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Sales tax rate differentials and cross-border shopping

INTRODUCTION

The purpose of this study is to estimate the impact of food tax differentials on food sales in Kansas counties, especially for the counties sharing their borders with other states whose food tax are lower. As several states consider cutting their income taxes,[1] sales taxes become policy makers' focus given that when income tax is cut, states will need to shift their reliance on revenue sources. This shift may create challenges to local governments because they tend to rely on sales taxes revenue as the second major source to property tax (American Legislative Exchange Council, 2015). While local governments need to maintain their spending on public road, safety, and communities' amenities, state sales taxes can shortchange local governments' capacity to raise revenue. Setting a state's sale tax rate that above a certain level can cause local governments to lose their competitiveness in economic development, which, in turn, defeats the state's purposes in cutting income taxes for growth. Furthermore, sales tax rates that are set beyond the level of its neighbors can cause inefficiency in the free market and taxing systems. This is the main focus for this study.

In states like Kansas and Oklahoma, food sales taxes are not exempted from state general sales taxes; local governments, especially those that share the state borders with others could be more negatively affected in terms of maintaining their revenue collection and preventing inefficiency in tax systems. This is because the consumers will choose to purchase their food on the side where food sales taxes are relatively smaller (i.e., Missouri) or no taxes (i.e., Colorado and Nebraska). In Kansas, among 105 counties, seventy counties share at least one border with another state. Among those states, Colorado and Nebraska exempt all food sales from taxation. Missouri passed a law in 1993 to reduce state food sales taxes to only 1.225%. Oklahoma, like Kansas, does not exempt food sales taxes. Thus, in general, Kansas's counties and cities that share their borders with Missouri, Colorado and Nebraska could face lost sales tax revenue that would it otherwise would collect. This, in turn, may force Kansas counties and cities as well as the state itself to increase their sales tax rate to generate adequate revenue. Furthermore, Kansas counties and cities may become less competitive in attracting new businesses and residents.

The remainder of this study is organized as follows. The following section discusses theoretical backgrounds for state and local sales taxes. The following section discuss Kansas food taxes as practical background and the inefficient food consumption in Kansas that might occur due to uncompetitive sales taxes. The following section presents methodology, findings and discussion. The last section provides conclusion, applications and policy recommendation.

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[1] *In 2013, fourteen states passed state income tax cuts (American Legislative Exchange Council, 2015). Six states – Kansas, Nebraska, Wisconsin, Florida, Indiana and Ohio – repeated tax cuts in 2014 (American Legislative Exchange Council, 2015).*

THEORETICAL BACKGROUND

For local governments, the sales tax plays an important role in both economic development and financial management. Empirical studies of the economic development aspect finds evidence that in non-urban areas, having a competitive sales tax rate is one key to attracting new households and firms (Yu & Rickman, 2012). In financial management terms, sales taxes can generate adequate revenue sources for local governments in addition to property taxes if they are set effectively and efficiently (Brunori, 2006). Best practice dictates that local sales taxes should not be higher than those of neighboring jurisdictions, especially for goods that are not necessities, since tax rates will distort consumer decisions to avoid tax; and hence, the jurisdiction will lose its sales tax revenue that would otherwise be collected (Winfrey, 1998; Brunori, 2006; Fisher 2007).

A number of studies examining disparities of tax treatment across borders document the phenomenon of cross-border shopping (Beard, Gant & Saba, 1997) in food items (Toson & Skidmore, 2007), alcoholic beverages (Toson, 2003), state lottery ticket sales (Garett & Marsh, 2002; Toson & Skidmore, 2004), housing establishment (Yu & Rickman, 2012; Thompson & Rohlin, 2012) and employment in the retail sector (Thompson & Rohlin, 2012). Thus, if local governments want to have an efficient and effective sales tax that generates sufficient revenue, they should try to set a rate that is similar to those of the neighbors given that tax avoidance behaviors of the consumers could reduce local sales tax revenue.

In this study, we follow Toson and Skidmore (2007) in measuring after-tax price differentials. However, to improve reliability of the statistical results, we depart from Tosun and Skidmore's methodology by using an "omni-dimensional after-tax price difference" to represent tax difference in all dimensions, rather than those in the state bordering direction. This measure compares a county's food tax rate with the average taxes in adjacent counties in all dimensions (i.e., north, south, east and west), no matter whether the adjacent counties are interior counties or bordering counties.[2] For interior counties, food tax rates may be similar because they share the same state sales tax. For bordering counties, food tax rates may be dramatically different given that the adjacent states may have different food tax policies. We use this measure to predict food sales in the county. Our results capture the effect of tax rate differentials on food sales.

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[2] *Toson and Skidmore calculate only tax rate differences within the state and then added an "indicator" variable to indicate a border county.*

[3] Kansas state sales tax rates on food are:

Effective Dates	2013	2012
January 1 to June 30	6.3%	6.3%
July 1 to December 31	6.15%	6.3%
Average Rate-Entire Year	6.225%	6.3%

FOOD TAX CALCULATION AND PRELIMINARY ANALYSIS

Table 1 presents the example of how the combined food tax rate is calculated in each county, using Allen County in 2012 as a specific example. We add the state, county and average city rate to derive the combined food tax rate for each of the KS Counties in year 2012 and 2013 . As shown in Table 1, the average food tax rates of all cities within Allen County is 0.41 percent and when added to those of state (6.30 percent) and county (1.25 percent), the total food tax rate in this county is 7.96 percent.

Table 1: Allen County's Total Food Tax

	2012 rate
KS State	6.30
Allen County	1.25
Average of Cities in Allen County	0.41
Combined Food Tax Rate	7.96

Source: Authors' Calculation

Figures 1 and 2 present the total combined food tax rate by county in Kansas in 2012 and 2013, respectively. On average, the combined food tax rates of Kansas counties are around 7.7 percent and 7.6 percent in 2012 and 2013, respectively. The combined tax rate in the counties adjacent to Missouri are higher than those in the interior counties and those that share borders with Nebraska and Colorado.

Figure 1: Kansas Counties' Combined State and Local Food Tax Rates: 2012

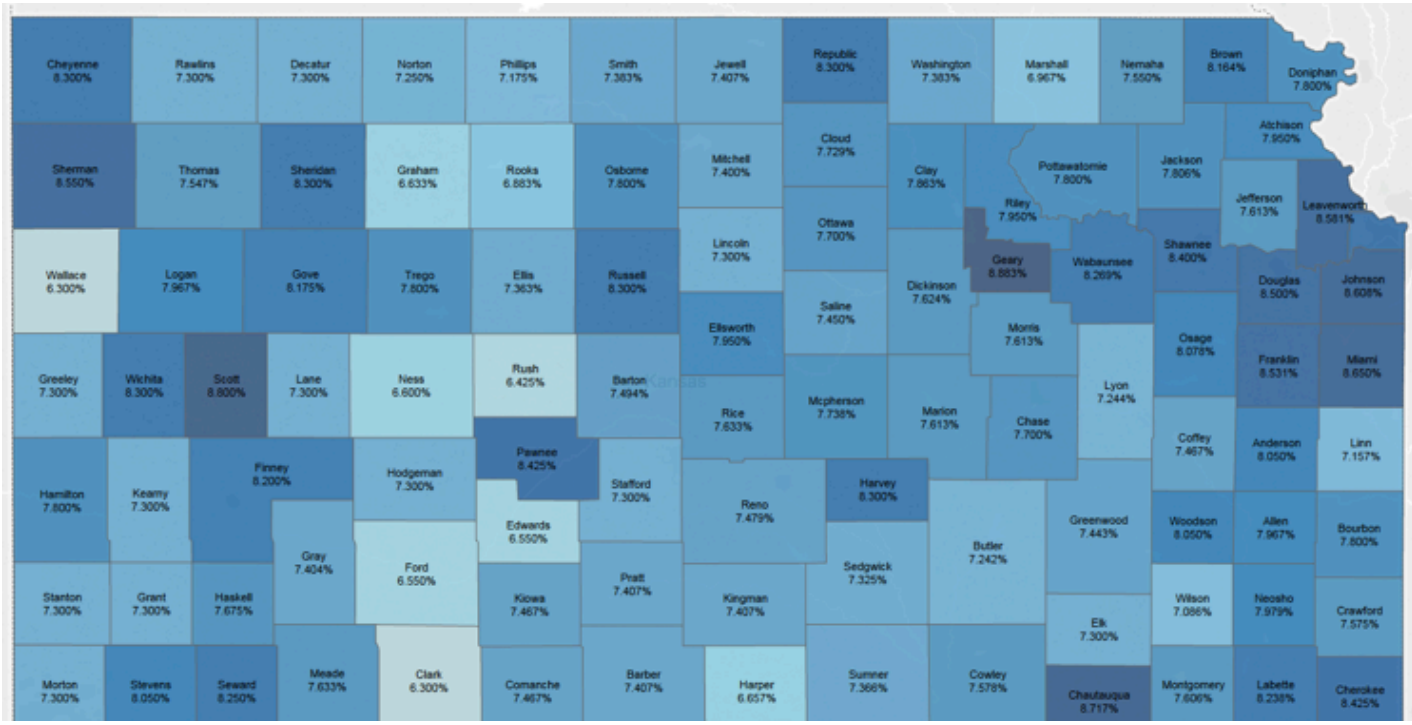
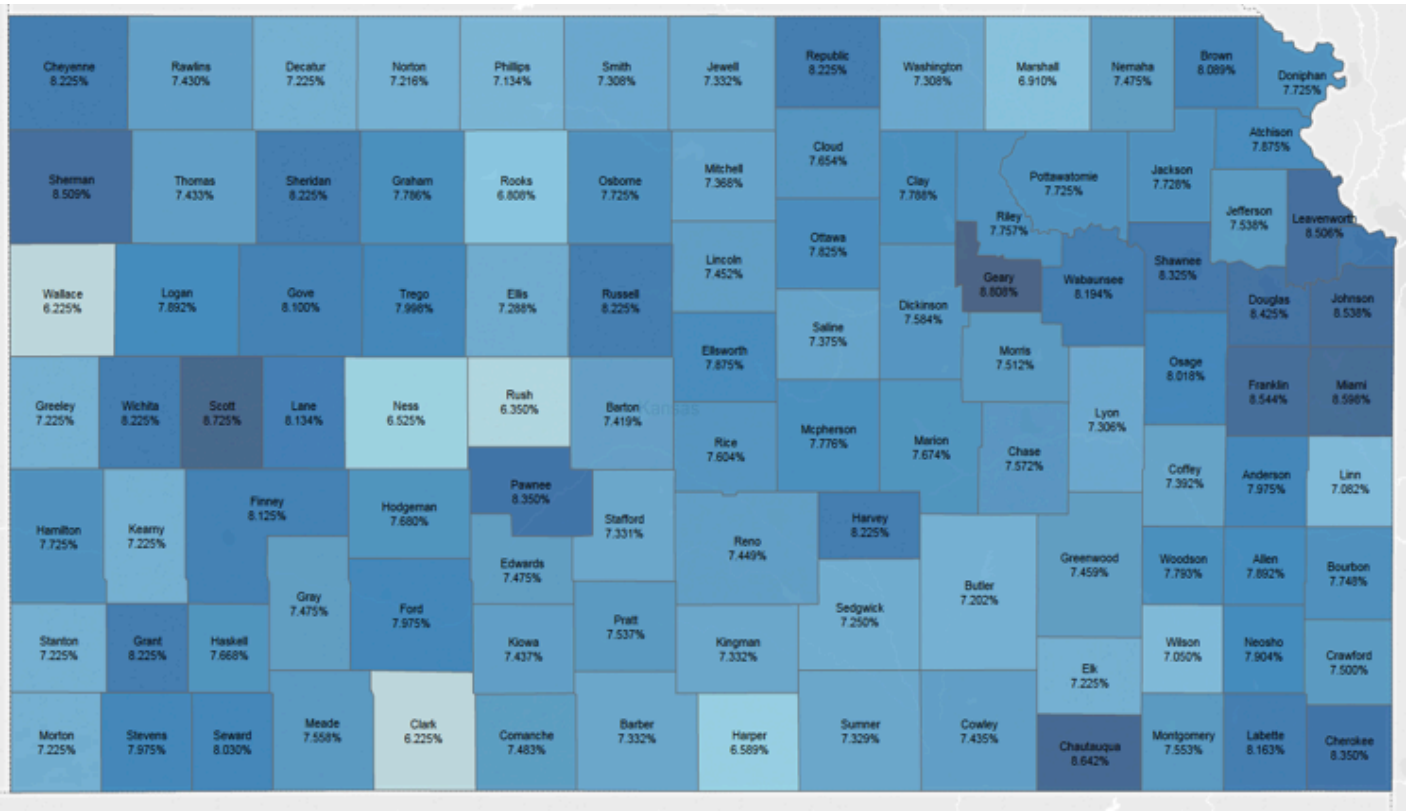


Figure 2: Kansas Counties' Combined State and Local Food Tax Rates: 2013



Source for Figures 1 and 2: Authors' calculations based on data from the Kansas Department of Revenue (http://www.ksrevenue.org/salesreports.html), Missouri Department of Revenue (http://dor.mo.gov/business/sales/rates/2013/) Oklahoma Tax Commission (http://www.ok.gov/tax/Businesses/Tax_Types/Business_Sales_Tax/Sales_Use_Lodging_Tax_Rate_Charts/) and Federal Tax Administration (2015).

Next, to construct our omni-directional food tax differential, we calculate the average difference between tax rates in Allen County and each of the counties with which it shares borders. For example, in 2012, the rate in Allen County is 0.0797. Four counties including Anderson (rate equal to 0.085 in 2012), Bourbon (rate equal to 0.078 in 2012), Neosho (rate equal to 0.080 in 2012), and Woodson (rate equal to 0.085 in 2012) share their county lines with Allen. We calculate the rate difference between Allen's and each of the bordering counties; and then finally average this rate difference out. Equation (1) above presents the rate difference calculation for Allen County in 2012.

$$\frac{[(0.079-0.085)+(0.079-0.078)+(0.079-0.080)+(0.079-0.085)]}{4} = -0.0000298 \qquad (1)$$

$$1+ (-0.0000298) = 0.9999702 \qquad (2)$$

Finally, to build the tax differential index for each county, we add 1.00 to the county's average rate difference, as presented in equation (2) above. A county with an index equal to 1.00 has a combined food tax rate that is not different than its bordering counties. An index below 1.00 indicates that the county's tax rate is relatively smaller than its bordering neighbors.[4] An index above 1.00 suggests that county's tax rate is relatively larger than the border counties. Allen County's index of 0.99 means that the county tax rate on the average is slightly smaller than the rate of its neighbors. See Appendix 1 for the rate difference index for each county in Kansas in 2012 and 2013 and for the differentials between border counties and non-border counties.

Our variable of interest is taxable food sales. Table 4 presents per capita food sales volumes in two groups of Kansas Counties: Interior and Border Counties. The table presents 2012 and 2013 data along with the difference within the two groups. The border county difference is smaller than the interior county difference by $4.90 per capita. This suggests that border counties may be facing loss in food sales volume growth relative to interior counties, presumably from lost sales across the border. In the next section of the paper we undertake a more formal statistical analysis of the difference.

Table 4: Difference-in-Difference Analysis: Real Per Capita Taxable Food Sales*

	2012	2013	Difference
Border Counties (Mean)	1097.11	1099.59	2.48
	(83.97)	(82.43)	(2.46)
Interior Counties (Mean)	1009.39	1016.77	7.38
	(50.07)	(51.25)	(1.18)
**Standard Error is in Parenthesis*			-4.9
			(2.44)

[4] *The .9999 rate difference is later entered into regression analysis. For ease of interpretation, the tax rate difference can be rewritten into percentage form. For Allen County we multiply 100 to 0.9999 deriving 99.99%.*

STATISTICAL ANALYSIS

The goal of our analysis is to ascertain whether counties with higher food tax rates have lower food sales due to the tax differentials. This would support the notion that consumers are shifting their purchases to jurisdictions with lower tax rates. The results of a broad assessment of border counties versus interior counties in Table 4 is suggestive of such an effect. But to test the question more thoroughly, we need to control for the effects of things that might also affect food sales in a county. We follow Fisher (1980), Fox (2000), Toson and Skidmore (2007) and many others in using multiple regression analysis. This form of statistical analysis allows us to control for county differences in income, socioeconomic and demographic characteristics among others. The statistical model is presented in equation (3) below.

$$lnFood_{it} = P_{it}\beta_1 + I_{it}\,\beta_2 + X_{it}\beta_3 + C_i + T_t + \varepsilon_{it} \qquad (3)$$

where;

$lnFood_{it}$	is per capita taxable food sale value in Kansas by county i and year t measured in its natural logarithmic form,
P_{it}	is the difference in the after-tax price for food by county i and year t, calculated by using our tax difference index shown in equations (1) and (2) above,
I_{it}	is per capita personal income in real dollar value based year 2014 by county i and year t measured in natural logarithmic form,
X_{it}	is a vector of variables capturing differences in consumers' taste and preference measured by the unemployment rate of the county, the percent of population age 65 years old and above, percent of male population, and percent of non-white population,
C_i	represents county i's time-invariant effects such as distance from another county or the travel cost to the adjacent counties,
T_t	represents time-fixed effects in which all counties may face similar circumstances at a particular point in time such as national recessions or booms and drought, and
ε_{it}	represents everything else that can influence food sale volume, but the model fails to capture.

Table 5 presents summary statistics for the data used in this study. The unit of analysis is 105 counties in Kansas during 2012 and 2013. Appendix 2 shows the source of data for each variable. The table shows that the average rate difference index is about 100.4% (or 1.0040 as shown in the table), while the minimum index is 98.5% (or 0.9851 as shown in the table) and the maximum index is 104.4% (or 1.0434 as shown in the table). This suggests that Kansas counties' food tax rates in general have a relatively wide range. Per capita food sales volume averages $1,042 per person. The standard deviation is $446 per person, also suggesting a wide dispersion of food sales; the minimum food consumption is $17 per person per year (in rural Kiowa county) while the maximum is $2,442 per person per year in the real 2014 dollar values.

Table 5: Summary Statistics

Variables	Mean	Std. Dev.	Min	Max	Obs
Population	27,532	76,318	1,266	567,326	210
Personal Income (Nominal $)	46,774	24,017	18,498	117,261	210
Unemployment Rate	5.1	2.3	0.6	13.0	210
% Population Age 65 Years Old and Older	18.2	4.8	7.2	27.8	210
% Male Population	96.0	7.2	81.7	99.8	210
% Nonwhite Population	92.3	6.9	61.6	99.4	210
KS County's Combined Food Tax Rate (State, County, City)	0.0767	0.0054	0.0623	0.0888	210
Omni-dimensional Food Tax rate difference	0.0040	0.0091	(0.0149)	0.0434	210
Omni-dimensional Food Tax Rate Difference Index	1.0040	0.0091	0.9851	1.0434	210
County's Total Taxable Food Sale Value ($ Nominal), as reported by KS Legislature	32,600,000	109,000,000	41,546	940,000,000	210
Per Capita Total Taxable Food Sale Value ($ Nominal)	1,018	436	17	2,368	210
Per Capita Total Taxable Food Sale Value ($ Real, Based Year 2014)	1,042	446	17	2442	210
Per Capita Real Personal Income ($ Real, Based Year 2014, in $1000 Value)	8.7122	10.0518	0.0529	69.9423	210
Log of Real Per Capita Personal Income ($ Real, Based Year 2014, In $1000 Value)	1.4844	1.3387	(2.9390)	4.2477	210

Using the statistical model shown in equation (3) above, we regressed per capita food sales against the tax rate differential index, controlling for other county characteristics. Details of the regression results are available from the Center. Table 3 shows the statistical model estimates of effect that each of the variables has on county food sales.

Table 6: Statistical Results

Variables	Base Estimate of Effect	Range of Effects	
Differential Tax Rate Index	-9.769%	-12.127% to	-7.411%
Unemployment Rate	-0.146%	-0.156% to	-0.136%
Percent of Population Age 65 and Over	0.048%	0.045% to	0.051%
Percent of Male Population	0.004%	0.000% to	0.008%
Percent of Non-White Population	-0.027%	-0.030% to	-0.023%
Per Capita Personal Income	-0.272%	-0.282% to	-0.262%

All variables in the models are statistically significant at conventionally accepted levels. What this means is that there is enough scientific certainty in the results to suggest that the effects observed are not due to chance. The results suggest that food tax rate differentials negatively affect food consumption: for every 1 unit increase in the tax difference index, food sales volume drops 9.769% per person per year. This effect is relatively large based on sample mean. On the average, per capita food consumption is $1,042 per capita, thus for every one percent increase in food tax difference, food consumption drops by about $101 per person, controlling for other factors. Food sales in Kansas appears to be relatively responsive to price changes, and thus for bordering counties consumers appear to readily shift their purchases to lower tax jurisdictions. The effect found in this study is larger than those found in previous studies in Washington D.C. (estimated at 7% by Fisher, 1989) and West Virginia (estimated 5.9% by Walsh & Jones, 1988).

Other results in Table 6 suggest that as unemployment rate and number of non-white population increase, food sales drop, all else equal. The results also show that grocery food is an inferior good as a whole because food sales are shown to drop with income increases, all else equal. Counties with a higher population of males and people aged 65 or older tend to purchase more food.

CONCLUSIONS

This study investigates the effect of food tax rate difference on food consumption in Kansas counties during the period ranging from 2012 to 2013. In public finance literature, a criteria of good tax states that tax policies should not create inefficiency, meaning that when demands for goods and services are relatively elastic to price, tax rate that is set beyond optimal level can distort consumer's decision choosing to purchase the goods and services less than the level that they would otherwise consume without taxes. This condition may create revenue loss to the local governments whose food tax are higher than those in the bordering counties as consumers may choose to purchase grocery food in the adjacent state instead of their hometown. Figures and Tables in section 2 suggests that Kansas counties that share

their borders with Missouri, Nebraska and Colorado may face tax inefficiency problem; while the interior counties tend to not face such problem given that their tax rates are similar to the neighbors in the same state.

This study is different than the previous studies in that the food tax difference is calculated based on the average value of the tax rates in all dimensions a county shares its borders with, no matter the neighboring counties are in the same state or different states. This method reduce necessity to include dummy variable to represent bordering county; and hence, we can improve the reliability of estimation compared to those of the previous studies. The empirical results suggest that at the local level, food tax difference does have strong effect on food consumption; for every 1% increase in food tax difference in any county, food consumption drops for about 9.769% approximately. Based on sample average data, for every one percent difference in food tax rates compared to the adjacent jurisdiction, food consumption drops for about $101.8 per person per year, all else equal. Thus for tax efficiency and revenue collection capacity purposes, state policy makers may consider modifying state's food tax to be more competitive to those of the neighbors. This policy adjustment may also help increase local governments' revenue collection capacity and competitiveness in economic development.

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