# STATE TAX CUTS AND DEBT MARKET OUTCOMES
## An Empirical Analysis of the Kansas Tax Reform

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## ABSTRACT

This paper analyzes the effects of state tax cuts on municipal market outcomes. It examines the extent to which state tax cuts affect borrowing costs and credit ratings of state and local governments. The paper focuses on the State of Kansas and analyzes the massive income tax cuts and tax base changes in 2012 that lasted until 2017. The analysis uses difference-in-difference techniques and generalized ordered logit estimations to investigate the effects of state tax cuts on state and local debt markets. Results show mixed impacts of the Kansas tax reform on state government borrowing costs. However, the results give consistent estimates of the adverse impact of state tax cuts on local government issuers: on average, local issuers experienced a 34-basis point increase in the borrowing cost on general obligation bonds (GOs); also, they faced a lower probability of receiving high credit ratings on their GOs. These findings deepen insights on the effects of state tax policy on municipal capital markets and provide an evidence-based context for discussions about how state policymakers can more effectively reduce the spillover effects of tax policy on local debt markets.

*Keywords:* state tax reform; Kansas; borrowing costs; local debt markets

## 1. INTRODUCTION

"You know, for years, they haven't been able to do it…Not since Ronald Reagan…But they called it "tax reform."…I said, "We have to call it – not tax reform. Nobody knows what that means. That could mean a tax increase. We have to call it tax cuts. So we called Tax Cuts and Jobs. And guess what? We got it passed." (Applause).[1]

- *Remarks by President Donald J. Trump, The White House Briefings, April 12, 2018*

President Donald Trump's recent comment (stated above) about The Tax Cuts and Jobs Act of 2017 aptly illustrates an increasingly dominant view of 'tax reform' among some politicians and policymakers and a group of think tanks. The core idea, as summarized in the Laffer Curve Napkin,[2] is that lowering taxes promotes economic activity. Against this background, a considerable number of states, mostly fiscally conservative states, have experimented with major tax cuts in recent years to boost economic growth.

Kansas is one of the states that enacted major tax cuts in recent years. In 2011, Kansas elected Sam Brownback as Governor and Republicans won the largest majority in almost half a century, creating a fertile ground for experimenting with a legislative agenda focused on tax cuts and promises of job creation. Besides, the economic impact of the Great Recession enhanced public support for such policies. Consequently, in 2012, the legislature enacted House Bill 2117 with one of the most extensive tax cuts in the state's history, characterized by a reduction in the number of individual income tax brackets and lowering of the tax rate. Furthermore, the state eliminated taxes on business income of sole proprietorship, Subchapter-S corporations,

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[1] "Remarks by President Trump on Tax Cuts for American Workers", April 12 2018, *White House Briefings and Statements*, https://www.whitehouse.gov/briefings-statements/remarks-president-trump-tax-cuts-american-workers/
[2] Laffer Curve Napkin, The National Museum of American History
http://americanhistory.si.edu/collections/search/object/nmah_1439217

and single-member limited liability companies (Pathak et al., 2016). In 2013, House Bill 2059 built on this groundwork and enacted a further reduction in the tax rate, completing the "tax cut" that is rumored to be an inspiration for the federal tax action in 2017.[3]

The Kansas Experiment was massive in its scale and ramifications, however, several states in the last two decades have experimented with different versions of such reforms. In the post-recession period, Wisconsin's Governor Scott Walker enacted several tax cuts with a cumulative revenue implication of more than $8 billion during his tenure.[4] In the pre-recession period (2001-2007), Arizona, Louisiana, New Mexico, Ohio, Oklahoma, and Rhode Island enacted massive tax cuts to personal income taxes. Between 1990 and 2000, Colorado, Connecticut, Delaware, Massachusetts, New Jersey, and New York enacted major income tax cuts.[5]

Studies have focused on the relationship between state tax cuts and economic development outcomes, often pointing toward unclear or insignificant impacts of tax cuts on economic growth (Richman and Wang, 2018; Turner and Blagg, 2018; Gale, Krupkin and Rueben, 2015; Leachman and Mazerov 2015). Fewer studies have extended that focus to examine the effects of tax policy changes on state and local debt markets. This paper analyzes the impacts of state tax cuts on municipal capital markets and addresses two broad questions. *First*, do major state tax cuts, like in Kansas, influence key municipal market outcomes, such as state government borrowing costs? *Second*, is there evidence of spillover effects of state tax

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[3] Trump's Tax Plan has Echoes of the Kansas Tax Cut Experiment, NPR, https://www.npr.org/2017/09/30/554506190/trump-s-tax-plan-has-echoes-of-the-kansas-tax-cut-experiment
[4] Walker: Tax Cuts will exceed $8 billion if budget proposal passes, Politifact, http://www.politifact.com/wisconsin/statements/2017/jul/12/scott-walker/walker-tax-cuts-will-exceed-8-billion-if-budget-pr/
[5] See Bourdeaux (2011) and Pathak et al. (2016) for a review of major state tax reform during the last two decades.

cuts on local governments; specifically, what is the impact of state tax cuts on local government borrowing costs and credit ratings? The Kansas tax reform of 2012 provides an appropriate natural experiment to investigate these questions.

The rest of the paper proceeds as follows. In the next section, we provide a brief overview of previous research on the economic impacts of state tax cuts and lay out the context of our first research question. Section 3 discusses the limited literature on state tax policy spillover effects and presents a background for the second research question. Section 4 summarizes some of the empirical challenges and provides details of the data and empirical strategy. Section 5 discusses the estimations and empirical results. The last section summarizes the findings and discusses policy implications.

## 2. ECONOMIC IMPACTS OF STATE TAX CUTS

In this section, we briefly review the economic arguments and previous research that discuss tax cuts and their economic implications. Higher taxes tend to have a distortionary effect on the economy because the increase in rates limits investment and hinders the creation of new firms and jobs, which altogether can cause a slowdown in economic growth (Alm and Rogers 2011). On the other hand, tax cuts tend to reduce the cost of capital, boost the incentive to invest, promote entrepreneurial activities, and raise total factor productivity, which altogether promotes economic growth (Ferede and Dahlby 2012). Both neoclassical and endogenous growth theorists agree about the impact of tax changes on the economy, even though the two schools of thought differ regarding the transience or permanence of the impact on economic growth. Neoclassical growth theorists such as Ramsey (1928), Solow (1956), and Cass (1965) predict that changes in tax policy will alter economic growth only temporarily, with

no permanent effect on the economy's steady-state growth rate. On the contrary, endogenous growth theorists such as Romer (1986, 1990), Lucas (1988), and Rebelo (1991) predict that tax policy changes will alter, permanently, the growth rate of per capita output.

In practice, however, state experiences with tax cuts have shown mixed results for economic growth. Some studies show that state tax cuts raise economic growth, other studies find that tax cuts cause a slowdown in economic output, and yet other studies indicate that tax cuts have no impact on economic activity. Ljungqvist and Smolyansky (2016) and Ferede and Dahlby (2012) are among the scholars that find that state tax cuts enhance economic growth and development. Ljungqvist and Smolyansky studied corporate tax changes among U.S. states and found that when states implement corporate tax cuts during recessions, employment and income increase and the economy grows. They analyzed 271 changes in state corporate income tax across U.S. states from 1970 to 2010. The authors used spatial modeling and difference-in-differences techniques to overcome confounding effects that can arise due to tax changes occurring at different times in different states and from neighboring states sharing similar economic conditions as the tax reform state. Ferede and Dahlby (2012) focused on corporate income tax cuts in Canadian subnational governments. They found that a 1 percentage point cut in the provincial corporate tax rate is associated with a 0.1 to 0.2 percentage point increase in the annual growth rate of the province. The authors also found that when the provincial government switches from corporate tax cut to sale tax cut, and the sales tax rate harmonizes with the federal value-added tax rate, investment increases and economic growth rises.

Gale, Krupkin, and Rueben (2015) found no significant impact of state tax cuts on economic growth. They studied top income tax rates across U.S. states from 1977 to 2011 and considered effects on economic growth, entrepreneurship, and employment. Similarly, Rickman

and Wang (2018) studied state tax cuts in Kansas and Wisconsin and found that the fiscal experiments in these states did not spur economic growth, rather the tax reforms hurt state economic performance. Kansas implemented tax cuts in 2012 whereas Wisconsin implemented cuts in 2011, and the magnitude of cuts in both states during this period ranks among the top five state tax cuts in the United States since 2010 (Leachman and Mazerov 2015). Turner and Blagg (forthcoming) also find no significant impact of the 2012 Kansas state tax cut on employment growth. They used multi-state county fixed effects and Kansas county-border matching techniques and considered long and short pre- and post-policy change horizons. Finally, Alm and Rogers (2011) found results that somewhat summarize the state of knowledge on the impacts of state tax cuts on economic growth. They showed that depending on the parameterization and starting year, the effects of state tax cuts on economic growth may be "significantly negative, sometimes significantly positive, and sometimes not significant at all." (p.508)

As noted earlier, previous studies on the economic impacts of state tax cuts have largely focused on outcomes such as growth, employment, and investment. To our knowledge, this study is among the first efforts to examine, directly, the impact of state tax cuts on state and local debt markets. However, other studies show a connection between government fiscal policy and financial market outcomes and serve as a foundation for the present study. Benson and Marks (2010), for example, studied the impacts of government revenue caps on municipal bond yields. They focused on the City of Houston, Texas and analyzed specific fiscal changes that occurred in that city between June 2004 and March 2006. They found that fiscal factors can have a significant effect on secondary market municipal bond yields. Also, Bhandari, Evans, Golosov, and Sargent (2016) found that in an economy with incomplete markets, a

distortionary tax on labor can cause a worker to realign the composition of his or her securities portfolio and this realignment, when considered across all working individuals in the economy, can alter government debt such that the optimal target debt level will be negative, the distribution of debt will be very dispersed, and mean reversion will be slow.

Both Poterba (1989) and Afonso and Strauch (2007) analyzed the impacts of national tax policy changes on municipal debt markets. Alfonso and Strauch evaluated the extent to which relevant fiscal policy events that occurred among EU national governments in 2002 affected interest rate swap spreads in individual countries and found significant impacts. Poterba (1989) examined the impact of the 1986 U.S. federal tax reform on municipal bond markets and found that tax policy change was associated with narrowing of the yield spread between taxable and tax-exempt interest rates. However, we did not come across any previous work that focuses on state tax policy changes and its implications for municipal market outcomes.

The underlying rationale for investigating the effect of state tax cut on state and local government debt markets derives from the notion that governments with better fiscal health tend to have higher credit ratings and lower borrowing costs, whereas governments with weak fiscal indicators face lower ratings and higher interest costs. Within this context, municipal debt markets might anticipate a decline in government fiscal health following a major tax cut because the cut signals a potential decline in government tax revenue and indicates a greater risk of the government not meeting its interest obligations (Poterba and Rueben 2001). This context informs our first research question examining the indirect economic and budgetary impact of Kansas tax cuts, as measured by the borrowing costs and credit ratings of the state government.

3. TAX ACTIONS AND INTERGOVERNMENTAL FISCAL SPILLOVERS

Understanding how the tax actions of one level of government influence outcomes for another level of government is central to fiscal federalism. The theoretical literature has examined the extent to which fiscal decisions of state governments influence local governments as well as the channels of transmission for state-local fiscal spillovers. The overriding view among scholars is that subnational government interactions, whether the interaction is among units at the same level of government (e.g., state versus state), or at different levels of government (e.g., state versus city), may either lead to efficient levels of public good production, or become constrained by fiscal competition and lead to sub-optimal levels of public goods (Brennan and Buchanan 1980; Oates and Schwab 1988; Wilson 1986; Zodrow and Mieszkowski 1986).

Empirical work on state-local fiscal relations has focused on a variety of policy domains and produced mixed results about whether, and the extent to which, state fiscal decisions affect local government outcomes. Shon (2017) found that the extent to which a state government relies on sales taxation has spillover effects on county economic activity. The author analyzed state-local sales taxes and economic activity by type of industry in county governments from 1990 to 2013. Regarding channels of transmission of state-local fiscal impulses, the study noted that manufacturing and retail industries provided the largest responses linking state sales tax rates to changes in county economic activity. Similarly, Ham, Swenson, Imrohoroglu, and Song (2011) analyzed the spillover effects of state tax credits and subsidies, transmitted through state enterprise zones, on local labor markets. They found that state fiscal changes spillover to local labor markets and affect unemployment, poverty, and wage and salary income. The authors used data from the 1980, 1990 and 2000 U.S. censuses and compared the difference-in-

differences between the outcome variable for a state enterprise zone census tract with the average in the outcome variable for contiguous census tracts in the same state.

An aspect of the literature that needs more scholarly interrogation concerns the debt market dimension of state-local fiscal spillovers. Given the interconnectedness of state-local fiscal relations (Hirsch 1970; Coen-Pirani and Wooley 2018), if state tax cuts have a significant impact on debt market outcomes of local governments, and therefore a direct impact on their budgets, this warrants academic and policy attention. These considerations lead us to our second research question focusing on the impact of Kansas tax cuts on the debt market outcomes of local governments in the state.

## 4. DATA AND METHODS

This study primarily uses data from two municipal securities databases compiled by Mergent Inc. and Ipreo Inc. Also, we obtain information from Bondbuyer and Bloomberg to create control variables and give background and context to the analysis. The primary variable of interest is True Interest Cost (TIC) which is a widely-used measure of the cost of capital for a bond issuer and calculates the present value of the interest that issuers pay over the life of a bond. However, the use of TIC as the main variable of interest leads to some empirical challenges. First, TIC is calculated for the entire bond issue, so we use the entire bond issue as the unit of analysis rather than individual maturities. This leads to a reduced sample of issues, especially when examining debt market outcomes in one state over time, because a single state does not issue many bonds in a given year. Second, the use of interest cost as a primary outcome measure precludes us from aggregating the outcome at the state level. For example, calculating an average of enrollment rate of school districts in a state is an intuitively valid measure, but the average interest rate on bonds issued in a state is not an intuitively

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appropriate measure. This aggregation problem forbids us from using research designs such as interrupted time series or synthetic control that are more suitable for evaluation of policy interruptions such as a major tax reform.

Given these constraints, we draw valid comparisons based on a difference-in-difference technique that also uses bonds issued in Kansas' four neighboring states (Oklahoma, Colorado, Missouri, and Nebraska) as a comparison group in an empirical setting. Arguably, these are valid comparison states since they are geographically proximate, politically comparable, and compete for economic activity against each other.[6] The primary empirical specification assumes the form of a difference-in-difference estimation as shown in equation (1).

$$y_i = \alpha_1 D_1 + \alpha_2 D_2 + \gamma D_1 * D_2 + x_{it}\beta + \varepsilon \qquad (1)$$

$y_i$ is the dependent variable, measured as true interest cost of a bond issue. $D_1$ is a propensity-to-treat measure that identifies bonds issued in the State of Kansas (*KANSAS*), and $D_2$ is a dummy variable that distinguishes pre-treatment observations (bonds issued until 2012) from post-treatment observations (*POST*). The main parameter of interest $\gamma$ measures the effect of the interaction term, that is, the differential effect of tax reform on borrowing costs of bonds issued in Kansas vis-à-vis bonds issued in the comparison states. All other covariates are included in the vector $x_{it}$. Also, $\beta$ is the vector of coefficients associated with the covariates and $\varepsilon_{it}$ is the error term.

We control for several key variables that are known to affect borrowing costs of bonds. First, we include key bond characteristics such as size of a bond, measured as the logged par value of the bond (*PARVALUE*), and weeks to final maturity of a bond (*BONDLIFE*), which

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[6] Recent studies on Kansas such as Turner and Blagg (2018) and DeBacker et al. (2017) also use these four adjoining states for comparison.

captures the duration for which the bond is issued. Also, since tax-exemption on interest earned is a primary feature of the U.S. municipal securities market and shapes the market demand for bonds, we control for bonds that have federal tax exemption (*FEDEXEMPT*). Additionally, underwriter selection process in municipal bond sales is known to affect borrowing costs (Kriz, 2003, Simonsen & Robbins, 1996, Peng and Brucato, 2004), therefore we control for method of sale with a dummy variable indicating competitive bids (*COMP*). Furthermore, issuers often introduce a call option in bonds such that they can refinance them, which may lead to uncertainty for buyers and higher borrowing costs. Therefore, we control for bonds that have a call feature using a dummy variable that is coded *1* if any maturity in the bond is callable (*CALLABLE*). Finally, we control for the Bondbuyer's 20 General Obligation Bond Index (*BBINDEX*) that captures the average estimated yield for GOs in the market on the date of issuance. Table 1 reports the descriptive statistics for all the variables outlined above.

[Table 1 here]

As noted earlier, the analysis of state borrowing costs faces the challenge that a single state does not issue many bonds in a given year, which results in a small sample of state bond issues. Another challenge relates to legal and institutional constraints on debt issuance in the study states. In Kansas, the state government does not issue general obligation debt directly. Either conduit agencies such as Kansas Development Finance Agency (KDFA) issue revenue bonds on behalf of the state government or bond issuance is delegated to agencies such as Kansas Department of Transportation. Therefore, we identify all the bonds that are issued by state government agencies and use them for our analysis. We face a similar challenge in three of the four comparison states (except Missouri). Colorado and Oklahoma have a constitutional

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requirement for voter approval before the state can issue general obligation debt, and Nebraska has a constitutional requirement that prohibits the state from having debt exceeding $100,000, except during invasions or insurrections.[7] As a result, we focus our analysis on all the bonds issued by *state issuers*, which is an important point to consider since that leads to including revenue bonds in the analysis.

We do not encounter sample size problems when working with data on local governments since collectively they issue a significant volume of general obligation bonds. For the local government sample, we only include unlimited tax GOs, limited tax GOs, and double-barreled bonds in the sample. In addition to the borrowing costs models, we analyzed credit ratings as the dependent variable for the local governments sub-sample to understand whether state tax cuts have any impacts on credit ratings of local governments. Given the ordinal nature of credit ratings, we used generalized ordered logit models to estimate the impact of state tax cuts and report average marginal effects on credit ratings. However, the primary model specification remains the same as in equation (1) discussed above with $y_i$ being an ordinal credit rating measure of high, medium, and low rating. The next section has more details on the steps we followed to recode ratings.

## 5.  ESTIMATION AND RESULTS

In this section, we present descriptive statistics and discuss the regression estimates. The tax reform in Kansas during 2012 and 2013 started to show its impact shortly afterwards as income tax revenues declined and created pressure on the budget. These developments were followed

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[7] See Nebraska State Constitution Article XIII-1: https://nebraskalegislature.gov/laws/articles.php?article=XIII-1

by a credit rating downgrade by Moody's in May 2014 and subsequent downgrades by S&P and other rating agencies. Figure 1 shows the trend in Standards and Poor's ratings for Kansas and neighboring states – Kansas' ratings stand out since none of the other states received a downgrade during the period 2004 to 2017.

[Figure 1 here]

These credit rating downgrades, along with the fiscal stress from tax cuts and diminished revenues, seemed to raise the borrowing cost of bonds in Kansas. Figure 2 draws on the state issuer sample and plots the distribution of true interest cost for state debt issuance in Kansas vis-à-vis state issuers in the four neighboring states. The chart divides the data into four time periods of pre-recession (2005-2007), recession (2008-2009), pre-reform (2010-2012), and post-reform (2013-2015). In Kansas, the entire distribution of true interest cost of bonds in the post-reform period shifted upwards while the distribution was relatively stable for the neighbors (median moved up for both). It is important to note here that the state issuer sample is relatively small and includes all bonds, so the pattern is relatively less clear. Concurrently, as shown in Figure 3, local government issuers in Kansas witnessed an upward movement in interest rate distribution in contrast to a decline in borrowing costs for local government issuers in the neighboring states.

[Figures 2 and 3 here]

Table 2 presents difference-in-difference estimates of the effects of state tax cuts on state and local borrowing costs. The first two columns show the results of the base model and Columns 3 and 4 show the full specification with additional controls for bond and market

characteristics. Column 1 and Column 3 report results for state issuers and Column 2 and

Column 4 report results for local issuers. The primary parameter of interest is $\gamma$, the coefficient

on the interaction term. In the full specification for state issuers (Column 3), the bonds issued

by them in the post-reform period, on average, paid a 43 basis points higher interest cost than

in the pre-reform period in Kansas vis-à-vis in the neighboring states. This coefficient is

significant only at the 10 percent level and is not significant in the base model shown in Column

1. Thus, we are relatively less confident of these results, but we suspect that the results show

larger standard errors because of the measurement problems in the state issuer sample.

[Table 2 here]


On the other hand, Column 4 shows that the bonds issued by local government issuers

in the post-reform period, on average, paid a 34-basis point higher interest cost than the pre-

reform period in Kansas vis-à-vis its neighbors. These results are significant at the one percent

level of significance and are consistent across all the model specifications. This provides

considerable support for our argument about the spillover effects of state tax policy changes on

local government debt outcomes. Since we had a relatively large number of observations for

local governments, we further investigate the plausible impact of the tax reform on credit

ratings of the bonds. However, we still lose several observations in the credit rating estimations

due to missing data. The ordinal character of credit rating leads us to use generalized ordered

logit regressions, and we condense the ordinal ratings into a simple scale of high, medium, and

low to enable easy interpretation of results and provide enough observations across three

rating thresholds.[8] Table 3 provides details of the credit rating recodes.[9]

[Table 3 here]

Table 4 reports the average marginal effects from the generalized ordered logit regressions showing the impact of state tax cuts on local government credit ratings. The three columns report the probability of receiving high (Column 1), medium (Column 2), and low (Column 3) credit ratings on local government bonds. The parameter $\gamma$ suggests that holding all other variables at their actual values, compared to its neighbors, the probability of a Kansas bond getting a rating higher than AA/Aa2 is nine percentage points less in the post-reform period than in the pre-reform period. Concurrently, the probability of receiving the medium rating (between AA2/AA and A1/A+) or low rating (A/A2 or less) is higher for bonds that have a low probability of receiving a high rating.

[Table 4 here]

Finally, in Table 5, we take into consideration the potential of the credit rating mechanism impacting true interest costs and examine the underlying mechanisms that lead to higher costs. Column 1 (base model) and Column 2 (full specification) are the same as Column 2 and Column 4 of Table 2, the third column adds dummies for credit ratings as a potential mechanism that leads to higher interest cost. We find that the coefficient of the interaction term shrinks from 34 basis points to 16 basis points because of the credit rating controls. This

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[8] Ordered logit violates the parallel regression assumption. Thus, we use generalized ordered logit.
[9] We follow the recoding structure in Pathak (2017) and create an eight-point scale and condense it further to a three-point scale of high, medium, and low ratings. Table 4 uses the three-point scale and Table 5 uses the eight-point scale.

indicates that almost half of the impact of tax reform on local government borrowing costs is manifested through the mechanism of lower credit ratings on the bonds.

[Table 5 about here]

Overall, we find a significant impact of the Kansas tax reform on debt market dynamics of the state. Due to limitations of data, we are less confident of the adverse impact on state issuers, but there is some supporting evidence. On the local government side, we find substantial evidence of the impact of the state tax cuts on local government issuers. Lower credit ratings play an important role in increasing the borrowing costs of local government issuers, but other mechanisms are also at play that may be explored further.

6. SUMMARY AND CONCLUSION

In 2012, the State of Kansas made sweeping changes to its tax code characterized by significant reduction in individual and business income taxes. This paper examines the impact of those tax cuts on state and local debt markets. We focused on two key questions: whether the tax cuts in Kansas significantly affected state government borrowing costs, and whether the state tax policy changes affected local government borrowing costs and credit ratings, implying state to local fiscal spillovers.

Using difference-in-difference and generalized ordered logit estimations, we compared Kansas and its neighboring states in the pre- and post-reform period and found supporting evidence for both our questions. The 2012 tax cuts appear to have led to higher borrowing costs for both state issuers and local governments, but the evidence is more robust for local governments. For the state issuer, problems related to sample size and constitutional limits on

issuing debt do not allow for generalizable comparisons. However, a notable finding in this

paper is the adverse impact of state tax policy on local government debt market outcomes, and

this finding points toward significant state to local fiscal spillovers.

These findings raise two important issues that require further consideration by state and

local fiscal policymakers. First, the enthusiastic pursuit of tax cuts using the logic of economic

development should be problematized by including the budgetary costs of indirect outcomes

such as higher borrowing costs and debt service. Second, if state tax actions, like the ones that

happened in Kansas, have such significant impacts on local government debt market outcomes

and budgets, it raises important questions on fiscal federalism, whether local government

policymakers should have a more prominent voice in state tax policymaking.

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TABLE 1

Descriptive Statistics – State and Local Issuers (2005-2015)

| VARIABLE DESCRIPTION | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| | State Agency Issuers (N=163) | | | |
| True Interest Cost (TIC) | 2.36 | 1.24 | 0.35 | 6.75 |
| Bonds Issued in Treatment State (KANSAS) | 0.22 | 0.41 | 0.00 | 1.00 |
| Bonds Issued in Treatment Period (POST) | 0.34 | 0.47 | 0.00 | 1.00 |
| Par Value in millions (PARVALUE) | 5.37 | 13.80 | 0.05 | 250.00 |
| Weeks until final maturity (BONDLIFE) | 401.96 | 318.56 | 53.00 | 1630.00 |
| A dummy for federal exemption (FEDEXEMPT) | 0.98 | 0.15 | 0.00 | 1.00 |
| A dummy for competitive sale (COMP) | 0.98 | 0.13 | 0.00 | 1.00 |
| A dummy for callable bonds (CALLABLE) | 0.26 | 0.44 | 0.00 | 1.00 |
| Bondbuyer's 20 bond G.O. Index (BBINDEX) | 4.26 | 0.42 | 3.27 | 6.01 |
| | Local Government Issuers (N=3489) | | | |
| True Interest Cost (TIC) | 2.91 | 1.39 | 0.10 | 6.09 |
| Bonds Issued in Treatment State (KANSAS) | 0.45 | 0.50 | 0.00 | 1.00 |
| Bonds Issued in Treatment Period (POST) | 0.25 | 0.44 | 0.00 | 1.00 |
| Par Value in millions (PARVALUE) | 89.50 | 143.22 | 0.32 | 700.00 |
| Weeks until final maturity (BONDLIFE) | 722.06 | 465.48 | 24.00 | 1707.00 |
| A dummy for federal exemption (FEDEXEMPT) | 0.93 | 0.26 | 0.00 | 1.00 |
| A dummy for competitive sale (COMP) | 0.98 | 0.13 | 0.00 | 1.00 |
| A dummy for callable bonds (CALLABLE) | 0.61 | 0.49 | 0.00 | 1.00 |
| Bondbuyer's 20 bond G.O. Index (BBINDEX) | 4.30 | 0.45 | 3.27 | 6.01 |

TABLE 2

The Impact of Kansas Tax Reform on the Cost of State and Local Borrowing

(Sample: Bonds issued in Kansas, Colorado, Missouri, Nebraksa, Oklahoma during 2005-2015)

| | (1) STATE ISSUER All Bonds | (2) LOCAL ISSUER General Obligation Bonds | (3) STATE ISSUER All Bonds | (4) LOCAL ISSUER General Obligation Bonds |
|---|---|---|---|---|
| KANSAS*POST | 0.375 | 0.404*** | 0.426* | 0.340*** |
| | (0.228) | (0.040) | (0.237) | (0.036) |
| KANSAS | 0.419** | -0.130*** | 0.297* | -0.158*** |
| | (0.169) | (0.031) | (0.166) | (0.030) |
| POST | -1.762*** | -1.768*** | -1.791*** | -1.445*** |
| | (0.188) | (0.034) | (0.295) | (0.042) |
| PARVALUE (ln) | -0.110*** | -0.102*** | -0.092*** | -0.099*** |
| | (0.032) | (0.007) | (0.035) | (0.006) |
| BONDLIFE (wks) | 0.002*** | 0.002*** | 0.001*** | 0.002*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| FEDEXEMPT | | | -0.327 | -0.833*** |
| | | | (0.267) | (0.074) |
| COMP | | | 0.199 | -0.035 |
| | | | (0.357) | (0.068) |
| CALLABLE | | | 0.537*** | -0.093** |
| | | | (0.195) | (0.036) |
| BBINDEX | | | 0.188 | 0.429*** |
| | | | (0.272) | (0.032) |
| Year Dummies | Yes | Yes | Yes | Yes |
| Observations | 163 | 3489 | 163 | 3,470 |
| R-squared | 0.803 | 0.878 | 0.815 | 0.894 |

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

TABLE 3
Recoding the Credit Ratings on an Eight-Point and Three-Point Scale
(Local Government Issued General Obligation Bonds)

| Credit Rating | Eight-Point Scale | Three-Point Scale | Observations |
|---|---|---|---|
| Aaa/AAA | 8 | High | 3 |
| Aa1/AA+ | 7 | High | 16 |
| Aa2/AA | 6 | Medium | 48 |
| Aa3/AA- | 5 | Medium | 105 |
| A1/A+ | 4 | Medium | 222 |
| A2/A | 3 | Low | 217 |
| A3/A- | 2 | Low | 164 |
| Baa1/BBB+ or lower | 1 | Low | 210 |
| | | | Total=985 |

Note: The eight-point scale is constructed after taking an average of ratings across the three agencies. If any two rating agencies assign different ratings to an issue, then average rating is rounded off to the nearest whole number. For example, if Moody's assigns Aa1 to a bond, and S&P and Fitch assign AA, the bond will have an average rating of (7+6+6)/3=6.33, which will assume the value six on the eight-point scale, and 'medium' on the three-point scale

## TABLE 4

### The Impact of Kansas Tax Reform on Credit Ratings of Local Government Bonds
### (Average Marginal Effects, Generalized Ordered Logit Regression)

|  | PR(HIGH RATING) | PR(MEDIUM RATING) | PR(LOWRATING) |
|---|---|---|---|
| **KANSAS*POST** | **-0.091*** | **0.062*** | **0.029*** |
|  | **(0.051)** | **(0.035)** | **(0.016)** |
| *KANSAS* | 0.011 | -0.008 | -0.003 |
|  | (0.035) | (0.024) | (0.011) |
| *POST* | -0.094 | 0.064 | 0.029 |
|  | (0.057) | (0.039) | (0.018) |
| *SPLITRATING* | -0.180*** | 0.123*** | 0.057*** |
|  | (0.031) | (0.022) | (0.012) |
| Other controls | Yes | Yes | Yes |
| Year Dummies | Yes | Yes | Yes |
| Observations | 985 | 985 | 985 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

## TABLE 5

### Testing the Credit Rating Mechanism Effect for Increase in Interest Cost

### (Local Government Sample, 2005-2015)

| | (1) | (2) | (3) |
|---|---|---|---|
| | Base Model | Full Specification | Mechanism Control |
| KANSAS*POST | 0.404*** | 0.340*** | 0.155*** |
| | (0.040) | (0.036) | (0.053) |
| KANSAS | -0.130*** | -0.158*** | -0.161*** |
| | (0.031) | (0.030) | (0.035) |
| POST | -1.768*** | -1.445*** | -1.135*** |
| | (0.034) | (0.042) | (0.061) |
| PARVALUE (ln) | -0.102*** | -0.099*** | 0.020 |
| | (0.007) | (0.006) | (0.013) |
| BONDLIFE (wks) | 0.002*** | 0.002*** | 0.002*** |
| | (0.000) | (0.000) | (0.000) |
| FEDEXEMPT | | -0.833*** | -0.946*** |
| | | (0.074) | (0.086) |
| COMP | | -0.035 | 0.013 |
| | | (0.068) | (0.062) |
| CALLABLE | | -0.093** | 0.027 |
| | | (0.036) | (0.049) |
| BBINDEX | | 0.429*** | 0.637*** |
| | | (0.032) | (0.050) |
| Aaa/AAA | | | -0.620*** |
| | | | (0.113) |
| Aa1/AA+ | | | -0.639*** |
| | | | (0.114) |
| Aa2/AA | | | -0.629*** |
| | | | (0.109) |
| Aa3/AA- | | | -0.618*** |
| | | | (0.108) |
| A1/A+ | | | -0.529*** |
| | | | (0.111) |
| A2/A | | | -0.606*** |
| | | | (0.117) |
| A3/A- | | | -0.629*** |
| | | | (0.135) |
| Observations | 3,489 | 3,470 | 909 |
| R-squared | 0.878 | 0.894 | 0.891 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

FIGURE 1

Standard & Poor's state credit rating for State of Kansas and the Neighbors (2004-2017)
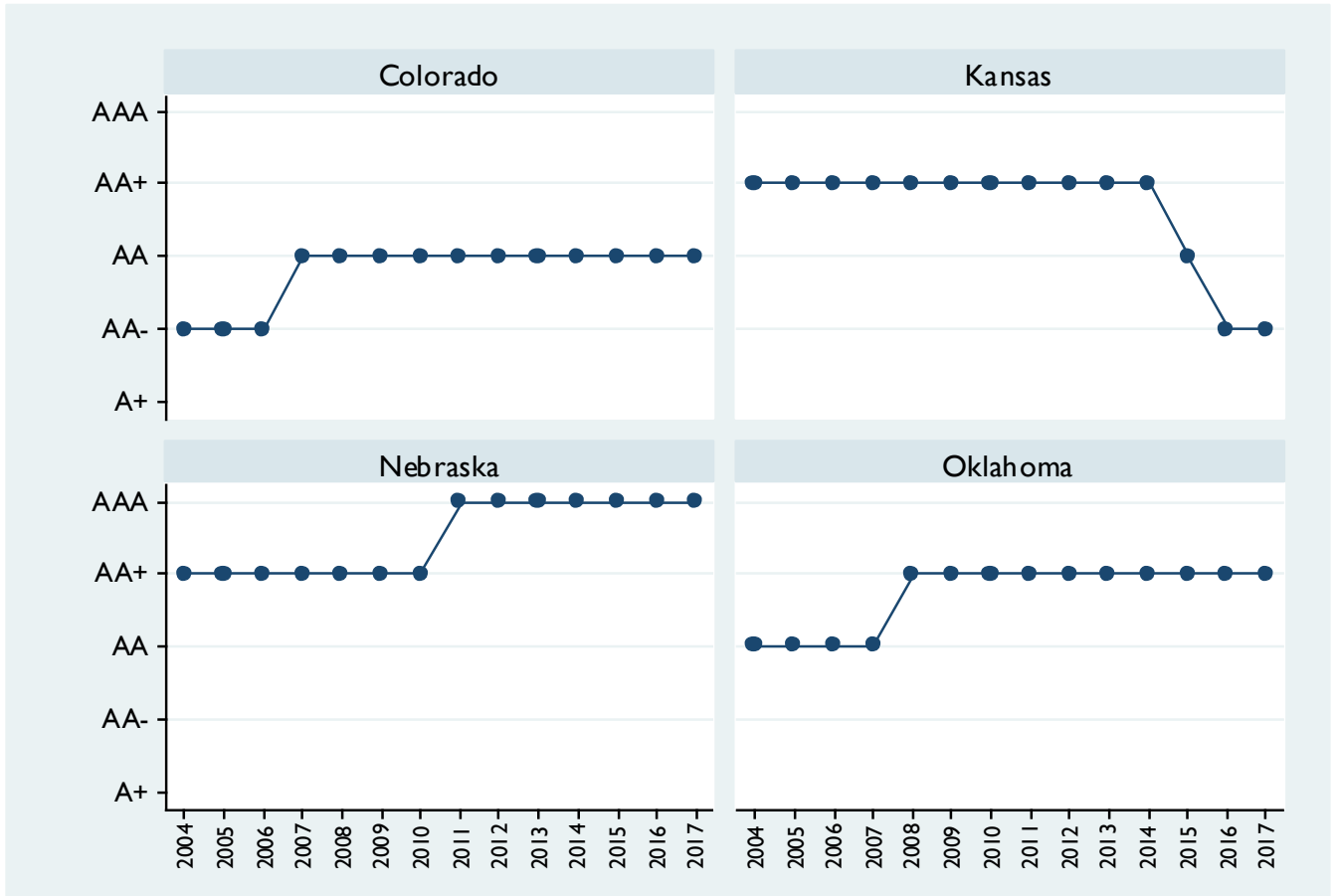


Note: State of Missouri has maintained a constant AAA rating throughout this entire period (2004-2017)

Source: Stateline: The Daily News Service of The Pew Charitable Trusts, "Infographic: S&P State Credit Ratings, 2001-2014," June 9, 2014; Janney, "State Credit Update and DataBank," October 21, 2016; Pew Charitable Trusts, "Rainy Day Funds and State Credit Ratings," May 2017

FIGURE 2

The Distribution of True Interest Cost for Bonds Issued by State Issuers
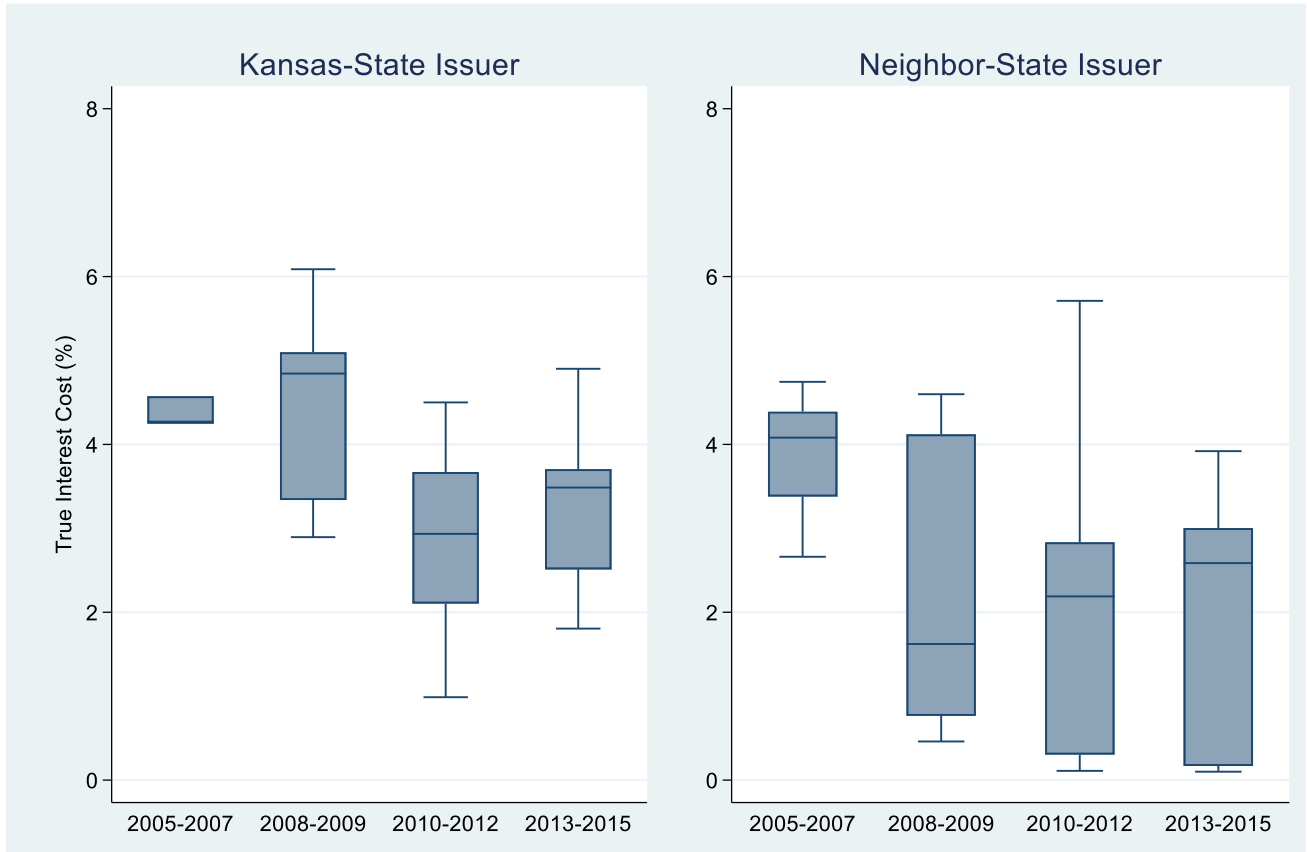
Kansas and Comparison States, 2005-2015

# FIGURE 3

## The Distribution of True Interest Cost for Bonds Issued by Local Issuers

## Kansas and Comparison States, 2005-2015