[14] For the FE models, endogeneity tests follow the procedure explained by Wooldridge (2002) on page 146. It involves regressing current values of the tax base on future tax rates to see if they are significant predictors of future rates. When running the tests without area fixed effects, the relationship is highly endogenous (at both the municipal and county level). However, after introducing fixed effects as we do in equation (1), the correlation between current bases and future tax rates is no longer present. Hence, this provides evidence that equation (1) estimates the effects of LOST tax rates consistently. For the FD and RT models, the tests are somewhat more complicated. Here, satisfying the requirement of strict exogeneity is verified by following the procedure outlined by Wooldridge (2002) on page 285. The test involves modifying the preferred estimation equation to include lead levels of the tax rate variables (leaving current changes in the model). If future levels of the test variable are significant predictors of the current value of the dependant variable in this setting, then reverse causality problems are likely tainting the estimated coefficients on the first differenced tax rate variables. All of our RT models pass this test (i.e., the future LOST level is an insignificant predictor while current changes remain a significant predictor) when using both the first and second lead value of each LOST rate. The FD models do not consistently pass the test. We interpret this as evidence that reverse causality is present to some extent, but that: 1) the RT approach effectively controls for it and, 2) it does not cause significant bias (since the FD and RT models have very similar point estimates of LOST effects).

[15] The hettest command in stata was used to identify problems of heteroskedasticity. The preferred test for serial correlation involves regressing Δe_{it} on $\Delta e_{i,t-1}$, for various time periods, as suggested by Wooldridge (2002, pg 283).

items with exemptions for motor vehicle sales, agricultural sales, sales subject to the Federal Food Stamp exemption, sales to tax-exempt organizations, and non-taxable services (labor). Administrative records of Oklahoma's state, county, and municipal sales tax rates and collections were provided by the Oklahoma Tax Commission (OTC).[16] Since inception in 1933 at a rate of one percent, the state sales tax rate changed only four times with the last change raising the rate to 4.5 percent effective May 1, 1990. Beginning in 1966, municipalities were authorized to implement LOSTs for general and specific purposes. The LOST rate is restricted only by voter approval. As shown in Figure 2, the adoption of municipal LOSTs was widespread by the early 1980s. The distribution of the imposed LOST rates shifted from a modal rate of 1% in the 1970s to 3% in starting in the mid 1990s.[17]

Beginning in 1984, county governments were also authorized to implement specific purpose LOSTs, subject to voter approval.[18] Unlike the municipal LOSTs, counties are limited to a two percent rate maximum and the revenues must be designated for a specific purpose. Figure 3 shows the historical trend in the county LOST adoption and implemented rates. The modal rate has remained around one percent since their inception; however, the counties that adopted LOSTs since the 1990s tended to favor rates less than or equal to .5%.

Figure 4 shows the distribution of total sales tax rates imposed in Oklahoma municipalities since 1984. Municipalities that cross county boundaries were included as a single observation and were assigned the county rate corresponding to the location of the majority of its population. The modal maximum rate imposed gradually increased from 2% in the mid 1980s to 4% in recent years. Note the variation in the total LOST rates imposed does not appear to be driven by changes in the state sales tax rates as demonstrated by the lack of local rate response to the state tax rate changes in 1984 (from 2% to 3%), 1985 (to 3.25%), 1987 (to 4%) and the final change in 1990 (to 4.5%). Thus, the variation is driven by changes in municipal and county level LOST rate decisions.

A municipality's annual sales tax base is estimated by dividing the annual tax collections by the tax rate. In cases where LOST rates changed during the fiscal year, the applicable weighted tax rate is computed as follows:

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[16] Annual data are reported in OTC annual publication, *State Payments of Local Governments*.

[17] Within each rate range category in Figures 1 to 3, most of the rates fall on the whole percentage 1%, 2%, etc.

[18] Initially, county authorization was limited to the largest counties, but this rule was quickly changed to allow LOSTs in all Oklahoma counties.

$$weighted\ average\ rate = rate_1 * month_1/12 + rate_2 * month_2/12 \quad (4)$$

where $month_1$ and $month_2$ are the number of months that the corresponding tax rates, $rate_1$ and $rate_2$, were in effect during the year. This adjustment does not accurately reflect the seasonality of LOST revenues. In a tourism-dependent community, for example, retail sales may be higher in summer months than in winter months. In this case the average weighting scheme would put too much weight on the rate in effect during the winter months. The approximation, however, is not likely to be that important in the analysis that follows given the small number of mid-year rate changes relative to the total number of observations. Furthermore, using the simple weighted average will bias results only to extent that it produces systematic error in the estimation. There is no reason to think that this is the case, *a priori*.

3.3. Defining Regional Retail Centers and Proximity

For each municipality in our panel we characterize the regional retail center (RRC) within the closest proximity as the relevant competition for retail shopping customers. To identify RRCs we first selected all municipalities where $BASE_i$ was greater than $100,000,000 in the year 2000. This yielded 42 potential RRCs. Some of these, however, were clearly suburbs of the two dominant jurisdictions in the State: Oklahoma City and Tulsa.[19] Thus, the twelve potential RRCs that were within 15 miles of either Oklahoma City or Tulsa were eliminated, leaving the 30 RRCs we used in our analysis. Figure 5 shows their geographic dispersion as well as the distribution of total (municipal plus county) LOST rates imposed in the state in 2006 for all cities in our sample. Unsurprisingly, the RRCs were spread widely throughout the state. Furthermore, LOST rates varied considerably across the RRCs, which will contribute to the identification in our analysis that follows.

The competitive influence of RRCs is expected to be affected by the distance between the home municipality and the RRC. LOST rate advantages offered by RRCs are expected to weaken as consumers face higher travel costs (longer drive times).[20] We found no *a priori* reason to prefer any particular specification of distance, due to a lack of prior theoretical or

[19] The tax bases of Oklahoma City and Tulsa were each consistently larger than the next largest tax base in the state (Norman) by a factor of over 6.

[20] All municipality-to-municipality distance measures were calculated using GIS software and publicly available GIS maps from the Oklahoma Center for Spatial Analysis. Calculated distance measures reflect the straight line distance between municipal centroids.

empirical research on this matter. Hence, we explored both continuous and categorical measures of distance in our analysis.

Our primary results come from models that employ a very simple dichotomy to capture competitive effects. In particular, all municipalities within 12 miles of their RRC were coded as "close" and all other municipalities were coded as "non-close". The 12 mile cutoff was driven by several factors. The distribution of distances to the nearest RRC has a considerable positive skew. In addition, nearly half of the mass of the distribution lies within a somewhat tight range (five miles above or below) of the mean distance (approximately 18.3 miles). Third, somewhat noticeable natural breaks in the density function occur near the 25th percentile (12.1 miles) and just below the 75% percentile (23.6 miles) of the distribution. We used both of these natural breaks as group cutoffs in early work, creating three categories. However, we found no advantage of this three tiered system relative to lumping the second and third tier together and, in the end, went with the simpler system in our analysis that follows.

3.4. Sample Selection and Data Filters

From the OTC data on LOST rates and municipal tax collections we construct a panel covering the years 1990 through 2006 that contained the 467 municipalities that had LOSTs in place as of 1990. Thus, our empirical analysis considers the effects of changes in existing LOST rates over time and does not directly investigate new LOST adoptions. Some straightforward procedures are used to clean the data. An initial problem was that the reported collection period may not perfectly reflect the tax obligation period. Our panel only includes tax collection observations for years when a LOST was in place.

We eliminated 144 municipalities located in the twenty-nine counties that bordered other states. This was done for two reasons. First, we wanted to control for cross-border shopping issues along state borders (e.g., see Fox, 1986). By dropping the border counties, we are better able to control for unobserved changes in border state policies that may affect consumer behavior near the border. Secondly, an important aspect of our empirical strategy is to account for competition effects by relating the prevailing tax conditions in municipalities to those found in the nearest regional center. For municipalities near the state border it is possible that our method of capturing competition effects may incorrectly reference an Oklahoma retail center when, in reality, a closer retail center exists in a different state.

Our selected method of investigating competition effects also meant that we needed to drop the observations from the municipalities that were designated as retail centers from the estimated models. This left us with a final sample of 302 municipalities.[21]

We also estimated all our final empirical models using only observations from 1993 to 2006 for two reasons. First, the empirical strategy of using first-differenced data in several models forces 1990 observations to be dropped. Secondly, there was a change in the state tax rate during 1990. We wanted to minimize any potential impact of the statewide change on municipal and county LOST rate decisions and/or LOST bases so we dropped two additional years at the beginning of the panel. In doing so, any major reactions to the state rate change should have already occurred. Furthermore, estimates that included the entire panel yielded qualitatively similar estimates to the ones presented below.

After these initial filters the panel was still both wide and long and contained 4,228 observations (302 municipalities multiplied by 14 years). The difference between this figure and the 4,208 observations used in all our presented estimations is due to other filters that, while smaller in size, still played an important role. Likely data entry errors and large random shocks were suspected to be an issue and were controlled for in the following manner. Any annual change in the municipal LOST base variable that fell outside (i.e., more extreme) of a 3:1 or 1:3 ratio for the year-to year change was dropped from the panel. For example, if $BASE_{i,t-1}$ was \$100,000, then a value greater than \$300,000 or less than \$33,333 for $BASE_{i,t}$ would cause the year t observation to be dropped. This led to several "pairs" of consecutive year data points for the same municipality being dropped- one from a large drop and the other from a large increase (in either order). This is the clearest indication that we have likely purged several data entry errors. Also, in one case, we observed that a merger between two previously autonomous cites occurred. Hence, we were forced to drop the 2005 and 2006 observations for both communities because the pre and post-merger years were not directly comparable.[22]

Finally, in the process of running several initial estimations of different specifications of our basic FE, FD and RT models, we checked for extreme outliers by identifying observations that had undue influence on LOST coefficient estimates. Six observations were consistently

[21] Of the 30 RRCs, nine were in border counties. Hence, the RRC filter only drops 21 *additional* cities, producing the final sample of 302 (467-144-21) municipalities.
[22] Norman took over what had previously been the city of Hall Park, leaving no way of determining the portion of Norman's tax base attributable to economic activity occurring in the area that had previously been Hall Park.

found to be outliers across initial runs of all three types of models and were dropped.[23] We estimate all of our final regression models using the 4,208 observations that remained after all of the above described filters were applied.

4. Estimation Results

Table 3 [insert Table 3 about here] provides the estimation results for our FE (1a and 1b), FD (2a and 2b), and RT (3a and 3b) regression models. Before discussing results from the preferred set of models that account for competition effects, we briefly discuss the results of our models that do not account for competition effects, for the purpose of comparison. As was expected from propositions 1 and 2, we find that in all three models the signs on municipal and county LOST rate coefficients are negative. The estimated coefficients for county LOST rates are significant and of similar magnitudes across all three models, with a rate increase of 1% causing just over a 2% decline in the municipal tax base. Somewhat surprisingly, these basic models suggest the own-rate elasticity for municipal LOST changes is somewhat smaller than the estimated cross-tier elasticity, with a 1% rate increasing leading to around a 1.5% decline in the tax base. Furthermore, municipal LOST rates are insignificant in the FE (level) model. Taken together, results from the models that do not account for competition effects suggest that the response of municipal tax bases to LOST rate changes imposed at the county level are stronger than responses to changes coming from the municipal level. Hence, we not only have evidence that cross-tier elasticities are significant, but that they may be larger than own-rate elasticities, such that the implementing level matters.

A simple post-estimation exercise puts this difference into perspective. Setting aside model (1a) due to the insignificance of municipal rates, we take the effects of municipal and county level LOST changes to be the average effect across models (2a) and (3a). The average sized municipal tax base (for observations included in final models) was just over $25 million in 2006. A 1% increase in LOST rate implemented by the municipal government would lead to a reduction in the municipal base of just under $397,000. A similar 1% increase in the LOST rate

[23] Specifically, the procedure used the dfbeta command in stata which reports the sensitivity of the estimated variable coefficients to each individual observation. Data points causing a movement of the estimated coefficient on the tax rate variable that was greater than 0.25, in either direction, were considered outliers. Although the cutoff point is somewhat arbitrary, 0.25 is fairly large compared with all estimated coefficients. There is also casual evidence that this cutoff served as a natural break, since using the value of 0.20 caused the number of observations designated as outliers to increase significantly, suggesting the 0.20 cutoff probably affected data points that did not lie in the extreme tail of the distribution.

implemented by county government would lead to a predicted reduction in the municipal base by about 2.5%, or about $634,000. So an identical 1% rate increase would cause the estimated municipal tax base to decrease by about $237,000 more if it were implemented at the county level versus the municipal level, a considerable amount of resources for an average sized municipality in our sample.

However, moving on to models (1b), (2b), and (3b), we find that a more nuanced story surfaces when measures capturing competition effects are included. The results of model (1b) contain a number of interesting results. First, we see strong evidence that municipalities face significant competition for consumer spending coming from their RRCs. When both variables are included in a regression at the same time, it is not the municipal LOST rate that influences the size of the tax base, but the difference between this rate and the municipal LOST of the corresponding RRC. Furthermore, the distance between the municipality and their RRC plays an important role, as was expected. When a municipality is close (within 12 miles) to their corresponding RRC, the difference between their municipal LOST rate and the municipal LOST rate of the RRC exerts a strong influence on their tax base. Having a 1% higher (lower) municipal LOST than the RRC leads to around a 4% smaller (larger) tax base. On the other hand, when jurisdictions are located farther away from their RRC, competition effects seem to be much weaker. In fact, the results imply that competition effects fully dissipate once consumers have to make longer drives.[24]

The importance of accounting for competition effects is further demonstrated by the set of county LOST rate interaction terms included in model (1b). Recall that the estimation results from model (1a) suggested a one percent county LOST rate increase is associated with a corresponding municipal tax base decline of just over two percent (i.e., the cross-tier elasticity was approximately -2.2). However, the results from (1b) indicate this is actually an overstatement (understatement) of the true effect if the municipality does (does not) lie in the same county as its RRC. This result is consistent with proposition 4: if a jurisdiction shares a

[24] Note that claiming competition effects become insignificant when the RRC is further away and the claim that consumers from the home (smaller) jurisdiction no longer shop in the RRC are very different. Our findings suggest only the former and not the latter. Some goods may simply not be available in small municipalities: new automobiles, professional sporting events or concerts, and museums are just a few examples. For these cases, consumers must travel to the RRC to make purchases regardless of their travel costs since no good substitutes exist close to home. However, for more frequently purchased goods that can be found in all markets, consumers are able to choose where to purchase. We conceptualize these types of choices as driving the significant competition effects we are finding. However, when the costs of making a trip to the RRC become higher, it makes sense that consumers would quickly start to be unresponsive to relative rate differentials.

county border with its RRC, the county LOST does not influence the relative cost of goods between their local retail opportunities and those found in the RRC. On the other hand, municipalities that do not share a county border with their RRC experience meaningful changes in their relative position to the RRC when $\tau_{c,i}$ changes.

We use our FD and RT approaches as a robustness check on our two main findings: namely, that both cross-tier elasticities and competition effects play an important role in determining consumer spending patterns. Whereas the identification strategy in model (1b) makes use of both inter-municipality and intra-municipality variation, models (2b) and (3b) can identify LOST effects based only on intra-municipality variation over time. Competition effects enter these models in a slightly different manner due to modeling constraints. Notably, rate differentials or any other relationships that are stable over time no longer provide informative cross-sectional variation. Additionally, when rates and rate differentials are both first differenced, they are extremely highly correlated, an unsurprising finding.

As presented in Table 3, the estimates of models (2b) and (3b) suggest cross-tier elasticity estimates that remain negative, highly significant, and of a plausible magnitude. In fact, the point estimate of the effect does not change much when we compare it with that of model (1a). Notably, preliminary estimates using simple first differenced models (1b) produced counterintuitive results when we interacted Δ $LOST_c$ with the dummies reflecting whether or not the municipality and the RRC were in the same county.[25] We suspect the corresponding first-differenced estimates of (1b) are not appropriate given the nature of the data in this application.

To examine competition effects relating to municipal LOST rates into our FD and RT models, we introduce the two categorical variables: *conforming* and *non-conforming* changes. As discussed in Section 2, these classify each municipal LOST rate change based upon the direction of the change (increase or decrease) relative to that of the LOST rate imposed in the RRC (moves it closer to or farther away from RRC LOST rate).[26] The coefficient estimates from models (2b) and (3b) collectively show that competition effects remain important in this setting. In particular, a non-conforming municipal rate increase (decrease) of 1% reduces

[25] Specifically, the estimated effect was stronger (in a negative direction) and more significant for cases where the RRC was in the same county- the reverse of our findings from model (1b). Results are available upon request.

[26] We also tried *further* breaking down our non-conforming changes into two categories: movements towards more extreme positions as one case and central movements that flip relative standings as another. Both categories of changes perform very similarly in our estimations. Hence, the simpler classification system was employed.

(increases) the tax base by approximately 2%. Conversely, conforming changes do not seem to influence consumer spending patterns across municipalities.[27]

Thus, we have additional evidence that competition effects matter coming from models where the identification strategy rests solely upon isolating the effects of rate changes on the tax base. These results suggest that it may be feasible for municipalities falling far enough below the rates of their competition to raise LOST rates without causing a significant loss in their tax base. Municipalities in other situations do not have this luxury: they would feel the negative effect of a LOST tax increase on their tax base.[28]

4.1. Additional Robustness Checks

Because providing evidence of the significance of competition effects stands as one of the main contributions of our work, we further investigate the robustness of this finding using alternative measures meant to capture competition effects. While our theoretical framework indicates municipalities are likely to lose spending from their residents to large jurisdictions that provide enhanced retail choices, it is also reasonable to assume that consumers from a given jurisdiction may shop in nearby community that has *similar* retail options (i.e., *are not* a retail "center" as we have chosen to apply the term). We constructed alternative rate differential measures for each municipality where, instead of using only RRCs for comparison, we used the simple and weighted (by size of tax base) average of municipal LOST rates for every county. Thus, for this alternative approach the own municipal LOST minus the simple and weighted average for the county they fall within captured competition effects. Regressions akin to model (1b) but using these tax competition measures produce similar results- it is still the rate differential that always surfaces as having the negative and significant relationship while the level of the rate by itself is insignificant. Similarly, when county-wide municipal LOST averages (of either type) are used as the benchmark to classify conforming and non-conforming rate changes, FD and RT models similar to (2b) and (3b) show qualitatively consistent sets of results. Non-conforming changes are negative, highly significant, and similar in magnitude to our presented elasticity estimates, while conforming changes are always insignificant. Hence,

[27] While the positive point estimate was unexpected, the estimated standard errors are much larger than the coefficients, leading us to fail to reject the null hypothesis that there is no deterministic relationship.

[28] An interesting related research topic that is beyond the scope of this paper would be investigating the determinants of municipal and county rates in a multi-tiered LOST setting. It is possible that some municipalities actually follow a strategy where they purposely stay below their competition. This may be likely in communities where voters are highly tax averse.

competition effects seem to play an important role whether we measure them by focusing on large regional centers that offer enhanced retail choices or whether we use a more broadly defined measure that posits communities may face competition even from nearby communities without large retail sectors.

We also investigated whether or not the initial level of the LOST was important in determining consumer reactions to rate changes. This was accomplished by specifying an interaction term equal to the LOST rate change multiplied by the pre-change LOST rate. The estimated coefficient was insignificant for both municipal and county tax interaction terms in runs of various FD and RT models. In a similar vein, we were concerned that initially adopted county tax rates might create differential effects compared with increases in existing county LOSTs.[29] We investigated this possibility by interacting the change in county LOST rate with a dummy variable equal to one if the change was an initial LOST adoption. Across several models similar to those presented in Table 3, the estimated coefficient on this interaction term was always insignificant.

5. Implications and Extensions

Our analysis investigates consumers' responses to LOST rate changes in the context of multi-tiered taxation while accounting for spatial competition effects in the presence of agglomeration. In regressions that do not control for competitive effects, we find evidence not only that cross-tier elasticities are significant, but also that the implementing level matters. We find larger consumer spending responses for county LOST rate changes compared with municipal LOST rate changes of similar order magnitude. These results are consistent with the idea that the bias toward municipal LOSTs (in the form of less reduction in the municipal tax base) is driven by consumers' preferences for municipal public goods (the target of extra municipal LOST revenues) compared with county-wide projects. Support for the local bias possibility, however, was no longer present when competitive effects were introduced.

An important finding is that municipalities face significant competition for consumer spending coming from their respective regional retail centers (RRCs). Notably, the difference between the municipal LOST rate and that of the corresponding RRC, rather than the municipal

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[29] Initial adoption effects were not a concern for municipal rates since there were very few new LOSTs implemented during our examined panel.

rate, itself, is found to significantly influence the municipal tax base. Furthermore, the distance between the municipality and the RRC plays an important role, as was expected. When a municipality is closer to (farther from) their corresponding RRC, the difference between their municipal LOST rate and the municipal LOST rate of the RRC exerts a considerable (weaker) influence on their tax base. Thus, distance clearly serves as a buffer from competitive pressures on municipal tax bases.

We also find evidence that municipalities falling far enough below the rates of their competition, either RRCs or weighted average of municipal LOST rates in the same county, are able to raise rates without causing a significant loss in their tax base, while municipalities in other situations do not have this luxury and would feel the negative effect on their tax base.

Our most important conclusion - that the ability of municipal governments to influence LOST revenues by changing LOST rates is constrained by competitive pressures and proximity to RRCs - has important policy implications. From a modeling perspective, we reinforce Rork and Wagner's (2008) conclusion that interstate tax competition models need to capture complex interactions by demonstrating the importance of complex tax interactions within our sample. By more accurately modeling such effects, research can better inform policy decisions regarding the merit of extending multi-tiered LOST authorization to local governments.

LOSTs may likely be a target for states and localities in desperate need of local revenues, particularly those that have limited or no LOST authorization currently. For example, Dye (2008) urges New England states to consider new local revenue sources. Indeed, for some 17 states with negligible LOST authorization, introducing LOSTs may seem like a panacea for creating local tax revenues. LOSTs, however, can have unfortunate side effects. Zhao and Hou (2008) conclude that LOST authorization perpetuates and exacerbates fiscal inequalities across county jurisdictions. Our results extend this recent finding by highlighting the role of competitive pressure in influencing municipal LOST revenues. Furthermore, our results also demonstrate the role of regional retail centers in attracting and retaining sales tax revenues, thus emphasizing concerns about the fiscalization of local policy towards retail sector. This is particularly pertinent in settings, such as Oklahoma and many other states, where municipal finance is so heavily dependant upon LOST revenues. Cities with regional shopping centers are able to export a portion of their tax burden through LOST revenues while those without retail agglomerations must rely to a greater extent on municipal fees.[30] As Dan Galloway, City Manager of Bethany, Oklahoma summarized, "if you don't want cities to condemn neighborhoods to build shopping centers, don't make cities rely on sales tax collected within their boundaries to fund municipal services."[31]

This paper has investigated several important issues regarding the complex fiscal interactions associated with multi-tier LOST implementation. Our results document several interesting relationships that would likely effect local revenues in states implementing or expanding local LOST autonomy. Our findings suggest states should proceed with caution. Regarding efficiency issues, local governments should better understand how their policy decisions may have spillover effects on other jurisdictions. With regard to equity concerns, we find strong evidence to support the idea that rural communities may be disproportionately constrained when states rely heavily upon LOST revenues for local finance. Numerous extensions of our model are planned. In particular, we need to consider aspects of tax competition and the possibility of fiscal spillovers affecting county government revenues (county-county and county-municipal). In addition, while a small literature has emerged regarding feedback and imitation effects in the determination of the timing of LOST rate adoptions and changes (for example, Sjoquist, et al., 2007), no study to our knowledge has directly investigated the determinants of LOST adoption patterns in a multi-tiered setting. Capturing the complexity of the cross-tier and cross county LOST policy interactions is a worthwhile endeavor that will contribute to our understanding of local tax structure for the many US states currently imposing multi-tiered LOSTs as well as the others that might consider enabling these local revenue raising structures in the future.

[30] Dan Galloway, City Manager of Bethany, Oklahoma, discusses the plight of rural cities in light of the municipal fiscal structure in Oklahoma. See "Local Sales Tax Law in Oklahoma: The "Donors" are Dying," unpublished manuscript, downloaded from www.thebasement.com/blojsom/resources/thebasement/TheDonorsAreDying.pdf on 10/20/2008.

[31] "Time to Head for the Basement" by Michael Bates submitted on July 1, 2005 10:39 PM. http://www.batesline.com/archives/2005/07/time-to-head-to.html. Downloaded 10/20/2008.

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Table 1: Panel Data Descriptive Statistics[a]

Variable description	*All Years mean (st.dev.)*	*1993 mean (st.dev.)*	*2006 mean (st.dev.)*
Log of municipal tax base	15.147	14.928	15.357
	(1.747)	(1.712)	(1.785)
Municipal LOST rate	3.011	2.758	3.218
	(0.718)	(0.698)	(0.691)
County LOST rate	0.532	0.273	0.771
	(0.533)	(0.485)	(0.571)
Distance to regional center	18.325	18.291	18.348
	(8.349)	(8.388)	(8.353)
Municipal LOST rate differential relative to regional center	-0.270	-0.323	-0.379
	(0.784)	(0.792)	(0.772)

[a] The number of observations is 4,208 (all years), 301 (1993), and 300 (2006)

Table 2: Analysis of LOST Rate Changes (N=4208)

Implementing level and direction of LOST rate change	***Number of observations***	***Average change***	***Standard deviation***	***Largest rate change***
Municipal level Change				
LOST rate increase	180	.934	.390	2.0
LOST rate decrease	30	-.925	.384	-2.0
County level change				
LOST rate increase	383	.609	.310	1.25
LOST rate decrease	96	-.593	.369	-1.0

Table 3: Regression Estimates (N=4208)

Variable	***Fixed Effects Basic Model*[1] *Log(BASE$_{i,t}$)* (1a)**	***Fixed Effects Full Model Log(BASE$_{i,t}$)* (1b)**	***First Difference Basic Model (% ΔBASE$_{i,t}$)* (2a)**	***First Difference Full Model (% ΔBASE$_{i,t}$)* (2b)**	***Random Trends Basic Model (% ΔBASE$_{i,t}$)* (3a)**	***Random Trends Full Model (% ΔBASE$_{i,t}$)* (3b)**
Municipal LOST rate (τ_m)	-0.00716 (0.01045)	-0.00576 (0.01596)				
($\tau_m - \tau_{regional\ center}$) * close		-0.04159** (0.01992)				
($\tau_m - \tau_{regional\ center}$) * not close		0.01068 (0.01178)				
$\Delta\ \tau_m$			-0.01596** (0.00779)		-0.01486* (0.00776)	
$\Delta\ \tau_m$ * conforming				0.01282 (0.01880)		0.01090 (0.01926)
$\Delta\ \tau_m$ * non-conforming				-0.02123** (0.00833)		-0.01947** (0.00833)
County LOST Rate (τ_c)	-0.02213* (0.01284)					
τ_c * Regional Center same County		-0.00560 (0.01891)				
τ_c * Regional Center different County		-0.03026* (0.01653)				
$\Delta\ \tau_c$			-0.02505** (0.01076)	-0.02504** (0.01077)	-0.02416** (0.01140)	-0.02419** (0.01140)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Municipal Dummies	Yes	Yes	No	No	Yes	Yes
F-statistic	119.92	101.85	9.10	8.68	8.68	8.28
R^2	0.9894	0.9894	0.0340	0.0343	0.0877	0.0879

[1] Standard errors in parentheses. *,** Denotes significance at the 10% and 5% level, respectively.

FIGURE 1
LOST Revenue Reliance: US and States with County and Municipal LOSTs

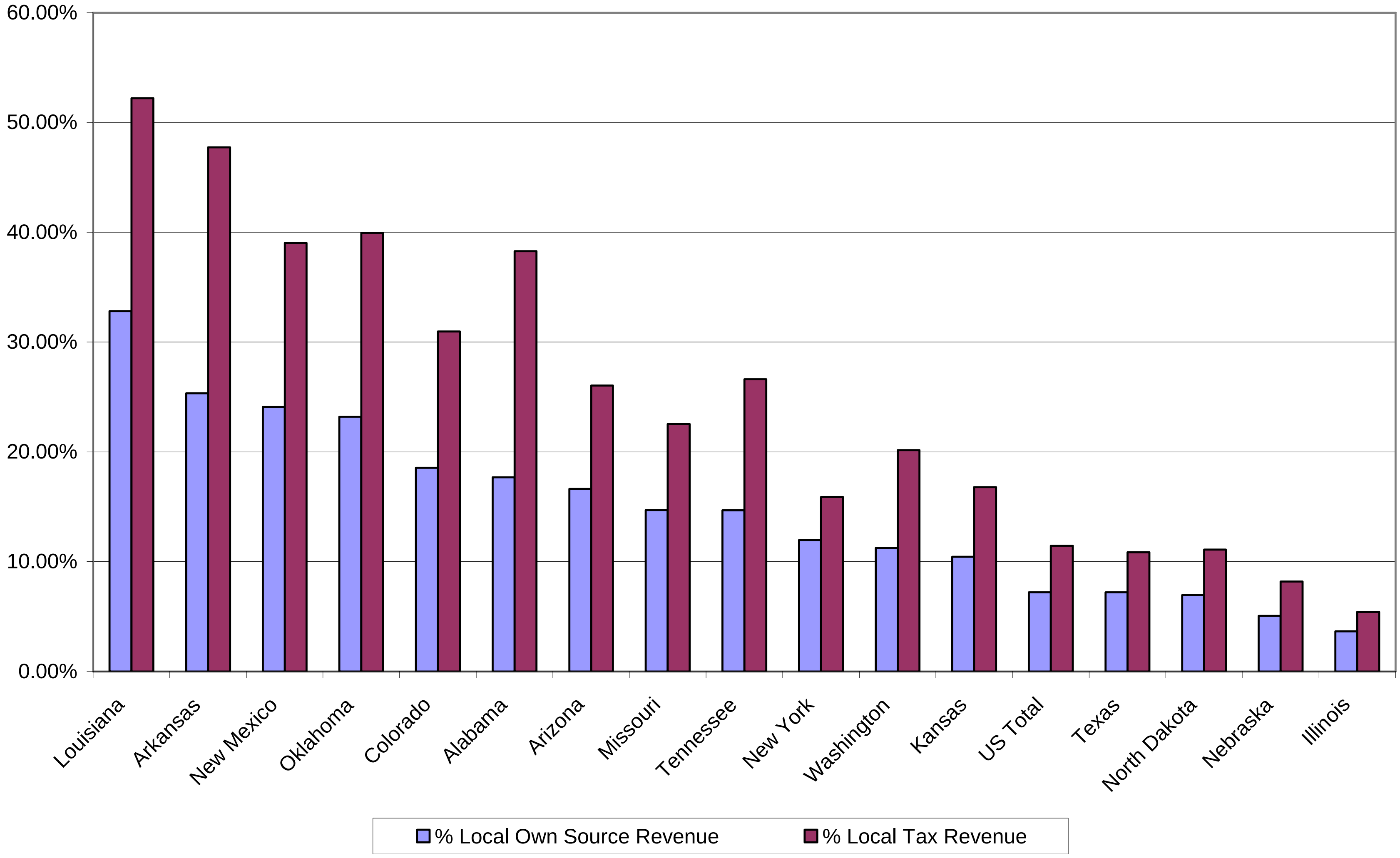


FIGURE 2
Local Option Sales Tax Rates: Oklahoma Municipalities 1966-2006

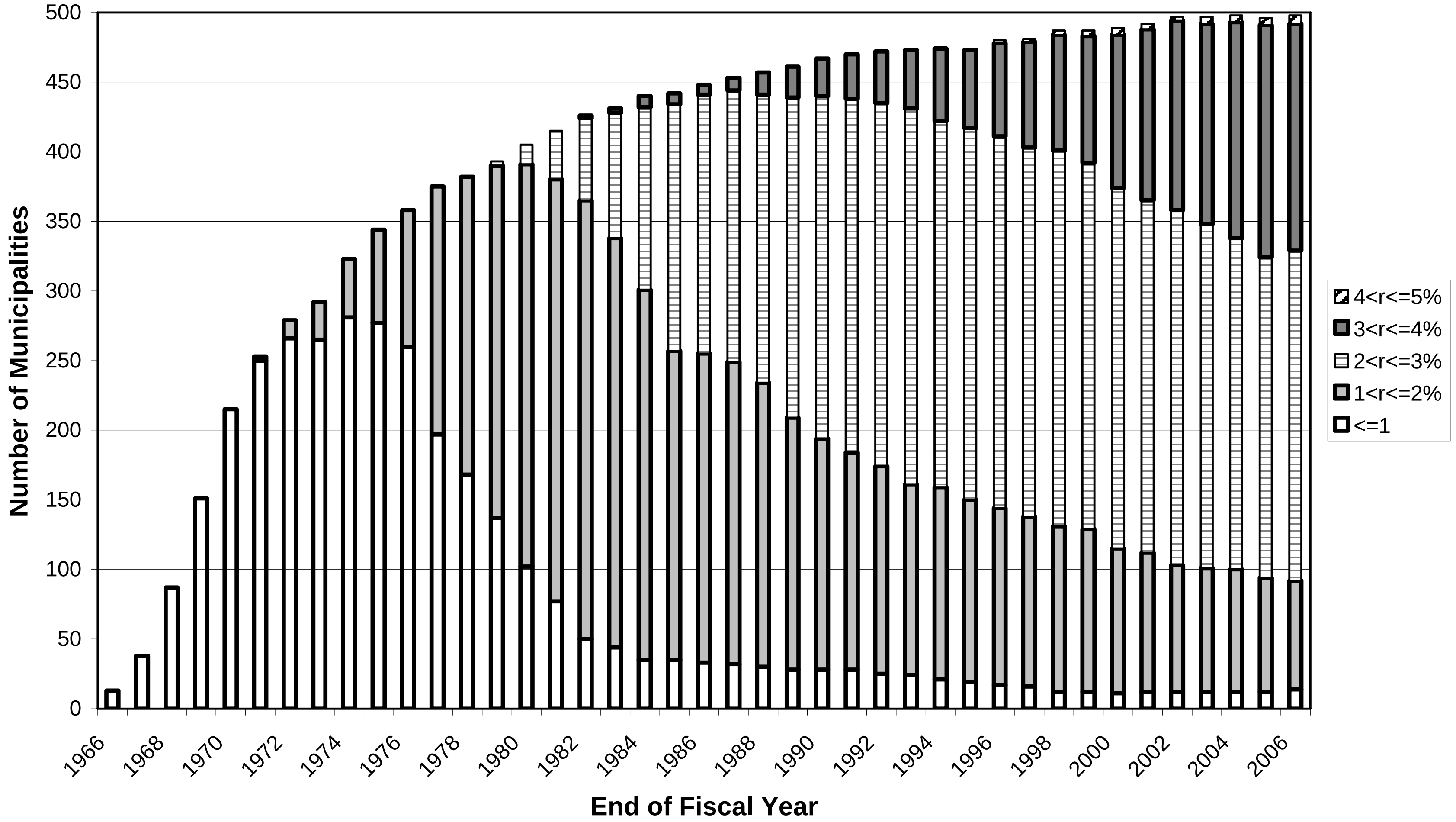


FIGURE 3
Local Option Sales Tax Rates: Oklahoma Counties 1984 - 2006

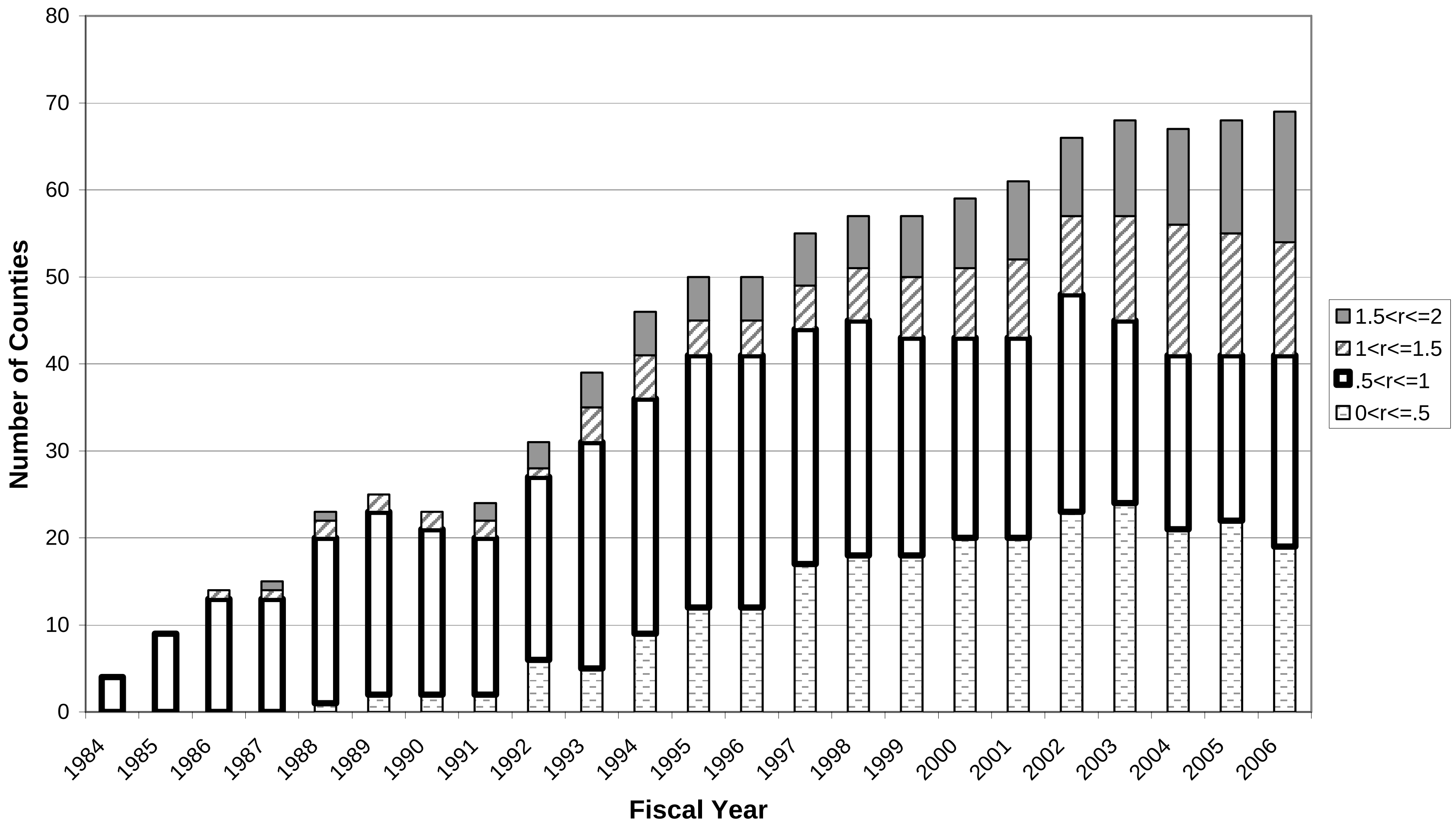


FIGURE 4
Total Municipal + County LOST Rates in Oklahoma Municipalities

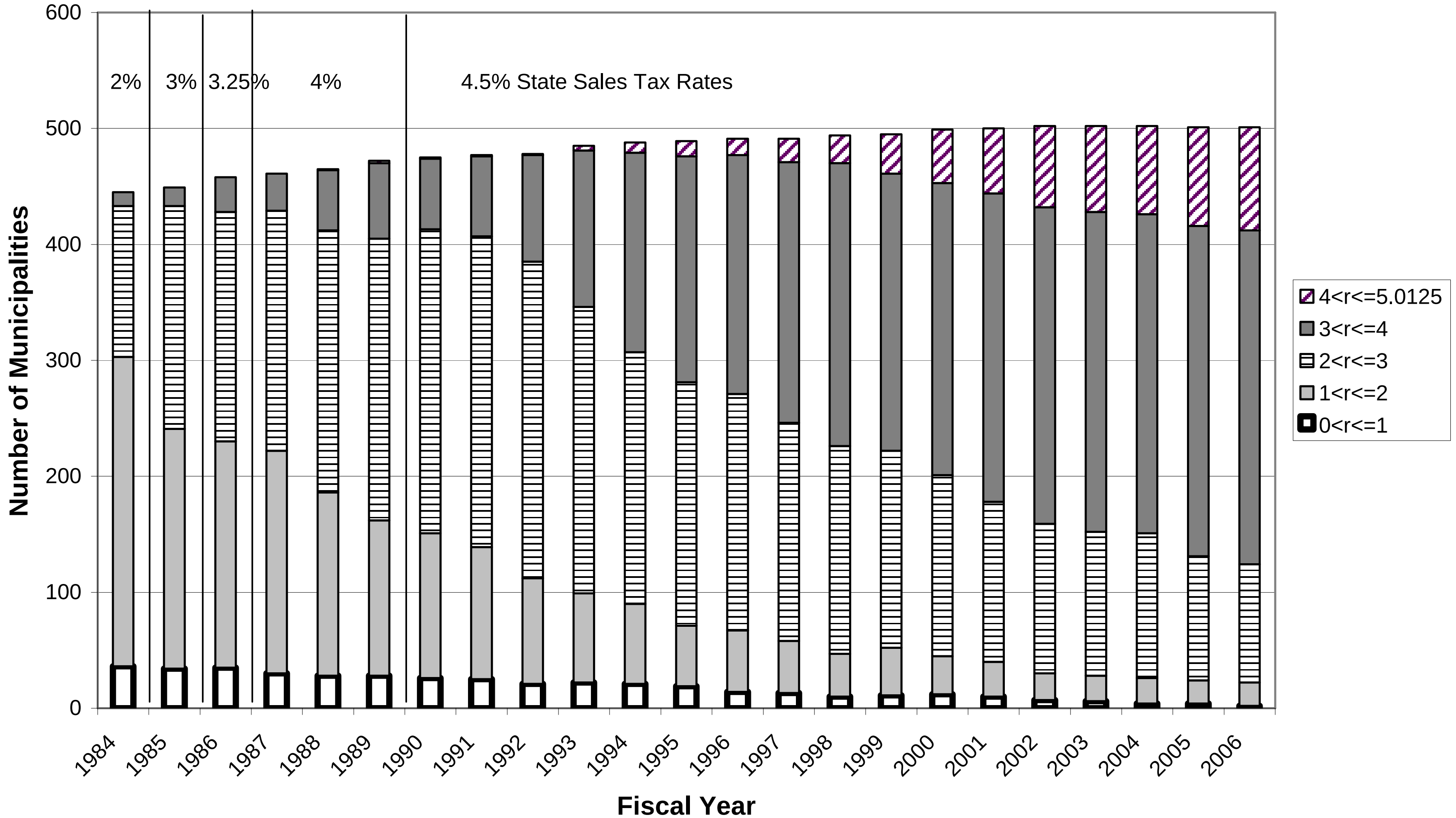
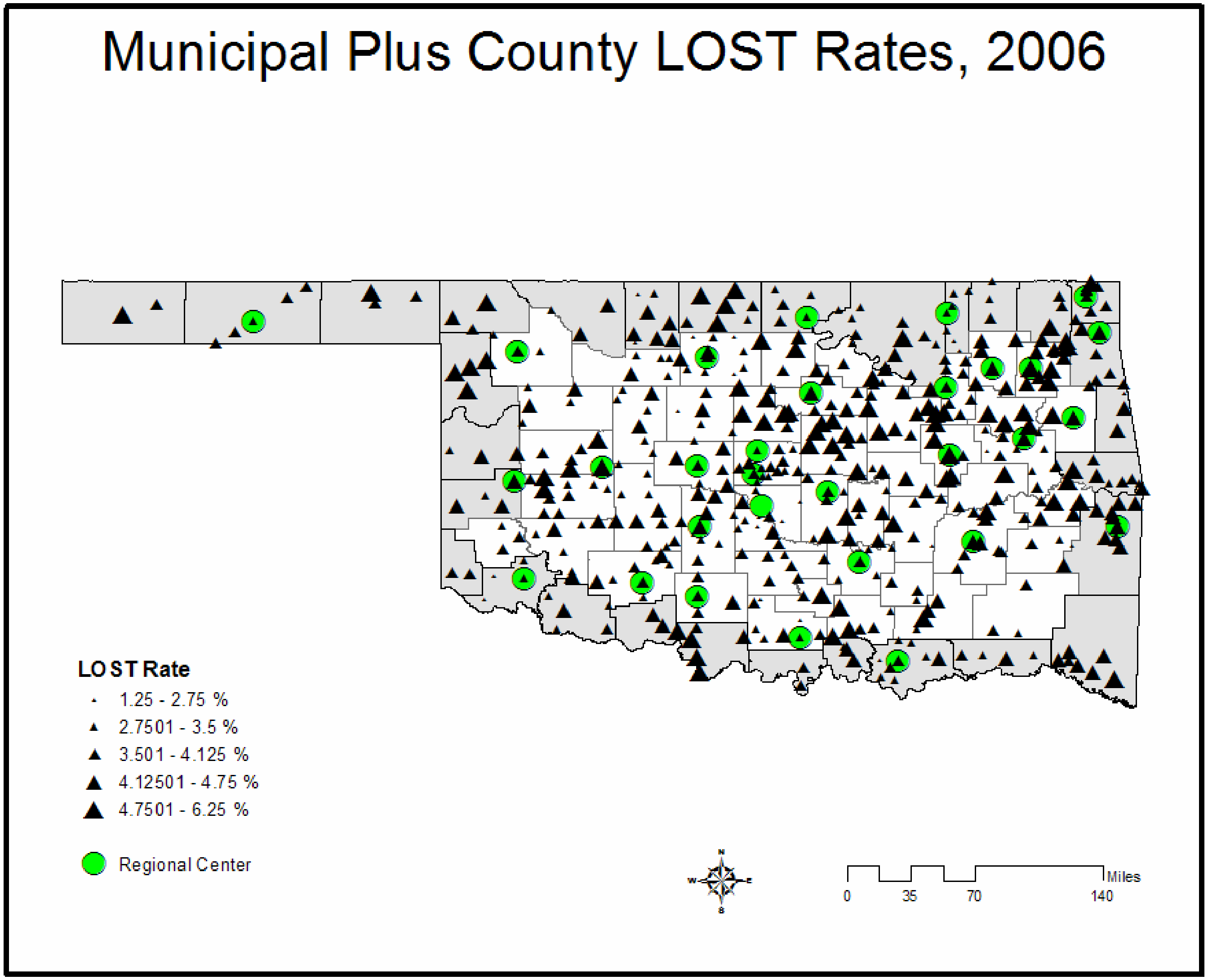


FIGURE 5


Municipal Plus County LOST Rates, 2006
LOST Rate
1.25 - 2.75 %
2.7501 - 3.5 %
3.501 - 4.125 %
4.12501 - 4.75 %
4.7501 - 6.25 %
Regional Center
Miles
0
35
70
140