



# LOST in America: Evidence on local sales taxes from national panel data<sup>☆</sup>



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## ABSTRACT

This paper studies comprehensive national panel data of local option sales taxes at the monthly frequency. I calculate state-by-month population weighted averages and standard deviations of local sales tax rates. I document ten stylized facts concerning the time series patterns and spatial dynamics of local sales tax rates. The paper then proposes a “tax system” approach to tax competition where states compete on a variety of margins – including restrictions on localities’ tax setting authority – that are often ignored by the standard focus on tax rates. Using spatial panel data techniques and the state-by-month population weighted averages, I find a significant association between one state’s tax system and its neighboring states’ tax systems.

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## 1. Introduction

It can easily be argued that one of the most significant changes in local public finance (in the United States) over the past half century has been the diminishing role played by local property taxes and the increased importance of other revenue sources. No single revenue mechanism has taken up more of this slack than local option sales taxes (LOST). Local option sales taxes are the second largest own-source of revenue for local governments. On average, LOST raise 12% of municipal revenue (Sjoquist and Stoycheva, 2012; Mikesell, 2010). Yet despite this trend, we know very little about changes in this tax from a national perspective. This paper documents both the time and spatial dynamics of location

option sales taxes using high frequency national panel data. Both correlations over time and space are necessary to properly understand LOST.

Because of the difficulty of assembling a national panel data set of municipal tax rates, many tax incidence and cross-border shopping studies focus on a sub-set of metropolitan areas or a single state. If the researcher only observes state tax rates, the researcher will incorrectly measure tax differentials across time and space. This paper represents the first attempt to assemble comprehensive national panel data on LOST. I have constructed a database of every district, municipal, county, and state sales tax rate in the United States from 2003 to 2011 at the monthly frequency. Armed with this data in hand, I am able to document important yet previously unknown facts concerning these important taxes.

The goal of this paper is four-fold. First, I will describe the institutional features of LOST on a state-by-state basis. When working with national data it is important to understand the institutional limitations. In some circumstances, comparisons across states are not valid. As such, I have carefully analyzed state statutes governing LOST and I outline noteworthy institutional structures governing these taxes that vary across states. Second, I develop state-by-month local sales tax rate indexes. These indexes are designed to allow researchers who have state level data to include a measure of the population weighted local

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sales tax rate on top of the statutory state tax rate observed. Third, I use the indexes to document ten stylized facts regarding LOST. How have LOST changed over time? What type of jurisdictions change tax rates? How does the variation of taxes change within states? Has the Great Recession changed tax setting behavior? What are the dynamics of tax rate changes? Despite the simplicity of these questions, we know very little of their answers at the national level. The answers to these questions suggest fruitful future research topics concerning LOST.

Finally, the paper turns from documenting time series patterns of LOST to spatial correlations of these changes over time. The empirical application demonstrates that the tax rate series that I construct can be applied to empirically study outcomes across states. The application I study is fiscal competition. Not accounting for local tax data when studying state sales tax competition will inaccurately measure the intensity of spatial relationships across jurisdictions. I also propose a new theory where states compete for mobile shoppers by selecting a *tax system* as a whole (inclusive of the local tax rates) rather than a *single state tax rate*. Although municipalities have freedom to choose their tax rates, they do so in an environment that is constrained by the state government. Through these legal constraints, states can help determine whether or not the average municipal tax rate in a state will be high or low – or in states that prohibit LOST, that it will be zero. The spatial pattern in the total local tax rate across states is significant. This suggests that a tax system approach (Slemrod and Gillitzer, 2013; Slemrod and Gillitzer, 2014) is important. These spatial statistics complement the stylized facts documented using the time series.

Single state studies of LOST are extremely useful.<sup>1</sup> However, without national data, (1) the researcher cannot accurately measure tax discontinuities that vary at borders, (2) cross-state comparisons cannot be made, (3) comparisons exploiting relationships between state institutions and municipal tax rates are much more difficult, and (4) elasticities estimated using state-level data may be biased. How high local tax rates will be and the degree of variation of tax rates within a state will influence behavioral responses and must be accounted for. How flexible the LOST system is (in addition to the state statutory tax rate) influences the extent of cross-border shopping, firm location decisions, employment, tax incidence and other behaviors sensitive to tax policies. In such a context, the results in this paper are useful for thinking about what biases may exist when estimating elasticities without local data and whether single state studies are generalizable.

In addition to improving the measurement of tax differentials across states and within states, the data will also be useful to incorporate sales tax components into price indexes essential to measuring quality of life across cities. The Council for Community and Economic Research and its predecessor, the ACCRA, publish consumer price indexes for various urban areas across the United States. However, it is often ignored that these price indexes represent the net price to sellers and not the net price to buyers. In their description of the price indexes, the Council for Community and Economic Research notes that it attempts to “produce an index which adequately measures differences in goods and services costs, rather than to produce an inaccurate measure which attempts to incorporate taxes.” Given that state and local taxes vary substantially across states, not correcting for state and local sales taxes could result in measurement error in these price indexes. While correcting for state sales tax rates may be possible, the data to correct for local sales tax rates is not readily available. For example, if a researcher were correcting the price index for New York based solely on the state tax rate (4%), the researcher would ignore that local tax rates (average: 4.5%) in New York are on average higher than the state tax rate. Carrillo et al. (2014) is an example of a study that produces

<sup>1</sup> They are able to isolate particular institutional features of state tax law. In addition, researchers using one particular state have been able to reach back further in time to obtain data on LOST rates and the various outcomes they are interested in, but a shortcoming is that they are not nationally representative.

the best price measures to date, but would benefit from having access to panel data on local sales tax rates.<sup>2</sup>

The results in this paper will be of use to urban and regional economists seeking to correct price indexes and to public finance economists seeking to more accurately measure behaviors. Further, this paper aims to be a reference piece on LOST. Up until recently, comprehensive studies across municipalities were limited by data availability. The increased access to “big data” at the state and local level allows the researcher to conduct cross-municipal and cross-county studies that exploit a great deal of variation in an open economy setting.

## 2. Studies of LOST and state sales tax rates

In this section I review studies of local option sales taxes with an emphasis on papers that look at tax rates rather than the revenue implications of LOST. For survey pieces please see Fox (2012) and Sjoquist and Stoycheva (2012).

Following theoretical work on commodity tax competition (Mintz and Tulken, 1986; Kanbur and Keen, 1993; Trandel, 1994; Haufler, 1996; Nielsen, 2001)<sup>3</sup> several studies analyze tax competition in the presence of local option sales taxes. Most of these studies focus on one particular state.<sup>4</sup> Some examples include Zhao (2005) and Sjoquist et al. (2007) who study tax competition in the state of Georgia. Luna (2003) and Luna et al. (2007) study the rate setting behavior, including the phenomenon of “maxing out,” in the state of Tennessee. Rogers (2004), Burge and Rogers (2011), and Burge and Piper (2012) study fiscal interdependence and local adoption of sales taxes in the state of Oklahoma. Several recent studies exploit national data on LOST. Agrawal (forthcoming), Agrawal (2013a), and Agrawal (2014) use a national cross-section of LOST rates to estimate fiscal reaction functions for both horizontal, diagonal, vertical strategic interactions and interactions with e-commerce.

A much broader literature on tax evasion, tax incidence, firm location decisions, and consumer behavioral responses to commodity taxation has exploited variation at the state or metropolitan level. Some of these studies do not have data on local sales tax rates. Others have used selected samples of MSAs or particular border-pairs. Studies exploiting tax differentials at state borders to identify employment effects resulting from sales tax differentials have emphasized state tax rates.<sup>5</sup> Many of the previous studies have transformed the public finance literature concerning the effect of sales taxation. Having access to national panel data provides researchers the ability to broaden their samples beyond one particular border and has the potential to allow the researcher to estimate more precise estimates than they would in a world where only the state tax rate is observed. Even if the researcher does not observe all local tax rates in the country, aggregated measures of local tax rates could effectively modify these studies by allowing for a more accurate measure of the average differentials and incentives.

<sup>2</sup> Other studies using the ACCRA include Baum-Snow and Pavan, (2012), Dumond et al. (1999), and Winters (2009). Albouy (2012) adjusts the cost of living for state sales tax differences but not for local tax differences.

<sup>3</sup> Other studies such as Hoyt (2001) consider the optimal tax considerations of sales taxation in a federation.

<sup>4</sup> Other studies such as Benjamin and Dougan (1997), Devereux et al. (2007) and Jacobs et al. (2010) have analyzed commodity tax competition at the state level – although many of these studies focus on excise taxes.

<sup>5</sup> As examples, Poterba (1996) studies a sample of fourteen cities and Besley and Rosen (1999) use a sample of approximately 150 cities in the United States; both studies find that the after-tax price increases by the amount of the tax. For examples of border discontinuity designs, see Thompson and Rohlin (2012) and Rohlin et al. (2014). Studies estimating the behavioral response (cross-border shopping) to sales taxes include Mikesell (1970), Fox (1986), Walsh and Jones (1988), and Tosun and Skidmore (2007). Tax evasion has also been studied in the context of the Internet in Goolsbee (2000), Ballard and Lee (2007), and Einav et al. (2014); all of these studies observe some data on either city or county sales tax rates. Cole (2009) uses state tax rates to study the impact of sales tax holidays on both prices and quantities. The volatility of the sales tax has also been studied in the context of a single state by Hou and Seligman (2008) and in the national context with state tax rate changes (Seegert, 2012).

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