Conditions for Competition: Assessing the Competitive Dynamics of US Counties

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Research in public policy examines specific theories that drive policy adoption among jurisdictions. One of these theories, referred to in the economics literature as economic competition (or strategic competition), posits that local governments may engage in competition with one another because of the potential interjurisdictional economic spillover effects of certain fiscal policies. In this article, sales tax rates, a common, yet overlooked, policy instrument in the policy literature is examined to determine if sales tax rates drive competition among counties. Testing several hypotheses, this study finds that sales tax rate increases can exacerbate competition among counties. However, this relationship is conditional on the per capita county income; more specifically, poorer counties are more vulnerable to the effects of economic competition than wealthier counties. Furthermore, many other processes influence sales tax increases, depending on how the process is modeled. Thus, economic competition is a multidimensional process shaped by a multitude of factors.

Recent research in public policy has turned with greater frequency towards local governments when examining policy diffusion (Godwin and Schroedel, 2000; Rincke, 2007; Swarts and Vassi, 2011; Shipan and Volden, 2006; Bouché and Volden 2011; Zhang and Yang, 2008; Boushey, 2010; Butz, Fix, and Mitchell, 2015) or the underlying processes driving policy adoption among multiple jurisdictions. This allows scholars to test multiple theories that explain this underlying process, or what some scholars refer to as diffusion mechanisms (Shipan and Volden, 2008). However, despite these efforts, only a few studies

(e.g., Bouché and Volden, 2011) have examined diffusion among counties. Local policymakers often have the discretion to adopt local sales taxes, but most diffusion studies focus on tax policy at the state level (Berry and Berry, 1992, 1994; Chirinko and Wilson, 2013; Goel and Nelson, 2012). Diffusion scholars have traditionally thought of states as policy laboratories (e.g., Karch, 2007) and have thus given most of their attention to states. However, counties also adopt policies, face various fiscal pressures, have policymakers who answer to their constituents, are cognizant of the policies of others (e.g., Bouché and Volden, 2011), have some degree of autonomy (contingent upon the state in which the county is located), and can provide important clues regarding the consequences of the devolution of policies from states to local governments. However, in the economics literature, fiscal interaction, or how economic decisions made by one jurisdiction influence other jurisdictions (or more specifically, how these decisions drive inter-local government strategic competition), has been studied for decades at the local level. Taking cues from both the diffusion and economics literature, this study fills the void in the diffusion literature by examining if and how sales tax rate increases drive economic competition among counties. The study uses data on Missouri's 114 counties between the years 2004-2010 to test multiple economic competition hypotheses. In addition, this study analyzes internal factors, or those that also may make policy adoption more likely (Berry and Berry, 1990; Boehmke and Witmer, 2004; Walker, 1969; Sabatier and Weible, 2007; Welch and Thompson, 1980).

The next section provides the literature review, followed by a discussion of the results, along with their implications and the shortcomings of this study.

Fiscal Competition and Sales Tax Decisions

Benjamin Franklin, in a 1789 letter to Jean-Baptiste Leroy, wrote, "In this world nothing can be said to be certain, except death and taxes" (Franklin, 2008). This reasoning is simple: all governments engage in taxation, as it is the primary means by which they generate revenue. Moreover, it is policymakers' fundamental task to adjust the tax rate because they use "their ability to tax and spend to achieve policy goals and objectives" (Kraft and Furlong, 2004, 89). The reason jurisdictions adjust tax rates may be as simple as generating revenue, or for other internally motivated tasks, such as adjusting for deficits, improving infrastructure, or funding new capital projects. However, external stimuli or factors that rest outside of the jurisdiction, such as a neighboring government's fiscal policy, may also determine adjustments. While taxes are important to both local and state governments, there is substantial variation among state tax laws, the latitude that states give local governments to change their tax rates, and the frequency of the usage of the sales tax.

Policy Diffusion

For decades, scholars have investigated how policy adoption impacts federalism and intergovernmental relations, with the more recent research empirically examining fiscal interactions among local governments (Revelli, 2005). Fiscal interaction is defined as how decisions made by one jurisdiction influence other jurisdictions economically, either in the form of economic spillovers where neighbors take advantage of capital inflow provided by their neighbors, or in the form of fiscal interdependence among jurisdictions—or when the tax base in one jurisdiction is contingent on the tax rate in others (Brueckner and Saavedra, 2001). Though there are several forms of taxation, the most popular tax for policymakers is the sales tax, which provides a substantial portion of revenue for state and local governments. Other taxes include property taxes, incomes taxes, and various other taxes (oil,

fees, charges, etc.). These account for the largest source of state and local government revenues.

Often, the sales tax is the preferred form of taxation due to its lack of transparency to consumers and lower likelihood of electoral retaliation, and also because it is a tax based on consumption rather than a general tax (Smith et al., 2005). However, placing a sales tax increase on the ballot can be challenging for a jurisdiction due to limitations imposed on local governments by the states. However, it is often essential to raise money for projects or in times of fiscal shortfalls.

Missouri, the focus of this study, has a multi-tiered sales tax. State statutes set procedures that permit local governments to periodically adopt sales taxes and set rates by local referendum. This results in varying levels of sales taxes among local governments (Burge and Piper, 2011; National Conference of State Legislatures, 2008). Although Missouri law allows flexibility for local governments that have an interest in obtaining additional revenues from the sales tax, there is a limitation of 1 percent of all taxable retail property in that particular county. Furthermore, counties have to provide an implementation and expiration date, the ballot results, and the stated purpose of the tax (MO.R.S.66.600.1 1991). Counties have used the tax for many purposes, such as storm water/drainage improvements, utility improvements, more funding for emergency services and 911 operations, as well as for economic development. In many cases, the taxes also have discretionary uses, with remitted monies going into the general fund (Missouri Department of Revenue, 2015).

To further add complexity to the issue, adjusting a sales tax rate may lead to jurisdictional interdependence in the form of strategic tax competition, which recognizes that jurisdictions look to other jurisdictions and choose their tax rates in a strategic manner. Thus, if a jurisdiction raises its tax rate, neighboring jurisdictions may benefit if this leads to an inflow in capital for them (Brueckner and Saavedra, 2001), and most policymakers recognize that raising taxes may ultimately lead to a decrease in its tax base (Wilson, 1999; Brueckner, 2003). However, sales tax rate increases are fairly common within a jurisdiction, which poses the question of how sales tax rate increases influence neighboring jurisdictions. For example, in 2005, 10 percent of counties altered their sales tax rates. However, in the recession years, this percentage increased.

External and Internal Determinants of Local Sales Tax Rates

Previous research has examined interstate tax competition (Fletcher and Murray, 2006; Deskins ad Hill, 2010; Chirinko and Wilson, 2013), how counties react to local option sales tax rate increases (Luna and Bruce, 2007), why counties seek the local option sales tax (Green 2014), and county and municipal sales tax options (Burge and Pipe, 2012). Several studies found that tax rate decisions are often a function of a neighbor's tax rates (Luna and Bruce, 2007; Chirinko and Wilson 2013) and that there are substantial levels of interdependency among neighboring jurisdictions in local sales tax adoptions (Sjoquist et al., 2007). Furthermore, studies have looked specifically at the diffusion of state income tax and state sales tax (Berry and Berry, 1992, 1994), enterprise zones (Mossberger, 2000), tax apportionment policies (Omer and Shelley, 2004), and development and research tax credits (Miller and Richard 2010). However, there is minimal research on sales tax rate increases and how they may drive competition and diffusion among counties.

Policy diffusion refers to the subsequent patterns by which policy innovations spread to other jurisdictions (Walker, 1969; Berry and Berry, 1990; Shipan and Volden, 2006).

Diffusion consists of external factors that help explain why multiple jurisdictions adopt the same policy, while internal factors are those that are within a jurisdiction, such as demographic or social factors. Though there are several external theories of policy diffusion, scholars often find that economic competition influences policy diffusion (Berry and Baybeck, 2005), especially for policies that may potentially produce economic spillovers into other jurisdictions. The economic competition hypothesis for cities is that "the likelihood of a city adopting a policy decreases with negative economic spillovers from that adoption to nearby cities and increases with spillovers from nearby cities" (Shipan and Volden, 2006, 842). The same impact could also be seen in geographically contiguous counties. More specifically, "In the context of US counties, geographically neighboring counties are more likely to compete with each other in order to attract or deter positive and negative economic spillovers than are those counties that do not border upon one another" (Bouché and Volden, 2011, 433).

According to economic competition theory in diffusion, when policymakers have comparable sales tax rates to their neighbors, *ceteris paribus*, there is minimal concern for economic spillovers or capital outflow. If one county increases its sales tax rate, there can be an outflow of residents into other counties with lower sales tax rates to make purchases, especially if residents perceive the difference in sales tax rates as justifying the cost of traveling to the neighboring county. Even if residents are too far from a county border to make the trip cost-beneficial, the perception of the capital outflow that may occur if sales taxes are raised might weigh heavily in the decision-making calculus of policymakers. However, despite the potential loss of revenue through economic outflow, sales tax increases do produce revenue, and local governments do implement sales tax increases frequently. In this case, neighboring counties face the choice of raising their sales tax or not. For the former choice, counties may raise their sales tax due to lessening concern for losing their residents to the neighboring counties. In other words, if a county's neighbor increases its sales tax rate, the county may raise its own as well, due to having less concern about economic outflow. As additional neighbors adopt the increased sales tax, the degree of concern would become even lower, making it more likely that a county would adopt an increase. Based on this literature, the present article hypothesizes that a county will become increasingly likely to raise its sales tax rate as neighboring counties raise their rates (*Competition Hypothesis*).

The impact of a county's neighbors raising their sales tax rates may not be contemporaneous. Often, scholars of diffusion examine the impact of time on this process. The "temporal effects" hypothesis states that various mechanisms of diffusion may display temporal variance (Shipan and Volden, 2008). According to this hypothesis, for economic competition, the effects may be long term (Shipan and Volden, 2008), and it may take counties time to react to the policies of their neighbors. If a county's neighbors adopt a sales tax rate increase, the county in question may take time to consider raising its rates. For example, a county's policymakers may take time to see if their county obtains revenue outflow from other counties, or they may simply wait for feedback from other counties or policymakers. Therefore, this study hypothesizes that there is a delayed diffusion effect between a county adopting a sales tax rate increase and neighboring adoptions (*Spatial Lagged Competition Hypothesis).* An additional consideration arises when recognizing that local sales tax adoptions and/or rates changes require referendums in Missouri. Therefore, it is also important to consider how referendums affect adoption. Most diffusion theories consider the policymakers themselves (Pachecho, 2012) and not the citizens. According to the social contagion model, citizens themselves react to neighboring policies by changing

their aggregated opinion on that policy. If this opinion is in favor of the policy, policymakers respond by adopting it (Pachecho, 2012). Therefore, in this research, neighboring counties are expected to influence the sales tax of a particular county. Specifically, as other counties adopt a sales tax rate change, it will cause the county in question to be more likely to pass a referendum to adopt its own sales tax rate change (*Referendum Hypothesis*).

This study also tests a conditional hypothesis to assess the extent to which economic competition varies between counties. A conditional hypothesis tests how external determinants vary based on internal characteristics. The conditional model posits that counties are more or less prone to competition based on certain levels of a given characteristic (Shipan and Volden, 2008), such as the economic wealth and development of a county. Specifically, this study examines the per capita income of individual counties' residents to determine how that shapes the influence of neighbors on sales tax rate increases. This tests the notion that wealthier counties are not as competitive as poorer counties, and counties with a smaller tax base are going to be more sensitive to the actions of neighboring counties. Based on this study, this article hypothesizes that wealthier counties will be less responsive to the sales tax rate increases of neighboring counties than poorer counties will be (*Conditional Competition Income Hypothesis)*. Additionally, this study examines a conditional retail model. This model posits that, as the retail sales tax rate increases, the neighboring counties will be more likely to increase their own sales tax rate to capture neighboring revenue (*Conditional Competition Retail Hypothesis).* The study includes a model that examines the determinants of the sales tax rate. Rather than neighboring counties influencing a rate change, neighboring counties will influence a county's sales tax rate (*Sales Tax Rate Hypothesis*). Finally, this article includes a model that ascertains the magnitude of change for each county between each year or, in other words, the specific increase or decrease in sales tax rates for each year *(Sales Tax Rate Change Hypothesis).*

Methodology

Missouri is an ideal location for this study due to its similarity to other US states. For example, its population growth rate and density are near the average of other states (U.S. Census Bureau 2012). Missouri is also situated in the Midwest, is bordered by seven other states, and has a diverse spectrum of counties with a mixture of urban and rural areas. Missouri has four large metropolitan counties: St. Louis, Jefferson, St. Charles, and Greene (Missouri Census Data Center 2012). In Missouri, counties increase sales tax rates several times a year, including the first day of every quarter (every January, April, July, and October), so there is adequate variation in tax rate increases for this study (Missouri Department of Revenue, 2012).

To test the hypotheses proposed in the previous section, a number of different models were used. The first is a negative binomial regression for the competition model because the dependent variable (the number of sales tax rate changes adopted by counties) is an event count distribution. Since the model has significant evidence for over dispersion ($p<.001$), the negative binomial regression model is preferred over the Poisson model. Fixed effects are also included in the model to capture any yearly effects. Adding the annual dummy variables controls for the temporal and group effects. In addition, a robust variance estimate was included in order to adjust for inner-cluster correlation and repeated observations. Clustering adjusts the variance estimate of the model that would be biased because of repeated observations. Additional models were used, such as the zero-based negative binomial, and they all yielded similar results. A zero-inflated negative binomial model to

control for the large amount of zeros in this model was included. Moreover, for the referendum model, a Cox Proportion Hazards model was used. This model is typical in diffusion models where adoption is a one-time event. Finally, ordinary least squares regression was used for the sales tax rate change model, since the dependent variable is continuous.

Tests for multicollinearity were done to assure that the independent variables were not related to one another, which can be problematic in panel data. Data obtained were for Missouri's 114 counties during the years 2004-2010.

Dependent Variable

This study relies on several dependent variables. For competition (both primary and zero-inflated) models, the dependent variable is the total cumulative number of increases that occurred in a county's sales tax rate each year. For the lagged model, the dependent variable is lagged by one year. For the referendum model, a duration model was used, which is a binary sequence indicating 0 for each year a county did not adjust its tax rate, and 1 for each year that it did. Ideally, researchers would want to capture the specific date the referendum was passed. However, because these data were not available, this study relies on the year the sales tax rate changed as a proxy measure. Additionally, for the sales tax rate model, a dependent variable that is the current tax rate for each county in Missouri was used. The data for this variable were obtained from the Missouri Department of Revenue. Finally, for the sales tax rate change model, the total change in sales tax rate in the current year from the previous year was used. For example, if county *a* in 2007 had a sales tax rate of 5.5, and, in 2006, it was 5.7, the dependent variable would be coded as -.2 for 2007.

Independent Variables

External Factors

The *neighbor* variable is defined as the proportion of bordering counties that increased their sales tax rate in the previous year. For example, in 2006, if a particular county had two neighbors that increased their sales tax rate in 2005, and this county has five total neighbors, then this was coded as ".40." Presumably, the higher the proportion of neighboring counties that have adopted a sales tax rate increase in previous years, the more likely the county is to adopt due to economic competition.

Internal Factors

The *population* of a jurisdiction can have an impact on the type and the number of policies it pursues (Mintrom and Sandra, 1998; Eyestone, 1977; Strang and Tuma, 1993), and it can also be a determinant or corollary of the financial capacity of the jurisdiction. Additionally, population is often included in studies that examine economic competition among local governments (e.g., Brueckner and Saavedra, 2001; Chirinko and Wilson, 2013). Presumably, larger counties may exhibit different policy behaviors than smaller counties because larger counties may adopt policies with greater frequency due to the county having more policymakers, greater amounts of resources in the county (such as a larger tax base), differing citizen demands, or a more professional government capable of evaluating policy alternatives. Furthermore, larger counties may be less likely to respond to their neighbors' policies because policymakers perceive smaller counties as less of an economic competitor. Likewise, counties with smaller populations would likely adopt policies less frequently or may be less responsive to their neighbors' policies.

There is some variation in population among Missouri counties. Some counties hold the major cities (including Springfield, Kansas City, and St. Louis), some are suburbs located on the outskirts of major cities, while others are largely rural. For the most part, Missouri is comprised of counties that are lowly populated; therefore, population must be included as an internal policy determinant in the diffusion models used in this study. This allows larger metropolitan counties to be compared to the smaller rural counties. To measure population, the total number of citizens residing in a county in a given year was used. This variable is logged because its distribution is not normal; counties housing the larger metropolitan areas had larger populations than average counties. These data were obtained from the Missouri Census Data Center, which provides yearly population estimates of counties in Missouri. This variable was used to control for the effect of population on sales tax rate increases.

States and local governments alike receive *federal funding* (whether in the form of appropriations, matching funds, grants, or other forms of revenue) directly from the federal government. The federal government, in turn, can impact policy adoption by lower governments through the use of funding structures or various economic incentives. Even if the federal government did not directly offer "direct incentives and punishments" (Mahalley et al. 2004, 336), it can still influence policymaking by sending signals about its policy preferences. Scholars have found that budgetary incentives do influence policy adoption and diffusion (Welch and Thompson, 1980), and that the federal government can use budgetary mechanisms to influence states (DiMaggio, 1991; Jensen, 2004; Baum and Oliver, 1996). Less is known about local governments and the extent to which the federal government can impact local policies. However, federal spending may impact local governments indirectly or could be related to other economic aspects of the county. For example, those counties with a higher tax base could have a greater financial need and are more likely to receive funding anyway. Regardless of the reason, federal spending must be used as a control variable in these models. For spending on the county by the federal government, the total amount of federal spending (in thousands) logged is included. These data were obtained from the U.S. Census Bureau. This variable captures the impact of federal appropriations on county sales tax rate increases. This will be used to determine whether counties that receive greater federal funding are more likely to enact sales tax rate increases.

The *per capita income* of residents residing in a geographic location is often used as an internal determinant in diffusion studies (Shipan and Volden, 2006; Berry and Berry, 1990; Boehmke and Witmer, 2004) or economic studies that examine competition among local governments (e.g., Brueckner and Saavedra, 2001). This is because a government's wealth may influence its policies. On the one hand, a lower per capita income in a location can be a barrier to governmental policy adoption due to a lack of resources. On the other, when a geographic unit has a larger income, there are more resources to pursue policies.

There is a plausible difference in the way wealthier and poorer counties pursue sales tax rate increases. Counties with higher levels of per capita income may be more likely to adopt tax rate increases, as wealthier counties adopt changes more frequently in order to capture the additional available revenue from its population. The poorer a jurisdiction is, however, the less likely it will be to raise taxes and pursue other options to generate revenue (Henrekson, 1993). Due to these reasons, per capita income should be controlled as an internal determinant. To use as a measure of economic development and wealth, the per capita income of each family in individual counties was included. The data for this variable were obtained from the Missouri Census Data Center. This will test the idea that a county is

bound by its economy when adopting sales tax rate increases. For this variable, the coefficient is standardized when used to test the conditional hypothesis.

The size of a government's *retail sales* often indicates its capacity to generate revenue, its relationship with the private sector, and other economic demographics, all of which may be a determinant of policy adoption (Berry and Berry, 1990). This study recognizes that retail sales may also be impacted by sales tax rates, meaning that endogeneity may be an issue. Therefore, additional models to determine if this would be an issue for modeling were included. No such effect was found (p=.114). Specifically, the amount of economic development that exists within a government may impact its propensity to adopt or change its policies. On one hand, for sales taxes, minimal retail sales would make policymakers more likely to raise revenue by raising sales taxes. For example, when a government considers raising the taxation rate, it is often considering changing its expenditure levels. The larger or wealthier a government is, the more funding alternatives it might have. On the other, raising the sales tax rate would mean that more revenue could be obtained through taxation, thus making it a preferable action to policymakers. Therefore, if this holds true, one could expect that a government's demand for services would increase the more the county has developed economically (Henrekson, 1993). The retail sector size variable is measured by the total dollar amount (in thousands) of revenue generated from retail sales transactions in a given county in a given year, logged. This variable was obtained from the U.S. Census Bureau. This will be used to assess whether or not a county's retail sector impacts tax rate increases.

Partisanship composition of a geographic area can impact policies. Electoral considerations, in short, "affect which policies are ultimately enacted as well as the provisions of these policies" (Karch, 2007, 4). In diffusion studies, researchers often theorize that politics influences policy adoption (Grossback, Nicholson-Crotty, and Peterson, 2004; Shipan and Volden, 2008; Berry and Berry, 1990). Moreover, studies that examine strategic tax competition between states also rely on political dimensions (e.g., Chirinko and Wilson, 2013) as a predictor of tax rate changes or how jurisdictions interact with one another. States composed more of a specific ideology or one political party will adopt certain policies aligned with the party's belief system (Grossback, Nicholson-Crotty, and Peterson, 2004). Theoretically, policymakers adopt policies favorable to the party composition of their electorate.

A county's electorate composition or ideology of the government can influence whether or not a tax is raised. Specifically, more liberal counties (or with a higher Democratic composition of the electorate) will be more likely to raise sales tax rates. Conversely, more conservative (or with a higher Republican electoral composition) counties would be less likely to raise sales tax rates. To use as a measure of a county's electoral composition, the percentage of the population of each Missouri county that voted for the *Republican Party* in the previous US presidential elections (2004 and 2008) was included. The vote returns for each county were obtained from the Missouri Secretary of State's website. Presumably, this will determine if there are any differences in the number of sales tax rate increases in counties with a higher vote percentage for the Republican presidential candidate.

Additionally, *fiscal stress* was used, which measures the total assessed property value of the county. Presumably, a decrease in the amount of assessed property tax, the more likely a county would be to need additional revenue from sales tax. This is similar to Sjoquist et al.'s (2007) research that relied on a change in the property tax base from the previous year.

This study also relies on *owner occupied housing*. This measure was used because those individuals who rent would be less likely to feel the burden of an increased tax (Sjoquist et al. 2007). Additionally, this article examines whether or not a county houses a *major university*, a variable used also by Sjoquist et al. (2007). Presumably, counties that have universities have a unique demographic that may be different from a normal county. A variable that is an indicator of whether or not a county has access to an *interstate* highway was also included. The underlying logic here is that it is easier for residents to shop in other counties due to ease of access to interstate highways (Sjoquist et al., 2007).

This study also examines whether or not a county shares a *border* with another state. Counties may be more reluctant to adopt a sales tax if they share a border with another state because of their increased concern for shopping across the border (Sjoquist et al. 2007). The study also relies on the percentage of the population within a county living below the *poverty* level. Presumably, counties that have higher poverty may be more fiscally stressed and have less of a tax base, while low poverty counties may have the potential to generate more revenue through taxes. Finally, this article examines multiple demographic control variables used by the Sjoquist et al,. (2007) study. First, the percentage of the population that is Caucasian *(% White*) non-Hispanic was used. This measure was used by Sjoquist et al., (2007) as a demographic control variable. Additionally, the portion of the population *over 65* was also examined, in line with Sjoquist et al., (2007). Finally, a county that is rural as opposed to urban may engage in economic competition differently. For example, urban counties with a large number of cities may have a more professionalized staff, may have additional revenue or can obtain additional revenue from taxes, or may be less susceptible to competition than the larger urban counterparts. In Missouri, several counties house larger metropolitan areas, making it important to control for these counties. Therefore, this study controls for the county, relying on a dichotomous variable to capture whether or not a county is *urban or rural*. If a county is below 50,000 in population, it is coded as 0; if higher, it is coded as 1. This is the U.S. Census Bureau's designation for an urban or rural county.

Internal Determinants Hypothesis: Internal county characteristics impact the sales tax behavior of counties.

Interaction Effects (Internal and External Factors)

In addition to the external and internal factors mentioned in the previous sections, it is likely that external and internal factors may work in conjunction with one another. Scholars often include interaction models when there is the potential for conditional relationships to be present. A conditional relationship exists when the impact of an independent variable on the dependent variable is conditioned by the presence of another variable (Brambor et al., 2006). Conditional relationships have also been used in policy diffusion studies (e.g., Shipan and Volden, 2008; Mitchell and Stewart 2014; Mitchell and Petray, 2016). For example, the neighbor variable has been shown to interact with measures such as population, which assess whether or not smaller or larger counties are more susceptible to certain policies (e.g., Mitchell and Stewart, 2014; Shipan and Volden, 2008), or income measures, which determine whether or not higher income (as opposed to low-income counties) are more susceptible to certain policies.

In this study, two interaction models are included: *neighbors x income* and *neighbors x retail*. These are multiplicative variables of the aforesaid internal income and retail sales variable and the neighbors external variable. For the latter and the former, this study posits

that the effect of economic competition will be dependent on the economic strength of a county's neighbors.

Interaction Hypothesis: Sales tax behavior of counties will be impacted by a combination of the internal county economic characteristics and the external behavior of bordering counties.

Results

Table 1 shows the descriptive statistics of each variable used in this study. The table reports the mean, standard deviation, minimum, and maximum of each variable. These show both the internal and external determinants used in this study. Table 2 shows the correlation coefficients for each variable. According to this table, multicollinearity is not a major issue for the models employed in this study, with the exception of a correlation between housing and % white (r=.67), fiscal stress and federal spending (r=.848), and population and several variables. Additional models were run, and the results did not significantly change. Alternative models that omit federal funding and retail sales were tested, and the results remained stable. These results are not reported due to space constraints.

Table 1 Descriptive Statistics for Variables

Variable	Mean	SD	Min	Max
Sales Tax Rate Change	0.0005	0.0038	-0.005	0.1
Proportion	0.164	0.199	0	1
Neighbor	0.332	4.26	0	100
% White	92.8871	7.9317	42.1	98.8
Over 65	16.4231	3.5273	7.2	29.6
Poverty	17.8	5.0257	5.8	29.3
Per Capita Income	20960.84	3469.73	14752	35143
Housing	72.373	6.822	44.6	84
University	0.0174	0.1308	0	1
Interstate	0.3478	0.4766	0	1
% GOP	60.8195	7.9447	16	76.3
Border	0.4087	0.4919	0	1
Population (l)	10.0143	1.081	7.6742	13.8233
Retail Sales (l)	4.7903	1.599	1.411	9.5729
Fed Funding	456.9108	1447.272	19.5	11614
Urban	0.1689	0.3749	0	1
Fiscal Stress	7.47E+08	2.39E+09	1.95E+07	2.53E+10
Income x Neighbor	0.2703	0.0934	0.0311	0.6746
Retail x Tax	5721.789	64397.44	0	1799000

Table 2 Correlation Coefficients for Variables

	Tax	DV	Neighbor	%White	Over 65	Poverty	Income	Housing	University	Interstate
Tax	1									
DV	0.025	1								
Neighbor	-0.003	-0.017	1							
%White	0.024	0.004	-0.055	1						
Over65	-0.01	-0.095	-0.005	0.522	1					
Poverty	0.022	-0.111	0.055	-0.047	0.234	1				
Income	-0.019	0.068	-0.033	-0.154	-0.361	-0.735	1			
Housing	0.01	0.028	-0.059	0.675	0.484	-0.216	-0.044	1		
University	-0.012	0.064	-0.005	-0.132	-0.201	0.04	0.193	-0.302	1	
Interstate	-0.025	0.088	-0.027	-0.404	-0.389	-0.295	0.377	-0.34	0.194	1
%GOP	-0.045	-0.094	-0.025	0.332	0.188	-0.017	-0.206	0.149	-0.159	-0.21
Border	-0.023	-0.022	0.039	-0.209	-0.041	-0.025	0.143	-0.15	-0.108	0.094
Population(1)	-0.03	0.083	0.019	-0.532	-0.65	-0.183	0.456	-0.422	0.321	0.381
Retail(1)	-0.071	0.026	0.027	-0.452	-0.485	-0.085	0.353	-0.459	0.284	0.302
Fed Spend	-0.008	0.009	-0.003	-0.615	-0.284	-0.052	0.312	-0.348	0.15	0.233
Urban	-0.016	0.035	-0.014	-0.36	-0.489	-0.275	0.553	-0.31	0.33	0.239
Fiscal Stress	-0.013	0.034	-0.009	-0.504	-0.302	-0.16	0.47	-0.268	0.26	0.291

Interaction Effects

	%GOP	Border	Pop (1)	Retail (1)	Fed Spend	Urban	Fiscal Stress
%GOP	1						
Border	-0.056	1					
Pop(1)	-0.208	0.073	1				
Retail(1)	-0.014	0.103	0.736	1			
Fed Spend	-0.361	0.118	0.572	0.446	1		
Urban	-0.231	0.143	0.718	0.419	0.458	1	
Fiscal Stress	-0.414	0.154	0.665	0.505	0.848	0.555	1

Table 3 Models of Tax Rate Change within Missouri Counties (2004 - 2010)

	Competition	Competition (zero-inflated)	Lagged Competition	Referendum	Conditional Income	Conditional Retail	Sales Tax Rate Model	Sales Tax Change Model
Neighbors	-0.0121	-0.0124	-0.0275	1.0027	- 2.6895*	-0.0137	-2.3723	-1.48E-06
	-0.031	-0.031	-0.067	-0.059	-1.138	-0.035	-4269312	0
%White	0.0232	0.0233	0.025	1.0407	0.0237	0.021	1.30e+07*	0
	-0.016	-0.016	-0.016	-0.039	-0.016	-0.015	-4288920	0
Over 65	-0.0272	-0.031	-0.0312	1.0181	-0.0269	0.0016	3.72e+07*	0
	-0.024	-0.024	-0.023	-0.06	-0.024	-0.023	-6695550	0
Poverty	- 0.0550*	- 0.0442*	- 0.0563*	0.8549*	- 0.0455*	-0.0357	-29902.2	0
	-0.019	-0.019	-0.019	-0.038	-0.022	-0.021	-5530016	0
Income	- 0.0001*	-0.0001	- 0.0001*	0.1	- 0.0001*	0	21446.82*	2.65E-08
	0	0	0	0	0	0	-9461.988	-8.71E-08
Housing	0.007	0.0094	0.0149	0.957	0.0046	-0.0071	2154808	0
	-0.013	-0.013	-0.013	-0.028	-0.014	-0.013	-3838078	0
University	0.6358	0.6425	0.5792	3.7378	0.5698	0.5	1.28e+09*	0
	-0.397	-0.392	-0.388	-3.427	-0.394	-0.383	-1.33E+08	-0.001
Interstate	0.149	0.1936	0.1898	0.9567	0.1897	0.2105	5.37E+07	0
	-0.13	-0.129	-0.128	-0.322	-0.136	-0.131	-4.00E+07	0
% GOP	- 0.0244*	- 0.0242*	- 0.0252*	0.997	- 0.0235*	-0.0128	1.63e+08*	0
	-0.009	-0.009	-0.009	-0.021	-0.009	-0.009	3.34e+07)	0
Border	0.0173	0.007	0.0489	1.1192	0.0275	-0.0392	1.63e+08*	0
	-0.115	-0.114	-0.113	-0.296	-0.114	-0.113	-33400000	0
Population (1)	0.2189	0.2012	0.2261	2.0426*	0.1855	0.3525*	2.78e+08*	0
	-0.131	-0.13	-0.129	-0.649	-0.131	-0.132	-36000000	0
Retail Sales (1)	-0.0167	-0.0202	0.0047	0.7205*	-0.0173	- 0.8505*	3.75e+07*	0
	-0.054	-0.053	-0.053	-0.105	-0.053	-0.145	-17000000	0
Fed Spending	0	0	0.0001	1.0001	0	-0.0001	815598.1*	0.00000012
	0	0	0	0	0	0	-26271.27	-3.4E-07
Urban	-0.3205	-0.3047	-0.2006	1.1687	-0.3224	-0.3161	93800000	0
	-0.25	-0.247	-0.242	-0.627	-0.247	-0.241	-73200000	0
Fiscal Stress	-3.32E-11	-5.35E-11	-4.91E-11	1	-1.4E-11	2.3E-11	____	-1.48E-06
	-1.13E-10	-1.13E-10	-9.34E-11	-1.6E-10	-1.2E-10	-9E-11	____	0
Income x Neighbor	____	____	____	____	0.0001*	____	____	____
	____	____	____	____	0	____	____	____
Retail x Tax	____	____	____	____	____	14.7081*	____	____
	____	____	____	____	____	-2.379	____	____
N	780	780	779	549	780	780	781	778
Pseudo R^2	0.0236	____	.0.0303	____	____	____	____	0.01
Log Likelihood	-763.51	-763	-768.42	-383.14	-760.26	-744.01	-16614.78	____
LR	204	165	199	211.8				

Table 3 shows the results of the multiple models used in this study. *Model 1* examines the competition model. Of primary interest in this model is the neighbor variable, which will allow for the examination of whether economic competition is (or is not) occurring. This model will also be used to examine the effects of the internal determinants. *Model 2* is the zero-inflated negative binomial model. This is to control for the large number of zeros present within this study. *Model 3* is the competition spatial lag model which includes the lagged effects for the neighbor variable. *Model 4* is a duration model that examines the factors that increase a county's risk for adopting a sales tax referendum. *Model 5* is the conditional economic competition model that captures the interaction variables (neighbor x per capita income), which will help determine if the effect of the neighbor variable on sales tax rate increases varies across income levels. For the interaction model, the per capita income variable is standardized. *Model 6* examines an interaction between retail sales and the sales tax rate, and *Model 7* examines the factors that influence the sales tax rate of individual counties. *Model 8* examines the factors that cause sales tax rate changes between years.

Analysis of the models suggests that the factors that influence sales taxes are complex. The neighbor variable was insignificant in all models (except conditional income), but significant when it interacted with income in the conditional model. Interaction terms are difficult to interpret; Figure 1 shows a graphical representation of the interaction term between per capita income and neighbors, and its impact on sales tax rate increase adoption. The x-axis represents per capita income ranging from the lowest per capita income value of 14,752 to the highest value (see Table 1 for the descriptive statistics). The y-axis represents the predicted number of sales tax increase adoptions. The different lines represent the differences in how per capita income interacts with sales tax rate increases as the number of neighbors the county has that have previously adopted a sales tax rate increase. Thus, Figure 1 represents the likelihood of adopting a sales tax rate increase as the per capita income of the county increases for each per capita income level. The first change is at the 37,000 mark, after which this value continues to increase. The graph shows the greatest impact for the counties that have the lowest number of adopting neighbors. Thus, those counties that have 0-2 adopting neighbors are more likely to adopt sales tax rate increases when the higher per capita income neighbors adopt them. This is evidence to suggest that when considering adopting sales tax rate increases, counties do not (or only minimally) pay attention and react to their neighbors.

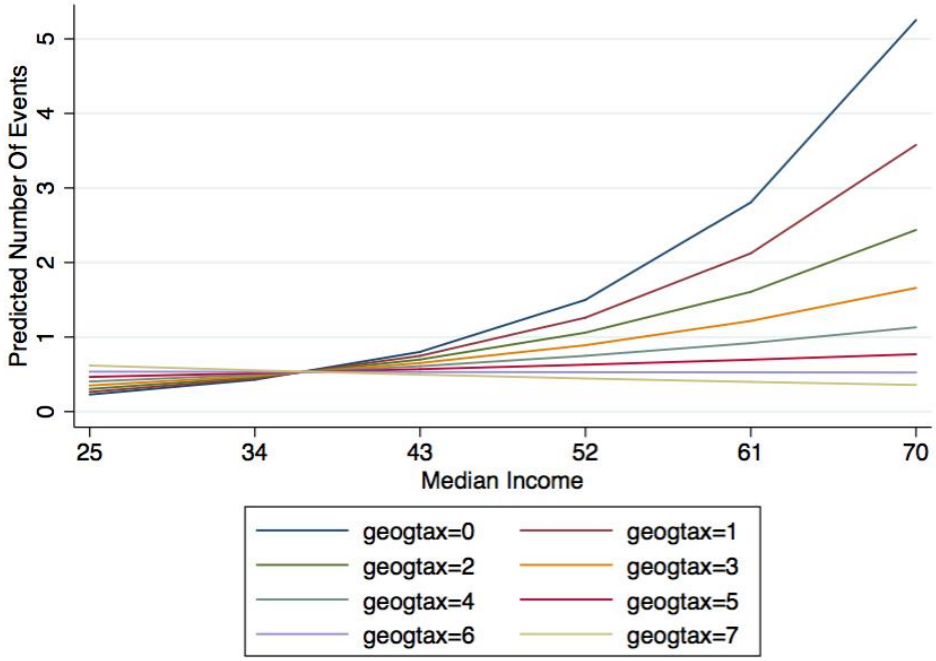
When examining the interaction effects in Table 3, the relationship is dynamic and complex. Specifically, the more neighboring counties that adopt tax rate increases, the less likely the county in question is to increase its own taxes, depending on the county's per capita income level. For sales tax rate increases, poorer counties are more likely to copy what their neighbors are doing. That is, if their neighbors adopt tax increases, the poorer counties are more responsive. However, wealthy counties are less affected by other counties. In terms of per capita income, the impact of a county's neighbors on its decision to alter its sales tax rate decreases as per capita income increases. This is likely because poorer counties have more fear of losing revenue from their neighbors' activities. Wealthier counties are less influenced, or they weigh the effect of their neighbors as minimal.

Table 4 Factor Change in the Expected Change of the Variables

Variable	P-Value	Factor Change	% Increase	SD
Neighbors	0.695	0.9880	0.9576	3.5808
% White	0.141	1.0235	1.1609	6.4194
Over 65	0.253	0.9732	0.9101	3.4658
Poverty	0.004*	0.9465	0.7661	4.8481
Income	0.044*	0.9999	0.8125	3141.7382
Housing	0.605	1.0070	1.0454	6.3802
University	0.109	1.8885	1.0881	0.1329
Interstate	0.251	1.1607	1.0725	0.4699
% GOP	0.006*	0.9759	0.8468	6.8178
Border	0.881	1.0174	1.0085	0.4883
Population (1)	0.095	1.2447	1.2358	0.9670
Retail Sales (1)	0.758	0.9834	0.9752	1.4981
Fed Spending (1)	0.864	1.0000	1.0236	875.1424
Urban	0.200	0.7258	0.8936	0.3509
Fiscal Stress	0.769	1.0000	0.9600	1.2288e+09

The (l) signifies that the variable is logged. P-Value represents the probability value of the original model. % Increase represents the percent change in the expected count for a unit increase in X. % SD increase represents the percent change in the expected count for a standard deviation increase in X. SD is the standard deviation of the variable.

Figure 1 Per Capita Income and Neighboring County Interaction Term



In the competition model, there were also three internal county determinant control variables that were found to impact tax rate increases: poverty, per capita income, and the percentage of the county's Republican vote share. Counties with higher levels of per capita income are more likely to adopt tax rate increases. Table 4 presents the factor change in each variable for the competition model. Since the negative binomial regression is non-linear, the percentage change is a more interpretable statistic. According to Table 4, for each additional one thousand dollars in per capita income, there is a .99 increase (or a .8125 standard deviation increase) in the expected count number of sales tax rate increases, holding all other independent variables constant.

In addition, counties with greater percentage vote for the Republican Party's presidential nominee in 2004 and 2008 were less likely to adopt tax rate increases. According to Table 4, for each percentage increase in vote for the Republican Party, there is a .975 decrease in the change of the expected count of sales tax increases. Turning to poverty, a percentage increase in the poverty level of counties decreases the expected count of sales tax increases by .946. For the zero-inflated model, the results are similar, except per capita income is not significant. According to the results of the lagged model, these variables are also significant. For the referendum model, poverty, population, and retail sales are all significant. In the conditional retail model, population and retail sales are all significant. Finally, for the sales tax rate model, % White, Over 65, Income, University, % GOP, border, population, retail sales, and federal spending are all significant.

Discussion

The analysis provides insight for how policies diffuse through local government and

sorts out ways by which county governments do and do not enact increases in their sales tax rates. The analysis shows sales tax increases can best be thought of as resulting from a combination of external and internal factors. Externally, the conditional economic competition hypothesis examined the effect of neighbors on sales tax rate increases and how it varies across income levels. Specifically, the adoption of a sales tax increase is further dependent upon the county's per capita income, as wealthier counties are more resistant than poorer counties to adopting increases when their neighbors do. This result is consistent with the literature that found economic competition as having an impact (Brueckner, 2000; Boehmke and Witmer, 2004; Berry and Baybeck, 2005), but the effect is not as direct as it was in the previous studies; specifically, there was a conditional economic competition effect (Shipan and Volden 2008). Wealthier counties respond to their neighbors less when they implement tax rate increases, while poorer counties respond to their neighbors more. This could be because wealthier counties perceive the threat of having neighbors with higher or lower tax rates as less of a concern than poorer counties. That is, they consider their citizens unlikely to go to another county with lower tax rates to engage in sales transactions. Likewise, they may consider the threat of their neighbors being able to generate more revenue through higher rates as minimal. Poorer counties, on the other hand, respond to their neighbors' increasing tax rates. This is likely because they feel they are susceptible to losing revenue to other counties. As revenue generation and balancing the budget become greater concerns in the future, counties will increasingly rely on taxation; these results illustrate just how they might be expected to do so.

The results also show that several internal determinants influence the adoption of sales tax increases, confirming many of this study's internal determinant hypotheses. The per capita income impacted sales tax rate changes in several of the models. This finding comports with many of the studies which theorize that a government's income influences its policies (Boehmke and Witmer 2004; Berry and Berry 1990, 1992; Mooney, 2001; Bouche' and Volden, 2011). One could contend that poorer counties would be more likely to increase their tax rates to gain more revenue or that policymakers would be more reluctant to raise taxes in poor geographical areas. However, in this study, the latter was not the case. This could be because poorer counties that need additional revenue may be less cognizant or have less capability of raising their tax rates. While counties can determine their own sales tax rates, a more resourceful government might be more capable of understanding the need for (and potential pitfalls to) raising their sales tax rates. It could also be that the fiscal capacity of the populace is not reflective of the capacity of the government. Since local governments in Missouri have discretion in generating their own revenue through sales taxes, wealthier counties may be better able to adjust their policies that create revenue.

The Republican vote share had a significant relationship in several of the models. This is consistent with many of the studies that hypothesize (or control for) the impact of partisanship or ideology on policies (Grossback, Nicholson-Crotty, and Peterson 2004; Shipan and Volden 2008; Berry and Berry 1990; Mooney 2001). The more Republican counties (as measured by support for the GOP presidential nominee) adopt tax rate increases less frequently than their Democratic counterparts. This suggests that policymakers are cognizant of their constituents' preferences on tax issues. The Republican Party generally favors lower taxes and less government intervention in economic matters. Thus, policymakers who have more constituents that voted Republican are less likely to adopt tax rate increases, possibly for reelection considerations. This could be exacerbated by the fact that many local elections in Missouri are partisan based.

Finally, poverty was also significant in several of the models presented. Specifically, higher amounts of poverty led to fewer sales tax rate increases. This is either because policymakers are less likely to increase taxes in poor economic times and feel that they are less capable of generating revenue from higher poverty citizens, or because areas that are higher in poverty lack governments that are capable of remedying poor economic circumstances.

The percentage of white population and the over 65 variables were significant in the sales tax rate model. This suggests that there are additional processes occurring when policymakers are considering the sales tax rates. Given the variation in these findings, it is imperative that future studies consider multiple models.

Conclusion

This study examined the diffusion of sales tax rate increases among counties in Missouri. Arguing that economic competition influences sales tax rate increases, multiple hypotheses were tested using a regression analysis. Specifically, this study tested the following hypotheses: competition, spatial lagged competition, referendum, conditional competition income, conditional competition retail, sales tax rate change, and internal determinants. This study found that, for Missouri counties, the conditional economic competition income hypothesis was supported, in addition to multiple internal factors that were hypothesized to influence sales tax rate increases. The conditional economic competition hypothesis suggests that the effect of neighboring counties on sales tax rate increases varies across income levels. This means that wealthier counties behave less competitively than their smaller counterparts, meaning that smaller counties may be disadvantaged by having to compete more with their larger counterparts. This competition is even more difficult because these counties likely have fewer resources. Thus, the devolution of policies from states to localities may exacerbate regional inequalities among counties. Additionally, we found that policymakers are also responding to internal conditions within their county and that external competition is not the only factor that they consider.

Despite this study's findings, it has several limitations. First, while Missouri does provide an arguably adequate representative state to examine county diffusion, future studies are needed to explore if these findings are similar in other states. Second, while the years in this analysis did provide variation in sales tax rate increases, capturing more years could reveal additional effects. Third, while this study included multiple variables to use as measures of diffusion, additional variables not used in this study may further scholars' understanding of diffusion processes. Future studies should examine other variables, such as county-level politics, government type, professionalism of government, and the presence of additional taxes, such as property or use taxes. Finally, it should be noted that the time frame of this study is within a period of recession. Different results could emerge from studies that occur within a non-recession period.

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