Effects of Kansas' Tax Reform of 2012: Evidence from a Synthetic Control Method

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Abstract

This paper examines the impact of Kansas' Tax Reform of 2012 on state government revenues, and on both macro- and micro-level economic outcomes. Using a synthetic control method (SCM), the current study finds Kansas' personal income tax revenue dropped significantly following the implementation of tax reform in Kansas. Specifically, there was almost a 50% gap in personal income tax revenue between Kansas and its synthetic control by fiscal years 2014 and 2015. The current study also finds that there was no increase in state GDP per capita or any changes in the number of usual work hours per week. Therefore, the current study finds no evidence of an economic increase due to Kansas' tax cuts, but instead these tax cuts appear to have created a significantly large opportunity cost for the state in the form of forgone revenues that could have been used for alternative government programs.

JEL Codes: H24, H70, and H71

Keywords: Kansas, synthetic control method, government revenues, tax cuts, and economic growth

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INTRODUCTION

On January 1, 2013, Kansas implemented one of the largest state-level tax cuts in history. Kansas' Tax Reform of 2012 led to four major changes.[1] First, the standard deduction nearly doubled for both married and single filing households. Second, the number of tax brackets decreased from three to two. Third, both the top and bottom tax rates were greatly reduced. The top tax rate decreased from 6.45% to 4.9%, while the lowest tax rate decreased from 3.5% to 3.0%. Lastly, and most controversial, Kansas no longer taxed nonwage income from sole proprietorships, limited liability companies, farm establishments, and other forms of pass-through businesses.[2] See Pathak et al. (2016) for more background information on Kansas' Tax Reform of 2012.

Supporters of Kansas' tax reform, like Kansas Governor Sam Brownback, argued that these tax cuts would be "like a shot of adrenaline" to the economy and create tens of thousands of new jobs in the state (Carpenter, 2012). The supporters for tax reform often cite supply-side economic theory which argues that reductions in tax rates incentivizes individuals to work more, create more businesses, and create more jobs (Canto, Joines, & Laffer, 1983). Supply-side economic theory also predicts that economic growth created by tax reform can increase government revenues, or at least partially offset revenue losses due to tax cuts.

Interestingly, the empirical evidence on the relationship between state taxation and economic growth is quite mixed (e.g. Reed, 2008; McBride, 2012; Mazerov, 2013; Gale, Krupkin, & Rueben, 2015). More recent studies find small impacts on business activity from changes to federal or state tax policy (e.g. Chirinko and Wilson, 2008; Yagan, 2015; Serrato and Zidar, 2016). The mixed findings from previous studies are not surprising for both theoretical and methodological reasons. From a theoretical perspective, the effect of a tax cut on labor supply is theoretically ambiguous because a tax cut creates both income and substitution effects. For example, a tax cut increases the after-tax return from working an additional hour which might encourage individuals to work more. However, a tax cut could will also increase the overall after-tax income which might encourage individuals to work less. If the magnitude of the income effect is the same as the magnitude of substitution effect, then a tax cut is not expected to increase either labor supply, the number of work hours, or spur economic growth.

A second possible reason for the mixed findings in previous studies is that these studies often use different methodologies, datasets, and state contexts to study the effect of taxation on economic growth (Gale, Krupkin, & Rueben, 2015). For example, Reed (2008) finds a negative relationship between tax rates and economic growth using state-level data from 1970 to 1990. However, Gale, Krupkin, and Rueben (2015) update the Reed (2008) study by adding more recent years of data and find an unstable effect of taxes on economic growth.

The lack of academic consensus on the economic impact of tax cuts is troubling because numerous state governments are currently considering enacting their own tax reform policies (Pathak et al., 2016). Understanding the impact of tax cuts on both economic outcomes and governmental revenues is vital for policymakers at all levels of government. Like government-operated programs (e.g. K-12 public education), a tax cut can be viewed as an implicit

government investment. Instead of investing resources in governmental programs, a tax cut invests resources in individuals and private organizations by lowering their taxes in hopes that their economic decisions will be altered in a way that leads to economic growth. If tax cuts do not lead to economic growth, society will be worse off because the forgone revenue could have been used for an alternative government program or investment.

Additionally, it is important for policymakers to be aware of the fiscal cost of a tax cut. Often, state policy analysts and policymakers cite the difference in total state government revenue between the fiscal years (FY) before and after a tax reform as a measure of the cost of the tax cut. For example, one policy report estimated that Kansas' Tax Reform of 2012 resulted in a 24% reduction in personal income tax revenue by comparing Kansas' personal income tax revenue between FY 2012 and FY 2013 (Mazerov, 2016). However, this is a potentially problematic approach because Kansas' personal income tax revenue in FY 2012, the year before tax reform, is not a good counterfactual for how much personal income tax revenue would have been collected in Kansas if the state did not enact tax reform. The economy was improving and the national unemployment rate was dropping between FY 2012 and FY 2013, and an improving economy would have likely resulted in more personal income tax revenue collected in Kansas during the FY 2013 compared to FY 2012.

There are three previous studies that examine the effects of Kansas' tax reform. All three studies suggest that Kansas' tax reform did not spur economic growth. First, Debacker et al. (2016) use data on a random sample of tax filers in Kansas and neighboring states and generally find the Kansas reform encouraged individuals to avoid state income taxation by reclassifying income as pass-through business income instead of wage income. Second, Turner and Blagg (2017) use a difference-in-difference approach comparing private sector employment growth in

Kansas counties with counties in neighboring states and find no evidence that Kansas' Tax Reform of 2012 increased the number of private sector jobs in Kansas. Lastly, Rickman and Wong (2018) use both a difference-in-difference and a synthetic control method (SCM) approach to examine the effects of fiscal austerity policies adopted in Kansas and Wisconsin starting in 2011. Rickman and Wong (2018) find no evidence of economic growth in the years following 2011, when the Kansas' newly elected governor enacted a set of fiscal austerity policies, including their tax reform policy adopted in 2013.

The current study contributes to these previous studies in three ways. First, the current study is the first attempt to estimate the causal effect of Kansas' tax reform on personal income tax revenue. Debacker et al. (2016) report trends in personal income tax revenue for Kansas and its neighboring states before and after the 2013. However, their approach does not allow for an estimate of the magnitude change in personal income tax revenue in the years following the tax cuts because there is no clear control group in their analysis. Building on Debacker et al. (2016), the current study uses a SCM approach to calculate a point estimate of the change in personal income tax revenue as a result of the tax reform by comparing Kansas' actual personal income tax revenue following the tax reform and its synthetic control's personal income tax revenue (Abadie, Diamond, & Hainmueller, 2010). Another advantage of using a SCM is this method does not rely on only neighboring states as the comparison group, but instead allows the SCM to identify neighboring and non-neighboring states that most resemble Kansas based on a set of predictors and outcomes. Estimating the gap in personal income tax revenue following Kansas' tax cuts is an important contribution because it is vital for policymakers to be well informed with a point estimate of the change in revenue, especially for policymakers in other states considering a similar tax cut as Kansas.

Second, the current study examines possible mechanisms for why previous studies find no evidence that the Kansas' tax cuts did not spur economic growth. Using a SCM approach, I build on Debacker et al. (2016) and Turner and Blagg (2017) by examining the macro-level effects of Kansas' Tax Reform of 2012 using state-level data and alternative measures of economic growth that could not be examined in those previous two studies. As mentioned above, the current study is not the first study to use a SCM to examine macro-level economic outcomes in Kansas during this time period. Rickman and Wong (2018) examines macro-level economic outcomes following Governor Sam Brownback's enactment of several fiscal austerity policies, including the tax cuts. However, this is the first study to focus solely on the Kansas' tax cuts. By setting the treatment year as 2013 instead of 2011, the current study finds slightly different results for changes to GDP per capita than those findings in Rickman and Wong (2018). Unlike Rickman and Wong (2018), the results in the current study do not allow for the claim that there was a decrease in economic growth following Kansas' tax cuts.

Lastly, the current study is the first to examine whether or not Kansas' tax cuts resulted in a change in the number of work hours per week. As mentioned above, the expected effect of tax cuts on work hours is theoretically ambiguous because it is unclear whether or not the income or substitution effect dominates. For this reason, it is important to test for this empirically. Additionally, understanding how the number of usual work hours changed following the tax cuts will allow us to better understand why Kansas' tax reform did not spur economic growth.

The current study uses panel data from 2005 and 2015 on Kansas and 41 other states that also levy state taxes on personal income. Using this data, I use a SCM to construct the counterfactual Kansas and compare trends in the outcome variables between Kansas and its synthetic control before and after the implementation of Kansas' Tax Reform of 2012. Overall, I

find that personal income tax revenue dropped significantly following the implementation of tax reform in Kansas. Specifically, there was almost a 50% gap in personal income tax revenue between Kansas and its synthetic control by fiscal years 2014 and 2015. This estimate of forgone tax revenues is much higher than estimates cited in previous policy briefs (Mazerov, 2016).

Additionally, I find that there was no increase in state GDP per capita, or any change in the number of work hours per week following the implementation of Kansas' Tax Reform of 2012.[3] These findings add to the evidence that suggests there was no economic benefit from Kansas' tax reform policy, but there was a significantly large opportunity cost to Kansas in the form of forgone revenues that could have been used for alternative government programs and investments. The remaining article proceeds as follows: Sections 2 and 3 describe the data and SCM methodology. Sections 4 and 5 present the main findings and robustness checks. Lastly, Section 6 provides conclusions and goals for future research.

DATA

Analytical Sample

The current paper analyzes publicly available data from various sources to estimate the effect of Kansas' Tax Reform of 2012 on personal income tax revenue and economic outcomes. The analytical sample includes Kansas and 41 other states that levy a tax on personal income between 2005 and 2015.[4] The analytical sample excludes North Carolina because it implemented a major tax reform in 2013.[5] The final sample includes 42 states over 11 years (i.e. 462 state-year observations). The sample period ends in 2015 because 2015 is the latest year that data is available for all outcomes of interest. The remainder of this section describes the outcome variables and the predictor variables used to create the synthetic control.

Outcome Variables

There are three outcomes of interest. The first outcome of interest is annual personal income tax revenue. The U.S. Census Bureau collects state government tax revenue for each quarter and by source. Annual personal income tax revenue is calculated by adding up all four quarters for each calendar year. I normalize the annual personal income tax revenue variable by state to equal 1 if the calendar year is 2012. For example, in 2011, this is done by dividing a state's personal income tax revenues in 2011 by the state's personal income tax revenues in 2012. This adjustment allows for comparisons across time and across states.

The second outcome of interest is annual real gross domestic product per capita. The study utilizes this outcome of interest because it is serves as a macro-level measure of the overall state economy. If Kansas' Tax Reform increases economic activity across all sectors of the state economy, as it was intended and forecasted by its supporters, there should be an increase in real gross domestic product per capita. Data for this variable comes from the Bureau of Economic Analysis which publishes all states' gross domestic product per capita for all combined industries. Similar to personal income tax revenues, this variable is also normalized to equal 1 if the calendar year is 2012.

If Kansas' Tax Reform did not increase economic activity across all sectors of the state economy, a macro-level indicator, like GDP per capita, might not be the best economic outcome to use to identify the economic effect from tax reform. For example, the state of Kansas may have reduced state government expenditures to respond to losing tax revenue following its tax cuts. Therefore, it is important to also use a micro-level indicator to identify possible economic effects from Kansas' tax reform. As mentioned above, it is theoretically ambiguous whether tax cuts changes workers' labor supply decisions because there is both an income and substitution

effect from tax cuts. If the substitution effect dominates, we would expect an increase in the number of work hours per week.

To examine labor supply decisions, the current study's last outcome of interest is usual work hours per week. Data comes from the American Community Survey (ACS) which publishes person-level data on usual work hours per week. ACS data comes from the Integrated Public Use Microdata Series (IPUMS). See Ruggles et al. (2017) for more information about IPUMS. Each person surveyed in the ACS is asked how many hours they usually work each work over the past twelve months. Using ACS sampling weights, I create the weighted average of usual work hours per week for each state in the sample by year between 2005 and 2015. The sample used to create this variable is restricted to include workers that were employed, between the age of 18 and 65 years old, and had a non-zero level of personal income.

Predictor Variables

Creating the synthetic control requires data on various predictors for all states in the sample. Predictors are essentially control variables that would usually be added to a regression model. A SCM is not regression analysis, but like regression analysis, the SCM relies on data to match the treatment unit (e.g. Kansas) with a set of similar control units (e.g. states). The current study utilizes data on a set of predictors for all years between 2005 and 2015 to create the synthetic control. The predictors used in the current study can be divided into three categories: economic factors, demographic factors, and political factors.

The economic predictors include personal income per capita, % of employment in the agriculture sector, % of employment in the construction sector, % of employment in the government sector, % of employment in the manufacturing sector, % of employment in the

mining sector, % of employment in the nonfarm sector, % of employment in the retail trade sector, % of employment in the transportation and warehousing sectors, % of employment in the utilities sector, and % of employment in the wholesale trade sector. Data for these economic predictors come from the Bureau of Economic Analysis. The current study uses the North American Industry Classification System (NAICS) industry codes.

The demographic predictors include state population, % of residents over 17 years old, % of residents over 64 years old, median household income, % of residents in poverty, % of residents under 18 in poverty, % white residents, % black residents, % Asian residents, % Hispanic residents, % of residents with less than a high school degree, and % of residents with a bachelor's degree or higher. Data for these demographic predictors come from the U.S. Census Bureau.

Lastly, the political predictors include an indicator for a divided state government, % of workers in a union, a citizen ideology index measure, and an indicator for a republican governor. All political predictors come from the Institute for Public Policy and Social Research and its Correlates of State Policy Project data.[6] The divided state government indicator equals 1 if the two chambers of the state legislature and the state governorship are not all controlled by the same party and 0 otherwise. The citizen ideology index measures the political preferences of the states' citizens, where a higher value indicates a higher preference for liberal policies.

SYNTHETIC CONTROL METHOD (SCM)

SCM is a data-driven approach used to select a comparison group (i.e. synthetic control) to measure the counterfactual outcome for the treatment unit had it not implemented the policy intervention (Abadie, Diamond, & Hainmueller, 2010; Abadie, Diamond, & Hainmueller, 2015).

In the case of Kansas' Tax Reform of 2012, the SCM uses a matching algorithm, developed in Abadie and Gardeazabal (2003), to select a weight for all other states in the analytical sample (i.e. donor pool) based on how closely those states' pre-treatment values for the predictors and outcome of interest match those in Kansas. Please see Abadie and Gardeazabal (2003) for more information about the algorithm. The Stata command for SCM is syntac.

These weights can range from 0.000 to 1.000 and all weights add up to 1.000. The synthetic control is a weighted average of the states in the donor pool based on their assigned weights. For example, a particular state could receive a weight of 0.200, which implies its outcome value makes up 20% of the synthetic control, while another state could receive a weight of 0.000 which implies it is not included in the synthetic control. The synthetic control's post-treatment values serve as what Kansas' treatment values would be if there was no tax reform. I run a separate SCM for each outcome of interest mentioned above.

There are at least three main advantages of a SCM. First, this methodology allows the data to select the comparison group rather than relying on an arbitrary selection process (e.g. selecting the neighboring states around Kansas). The results section reports the SCM weight given to all states that make up the synthetic control. Second, all results can be reported in a graph that displays the outcome values over time for Kansas and its synthetic control. This allows for a straightforward illustration of the impact of the tax reform on Kansas. Lastly, and most importantly, SCM allows for various robustness checks, including a method to test for statistical inference. These robustness checks and statistical inference tests will be discussed further later.

RESULTS

Main Results

Table 1 reports the weights assigned to each state in the donor pool for each outcome of interest. There are two important findings from Table 1. First, 16 of the 41 possible donor states received a positive weight for at least one of SCM outcomes of interest. Second, in some cases, a particular state receives a positive weight for one SCM analysis (e.g. Personal Income Tax Revenue) but does not receive a positive weight for another SCM analysis. (e.g. GDP per Capita). For example, Nebraska is included in the synthetic control when the outcome of interest is GDP per capita, but not when the outcome of interest is personal income tax revenue. This implies that Kansas and Nebraska might be similar economically, but not as similar in terms of government finances. Given that Nebraska is a border state of Kansas, this finding highlights the advantage of a SCM analysis because it relies on the data-driven approach to select the synthetic control group rather than an arbitrary selection process.

Table 2 reports pre-treatment characteristics for Kansas, the three synthetic controls, and all donor states. There are two important takeaways from Table 2. First, Kansas and its synthetic controls have almost exactly the same value for each predictor, except for a few cases. Kansas relative to its synthetic controls tends to have slightly more workers in the government sector, a smaller population, a higher proportion of Hispanic residents, more years with a divided government, less workers who belong to a union, a lower value for the citizen ideology index, and less years where a republican is the governor. However, in almost all cases, the synthetic control matches better with Kansas than the average of all donor states. This suggests that the SCM approach is selecting a set of states within the donor pool that best match Kansas on pre-treatment characteristics.

Figure 1a reports trends in personal income tax revenue for Kansas and its synthetic control between fiscal years 2005 and 2015. In the years before the implementation of Kansas' Tax Reform, the synthetic control tracks closely with Kansas' personal income tax revenue. In fact, both Kansas and its synthetic control have positive trends in personal income tax revenue right up to Kansas' Tax Reform of 2012. Following fiscal year 2012, the year before implementation of Kansas' tax reform, Kansas' personal income tax revenue drops significantly, while its synthetic control continues on an upward trend. This decline in personal income tax revenue for Kansas continues into fiscal year 2014, until revenue starts to increase between fiscal years 2014 and 2015. However, Kansas' personal income tax revenue in fiscal year 2015 was still below its 2012-level, while the synthetic control's personal income tax revenue is almost 20% above its 2012-level. In fact, Figure 1b shows that there is almost a 50% gap in personal income tax revenue between Kansas and its synthetic control in both fiscal years 2014 and 2015.

Figure 2a reports trends in state GDP per capita for Kansas and its synthetic control between fiscal years 2005 and 2015. Similar to Figure 1a, the synthetic control tracks very closely with Kansas' GDP per capita in the pre-treatment years. However, unlike personal income tax revenue, there is not divergence in post-treatment state GDP per capita between Kansas and its synthetic control. This finding suggests that the Kansas Tax Reform of 2012 did not increase GDP per capita any faster than it would without the tax reform.[7] This finding is slightly different than Rickman and Wong (2018). Rickman and Wong (2018) find a slight decrease in GDP per capita following the inauguration of Kansas Governor Sam Brownback in 2011. One possible reason for this different result across the current study and Rickman and Wong (2018) is the current study sets the treatment year as 2013, the first year of the tax reform, whereas Rickman and Wong (2018) set the treatment year as 2011. Rickman and Wong (2018)

set their treatment year as 2011 because their study focuses more broadly on fiscal austerity policies enacted in Kansas starting in 2011.

GDP per capita is only a macro-level economic outcome. It is also important to examine micro-level economic outcomes, like labor supply decisions. Figure 3a reports the trends in usual work hours per week for Kansas and its synthetic control between fiscal years 2005 and 2015. For all fiscal years, Kansas has a slightly larger value for work hours per week, roughly a 0.5 higher number for usual work hours per week. However, this small gap between Kansas and its synthetic control remains almost constant for all years, including the years following the tax cuts.

This finding suggests that there is no evidence that Kansas' tax reform increase the usual number of work hours for the average worker. One possible reason for this result is that some workers reduce their usual number of work hours per week following tax cuts, while others increased their usual number of work hours per week. The combined effect of these different labor supply decisions led to no aggregate change in work hours per week for Kansas.

The overall main results are robust if I select other micro-level economic outcomes. Appendix Figure A reports results using three other indicators. There is no evidence that Kansas' Tax Reform of 2012 increased number of business establishments, number of employees per business establishment, or average employee salary.

Overall, the main results suggest that Kansas' Tax Reform of 2012 resulted in a significant drop in personal income tax revenue, but did not increase GDP per capita or increase the number of work hours per week. To examin the robustness of the finding on revenues, it is important to test the statistical significant of the decline in personal income tax revenue. While it is impossible for SCM to use traditional methods for statistical inference due to having only one

treatment unit, there are alternative methods to test for statistical significance. Following Abadie, Diamond, & Hainmueller (2015), I run a set of placebo tests to evaluate the significance of the negative effect of the Kansas' Tax Reform on personal income tax revenue. Specifically, I run a separate of SCM where I assign treatment to a state in the donor pool. I do this for all 41 states in the donor pool. This creates a distribution of estimated gaps in personal income tax revenue between states with no intervention and their synthetic control. If many states in the donor pool also have significant gaps in personal income tax revenue, then there would be no evidence of a statistically significant effect from the Kansas Tax Reform on personal income tax revenue.

Figure 4a reports the gaps in personal income tax revenue from the various placebo SCMs. The bold line represents the difference in personal income tax revenue between Kansas and its synthetic control, which is the same line from Figure 1b. The gray colored lines represent the gaps for donor states that were not treated. As shown in Figure 4a, the gap for Kansas is substantially larger than the gaps for the donor states, and there is only one state with a larger gap in personal income tax revenue than Kansas. This suggests that the probability of estimating a gap of the magnitude observed for Kansas under random permutation is 1/41, or 2.4%. Figure 4b reports a similar graph as Figure 4a, except it excludes six placebo states with pre-treatment Root Mean Square Prediction Error (RMSPE) is greater than or equal to three times that of Kansas' RMSPE (Abadie et al., 2015). Based on Figure 4b, the probability of estimating a gap of the magnitude observed in Kansas drops to 0%. Overall, the results from Figure 4a and 4b provide support for the claim that the reduction in personal income tax revenue in Kansas was not only practically significant, but also statistically significant.

Placebo Studies

The current study investigates whether or not the main result is robust by conducting two placebo tests. First, I examine whether or not a particular state in the synthetic control is driving the main results. There are 10 different states that make up the synthetic control in the personal income tax revenue analysis. While only Minnesota and Wisconsin have weights above 0.2, it is still important to determine that the main result holds if I were to eliminate one of the ten states from the donor pool. Following Abadie, Diamond, & Hainmueller (2015), I run a leave-one-out robustness check. Specifically, I estimate a series of baseline SCMs where each time a particular state that makes up the synthetic control is eliminated from the donor pool.

Figure 5 reports the results of the leave-one-out robustness check. The bold line is the trend in personal income tax revenue for Kansas, while the dashed bold line is the trend in its synthetic control when all 10 states are included in the synthetic control. These consistent with those lines from Figure 1a. The gray lines are trends in personal income tax revenue from 10 alternative synthetic controls, where each line comes from a separate SCM where one of the 10 donor states are removed from the synthetic control. As shown in Figure 5, there are no practical differences in the main synthetic control compared to the alternative leave-one-out synthetic controls. This is support that no one particular state in the synthetic control is driving the main result.

The second placebo test examines the timing of the treatment. It would undermine the main finding if there was a significant gap between Kansas and its synthetic control in the years before Kansas' Tax Reform. To check this, I rerun the SCM twice where I reassign the treatment year to a particular year before the tax reform. Figure 6a reports the SCM estimates where the treatment year is set to 2010, and Figure 6b reports the SCM estimates where the treatment year is set to 2008. In neither case, there is no practically significant gap between Kansas and its

synthetic control. This provides further support to the main result that Kansas' Tax Reform resulted in a significant drop in personal income tax revenue.

CONCLUSIONS

This article documents that effects of Kansas' Tax Reform of 2012 on both governmental revenues and state-level economic outcomes. First, the current study finds a significant reduction in the amount of personal income tax revenue collected in Kansas following the implementation of its tax reform policy starting in FY 2013. Using a SCM, I find a roughly 25% gap in personal income tax revenue between Kansas and its synthetic control in the first year (i.e. FY 2013) following the implementation of the tax reform. This gap widens to almost 50% by FY 2014 and FY 2015.

Second, the current study finds no positive impact on macro- and micro-level economic outcomes following the implementation of Kansas' Tax Reform of 2012. I find no increase in state GDP per capita in Kansas relative to its synthetic control in any of the years following FY 2012. Additionally, I find no evidence usual work hours per week changed in Kansas following the tax cuts. One possible reason for this result is that some workers reduce their usual number of work hours per week following tax cuts, while others increased their usual number of work hours per week. The combined effect of these different labor supply decisions led to no aggregate change in work hours per week for Kansas. Alternative micro-level, economic outcomes were considered in this analysis, and I find no evidence that Kansas' Tax Reform of 2012 changed the number of business establishments, number of employees per business establishment, state unemployment rates, or average employee salary.

Other likely mechanisms for why there is no evidence of economic growth following Kansas' tax reform have been already been established in previous studies (e.g. Debacker et al., 2016; Turner & Blagg, 2017). The main mechanism offered by previous studies is tax avoidance. For example, Debacker et al. (2016) use individual-level data on Kansas tax filers and find individuals took advantage of the more favorable tax treatment on pass-through business income by reclassifying their income as pass-through business income to avoid state taxation. The current study finding on usual work hours per week provides another possible mechanism for why tax cuts in Kansas did not spur economic growth. Moreover, given that there is no evidence of a positive economic impact from Kansas' tax reform, it is not surprising that Kansas experienced larger than expected reductions in government revenues.

While the current study can only document short-term effects, Kansas' Tax Reform of 2012 is expected to have negative long-term impacts on Kansas policymakers and citizens. For example, starting in FY 2014, two rating agencies downgraded Kansas' bonds following the budgetary shortfalls caused by reductions in government revenues (Leachman, 2017). This downgrade will increase the future borrowing cost for state government programs like infrastructure and education. Additionally, budgetary shortfalls required the state to make significant cuts to K-12 public education expenditures that will likely have future impacts on citizens. Future research should examine how these reductions in infrastructure and education expenditures affect the long-term economic growth in Kansas.

The current study concludes with two policy lessons. First, future federal and state policymakers should be aware that individual and businesses do not always respond to tax cuts in the way that policymakers intend. For example, Debacker et al. (2016) provides evidence that Kansas' tax reform likely encouraged tax avoidance. The current study finds evidence that, on

average, workers in Kansas did not necessary respond to tax cuts by increasing their usual number of work hours per week. If tax cuts do not spur the intended economic growth, federal and state policymakers should be prepared for larger than expected reductions in government tax revenue.

Second, and building on the first lesson, policymakers at all levels of government would likely benefit from emergency plans for larger than expected reductions in government revenue following a tax cut. Given the fiscal crisis in Kansas following its tax reform, there are major consequences from failing to plan for government shortfalls, especially state governments that must enact a balanced budget. This is one reason why states should consider strategic plans to set aside additional funds in their rainy-day fund. While rainy day funds are often used to fund budgetary shortfalls during recessions, states that plan to enact future tax cuts should consider adding additional revenues in their rainy-day fund, especially during economic expansion years, to use as an emergency if their tax reform policies cause larger than expected budgetary shortfalls.

NOTES

1. There were also many other minor changes to the tax code. See Pathak et al. (2016) for a more thorough summary of Kansas' Tax Reform of 2012.

2. See DeBacker et al. (2016) and Turner & Blagg (2017) for more information on pass-through businesses.

3. As shown in Appendix Figure A, there is also no evidence that Kansas' Tax Reform of 2012 increased number of business establishments, number of employees per business establishment, or average employee salary.

4. Alaska, Florida, Nevada, South Dakota, Texas, Washington, and Wyoming are all states that do not levy a state-level tax on personal income.

5. The main results are robust to including North Carolina in the donor pool to create the synthetic control.

6. For more information about the Correlates of State Policy Project and its data, please see http://ippsr.msu.edu/public-policy/correlates-state-policy.

7. This main result is robust if I use state unemployment rates instead of real GDP per capita. See Appendix Figure A.1 for the results using state unemployment rates as the outcome of interest.

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Table 1. Weights Assigned to States by SCM Analysis

State Name	Personal Income Tax Revenue	GDP per Capita	Work Hours
Colorado	0	0.094	0.169
Connecticut	0	0.019	0
Georgia	0	0	0
Illinois	0.002	0	0
Iowa	0.086	0.138	0.117
Minnesota	0.212	0.262	0.187
Mississippi	0	0.028	0
Nebraska	0	0.206	0.135
New Jersey	0.001	0	0
New Mexico	0.051	0.036	0
North Dakota	0.122	0.027	0.049
Oklahoma	0.187	0.128	0.183
South Carolina	0	0	0.044
Utah	0.065	0.061	0.113
Virginia	0.038	0	0.002
Wisconsin	0.236	0	0
Total	1.000	1.000	1.000

Notes: SCM stands for synthetic control method. All states in the analytical sample that are not included in Table 1 received a 0.000 for all three outcomes of interest. Work hours is short for usual number of work hours per week.

Table 2. Predictor Means by Group

Variable	Kansas	Synthetic (Revenue)	Synthetic (GDP)	Synthetic (Hours)	All Donor States
GDP per Capita (2012=1)	1.0	1.0	.	1.0	1.0
Income per Capita ($)	38,228.0	37,776.0	.	37,698.7	38,305.7
% employed in agriculture	0.5	0.5	0.5	0.5	0.5
% employed in construction	5.1	5.6	5.7	5.9	6.0
% employed in government	16.3	14.5	14.2	14.4	14.4
% employed in manufacturing	9.9	9.2	8.3	8.0	8.0
% employed in mining	1.5	1.3	1.0	1.5	0.7
% employed in retail	10.2	10.7	10.2	10.6	10.8
% employed in transportation	3.1	3.1	3.1	3.3	3.2
% employed in utilities	0.4	0.4	0.3	0.4	0.4
% employed in wholesale	3.6	3.6	3.5	3.5	3.4
% employed in non-farm sector	96.4	96.7	96.7	96.8	98.0
Population (in thousands)	2,808.7	4,074.7	3,490.7	3,618.8	5,786.0
Unemployment Rate (%)	5.5	5.3	5.1	5.2	6.3
% over 18 years old	74.9	75.7	75.0	74.8	76.0
% 65 years or older	13.0	13.0	12.7	12.5	13.1
Median Household Income ($)	47,169.4	48,821.3	49,408.9	49,298.7	49,335.9
Poverty Rate (%)	12.4	12.5	12.4	12.5	13.7
Poverty Rate, < 18 years (%)	16.3	16.6	16.3	16.4	18.6
% White	79.8	79.9	79.5	79.2	73.4
% Hispanic	9.3	7.5	8.9	8.9	8.9
% Black	5.5	4.9	5.0	5.1	10.5
% Asian	2.2	2.2	2.2	2.1	3.5
% with less than HS Degree	10.7	11.3	10.9	11.0	13.6
% with a BA Degree or more	29.2	26.8	28.1	28.3	27.2
Divided Government Indicator	0.8	0.6	0.5	0.5	0.5
% of workers in union	7.1	10.7	10.2	9.0	11.4
Citizen Ideology Index	38.9	48.4	45.1	42.5	55.4
Republican Governor Indicator	0.2	0.4	0.6	0.5	0.5

Notes: All means are based on pre-treatment values (i.e. before the 2012 fiscal year). For the GDP per capita analysis, I drop the GDP per capita and income per capita from the set of predictors used in the SCM. Hours is short for the usual number of work hours per week.

Figure 1 – Trends in Personal Income Tax Revenue: Kansas versus Synthetic Kansas

Figure 1.A.

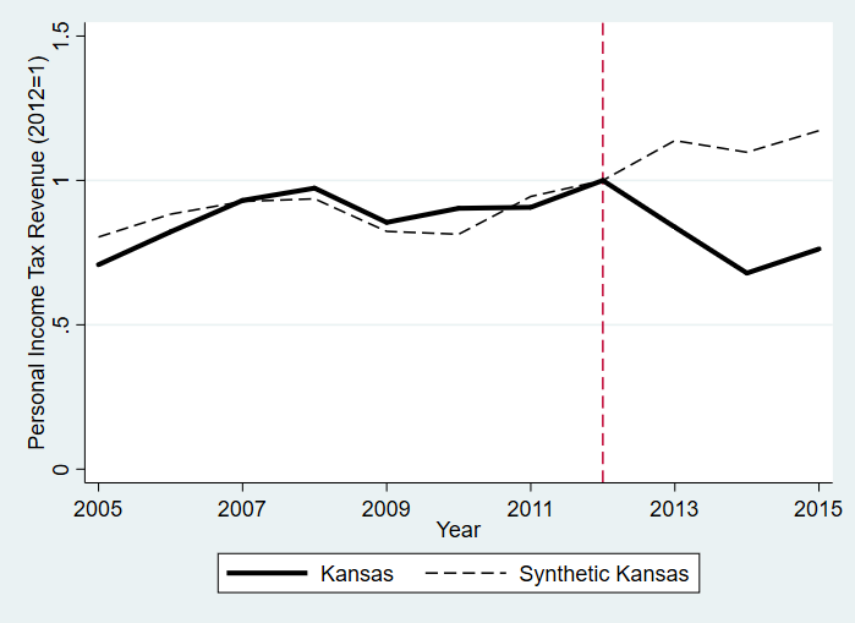


Figure 1.B.

Notes: The synthetic control is the weighted average of Illinois (0.002), Iowa (0.086), Minnesota (0.212), New Jersey (0.001), New Mexico (0.051), North Dakota (0.122), Oklahoma (0.187), Utah (0.065), Virginia (0.038), and Wisconsin (0.236). The Y axis in Figure 1.A. measures the real and synthetic Kansas distance from the 2012 state-specific value for personal income tax revenue. The Y axis in Figure 1.B. measures the gap between Kansas and its synthetic control.

Figure 2 – Trends in GDP per Capita: Kansas versus Synthetic Kansas

Figure 2.A.

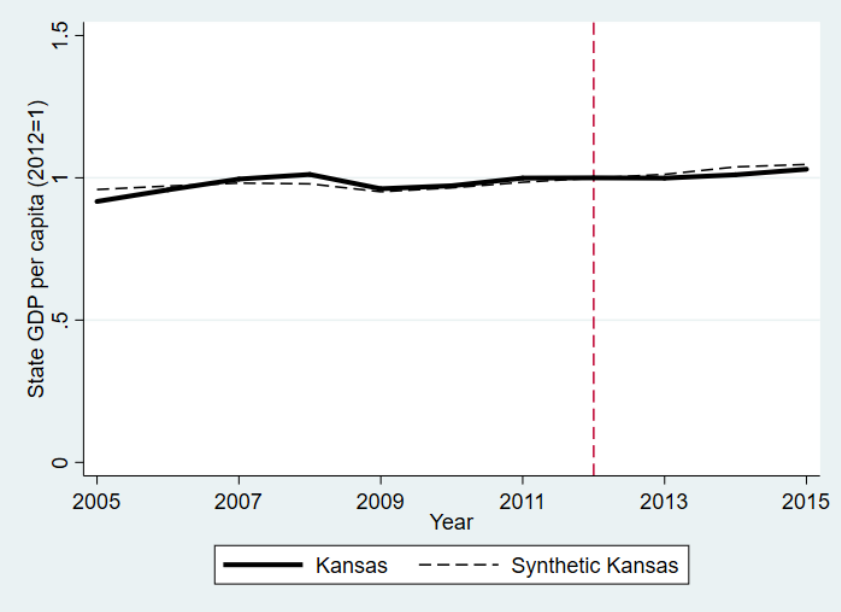
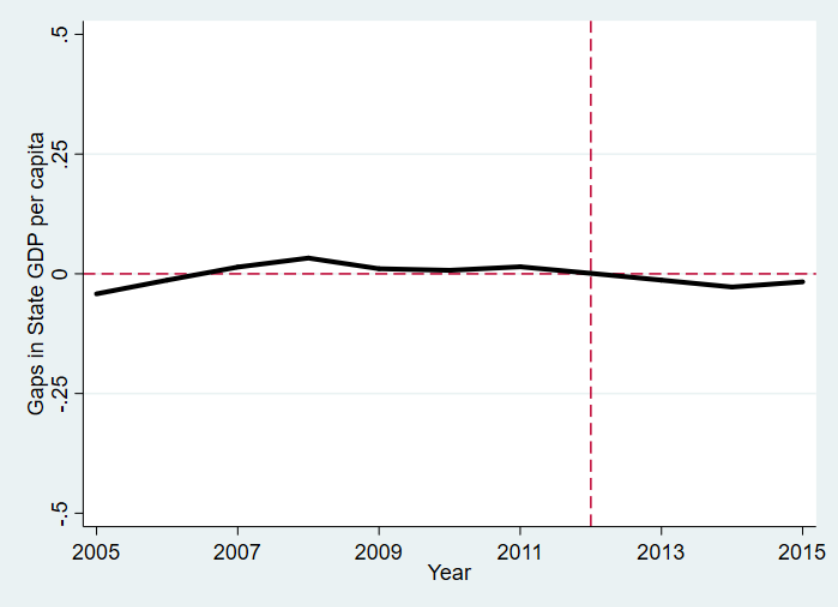


Figure 2.B.



Notes: The synthetic control is the weighted average of Colorado (0.094), Connecticut (0.019), Iowa (0.138), Minnesota (0.262), Mississippi (0.028), Nebraska (0.206), New Mexico (0.036), North Dakota (0.027), Oklahoma (0.128), and Utah (0.061). The Y axis in Figure 2.A. measures the real and synthetic Kansas distance from the 2012 state-specific value for GDP per capita. The Y axis in Figure 2.B. measures the gap between Kansas and its synthetic control.

Figure 3 – Trends in Number of Usual Work Hours per Week: Kansas versus Synthetic Kansas

Figure 3.A.

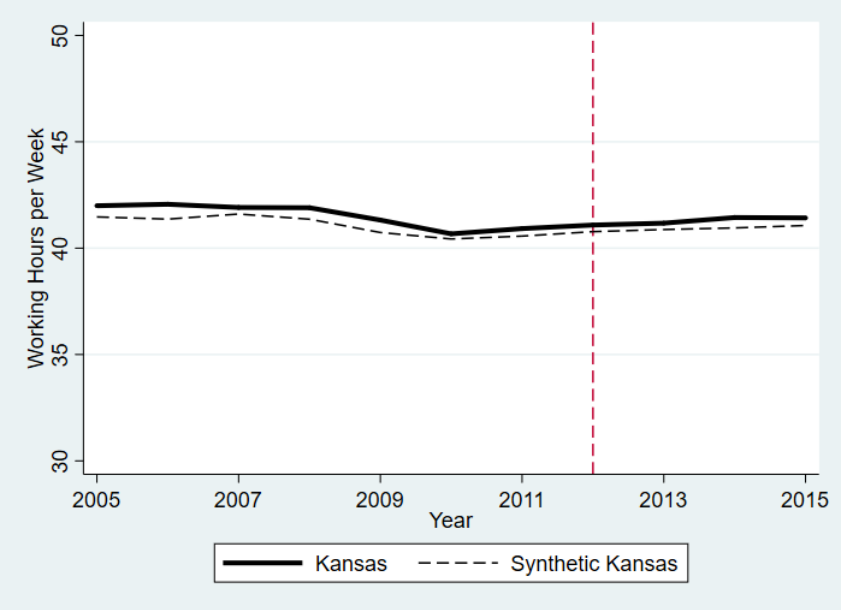
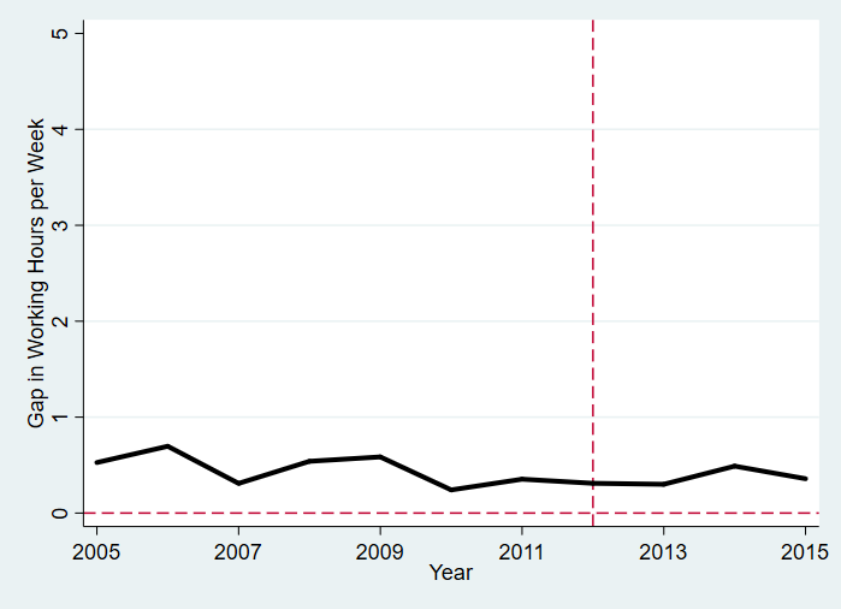


Figure 3.B.



Notes: The synthetic control is the weighted average of Colorado (0.169), Iowa (0.117), Minnesota (0.187), Nebraska (0.135), North Dakota (0.049), Oklahoma (0.183), South Carolina (0.044), Utah (0.113), and Virginia (0.002). The Y axis in Figure 3.A. measures the real and synthetic Kansas average number of usual work hours per week. The Y axis in Figure 3.B. measures the gap between Kansas and its synthetic control.

Figure 4 – Placebo Treatments in Untreated States

Figure 4.A.

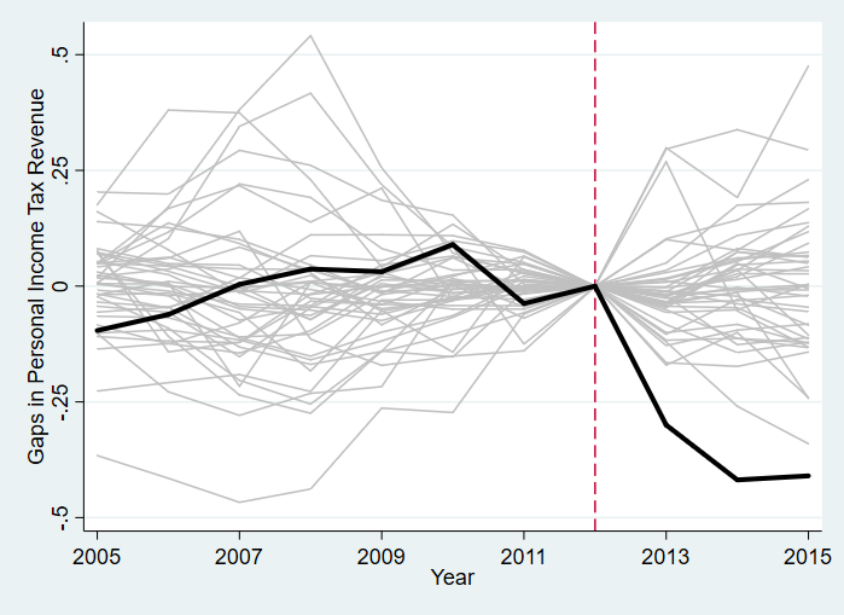


Figure 4.B.

Notes: The bold line represents the difference in personal income tax revenue between Kansas and its synthetic control. This is the same line plotted in Figure 1.B. and, in 2013, represents the impact of the tax reform on personal income tax revenue in Kansas. Synthetic controls were estimated for every other state in the analytical sample. Gray lines plot the difference between each placebo "treated state" and that state's synthetic control. Plots for all placebo state are shown in Figure 4.A. Figure 4.B. excludes six placebo states with pre-treatment Root Mean Square Prediction Error (RMSPE) ≥ three times that of Kansas' RMSPE (Abadie et al., 2015)

Figure 5 – Leave-one-out estimates of the synthetic control for Kansas

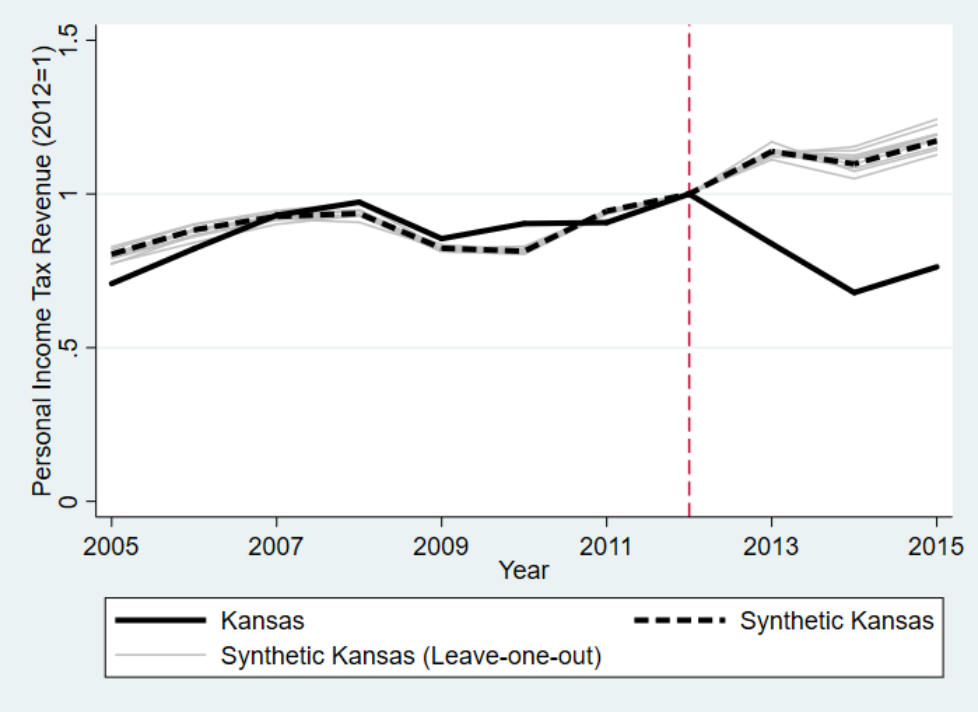


Figure 6 – Placebo Treatments in 2008 and 2010

Figure 6.A.: Treatment Year = 2010

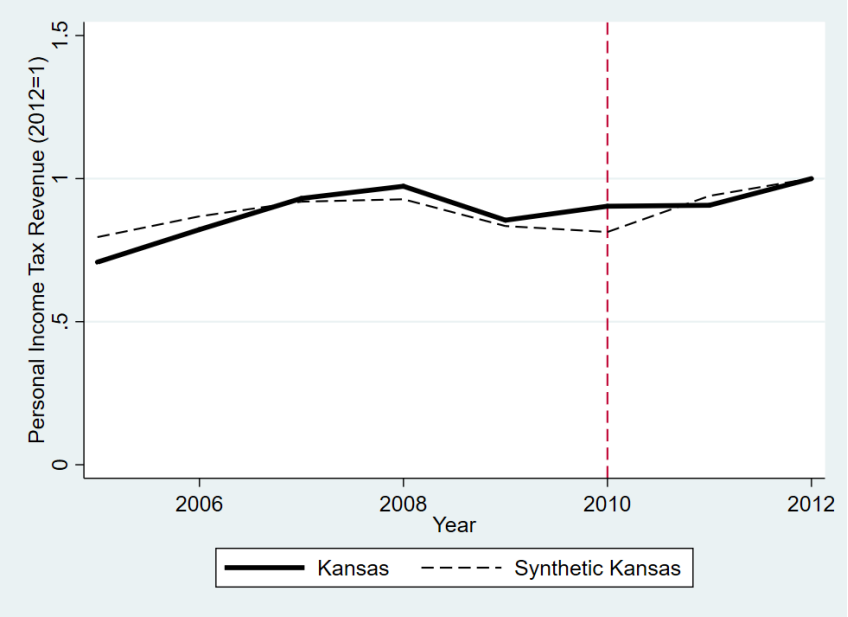
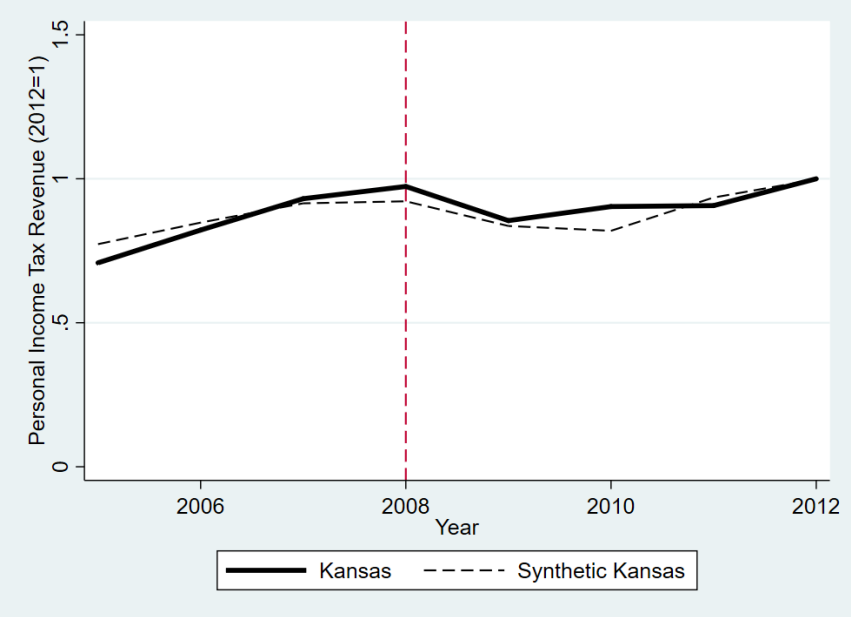
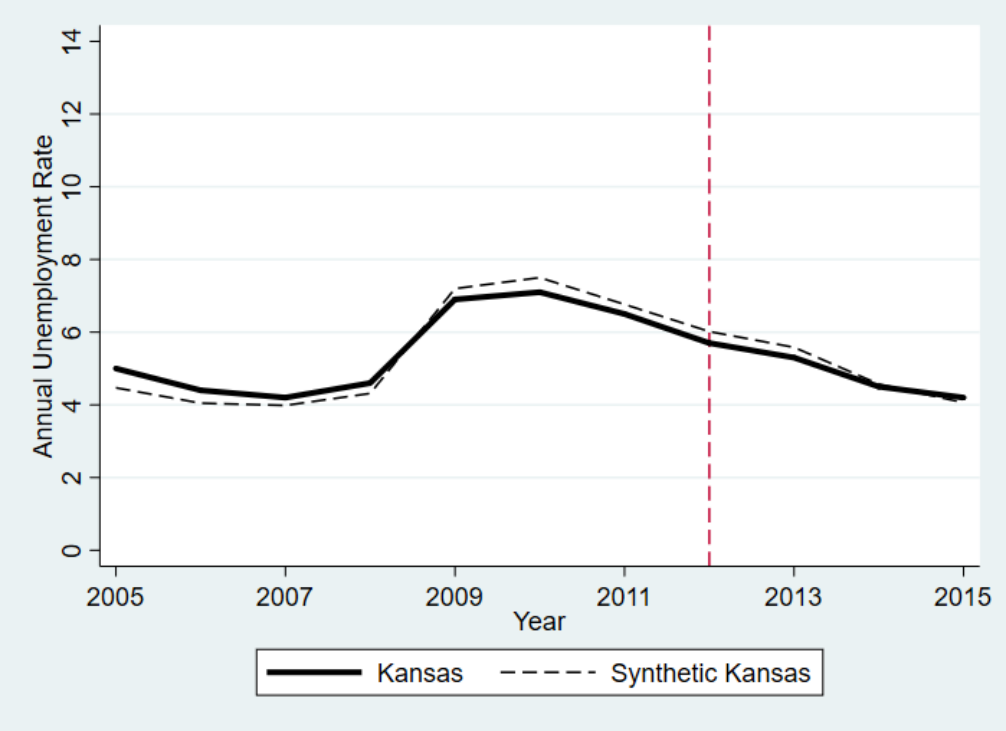


Figure 6.B.: Treatment Year = 2008



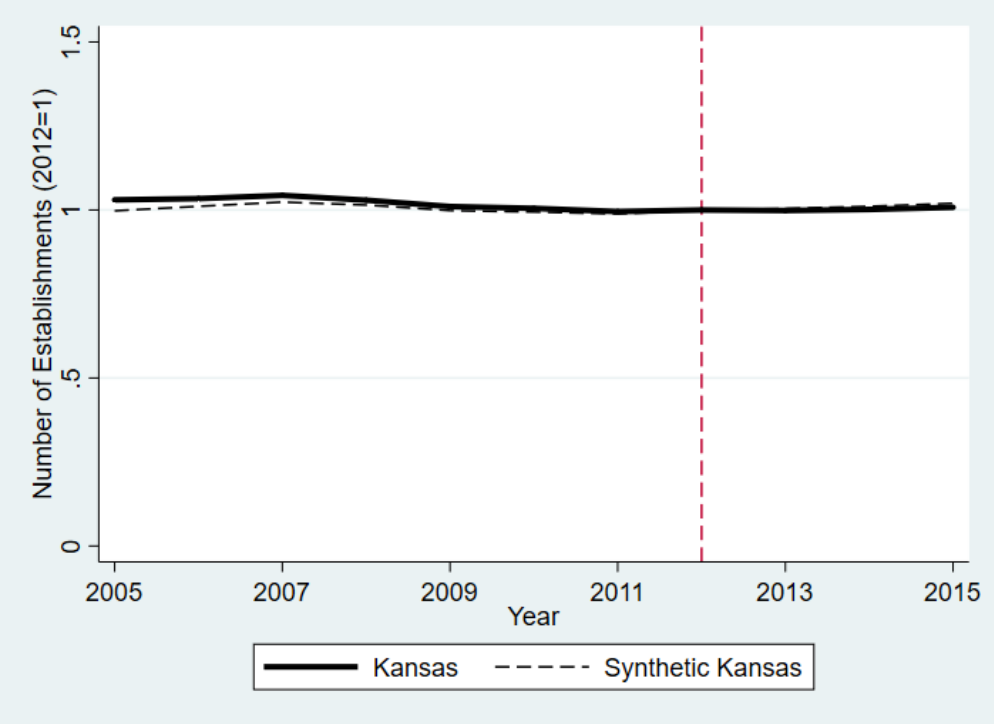
Notes: The synthetic control was re-estimated twice. In each case, data during or after the actual treatment year (2013) was excluded and the models instead assumed placebo treatments in 2008 and 2010, respectively. In Figure 6.A., 2010 through 2012 are all treatment years. In Figure 6.B., 2008 through 2012 are treatment years.

Appendix Figure A.1 – Trends in Unemployment Rates: Kansas versus Synthetic Kansas



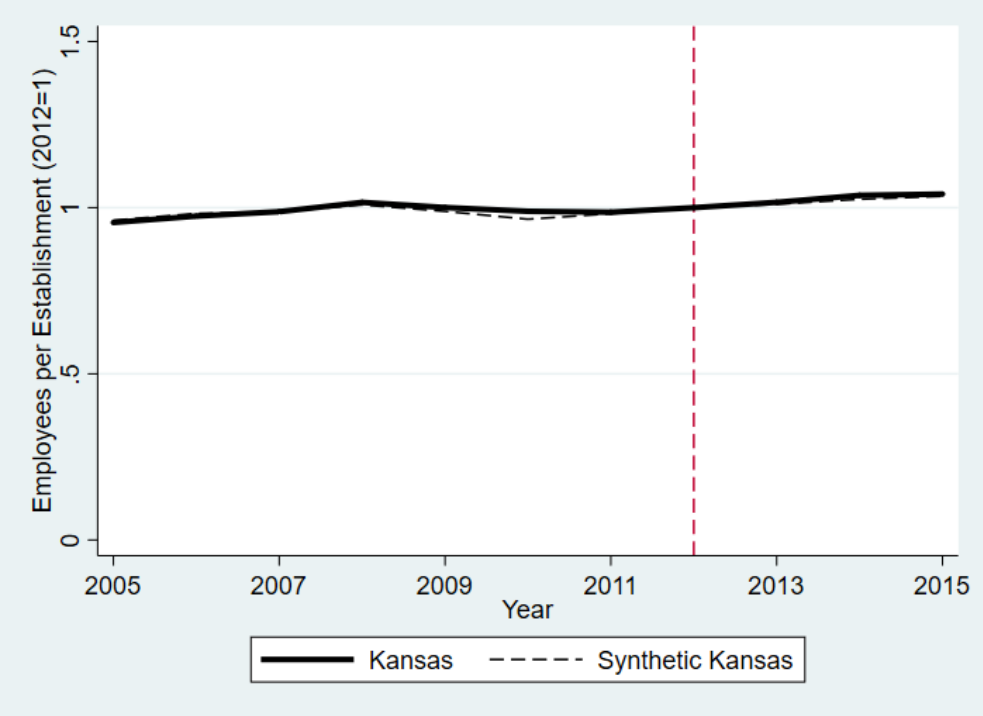
Notes: The synthetic control is the weighted average of Colorado (0.154), Georgia (0.002), Iowa (0.086), Minnesota (0.041), North Dakota (0.100), Oklahoma (0.182), South Carolina (0.011), Utah (0.131), and Wisconsin (0.294). The Y axis in Figure 3.A. measures the real and synthetic Kansas annual unemployment rates. The Y axis in Figure 3.B. measures the gap between Kansas and its synthetic control.

Appendix Figure A.2 – Trends in Number of Business Establishments: Kansas versus Synthetic Kansas



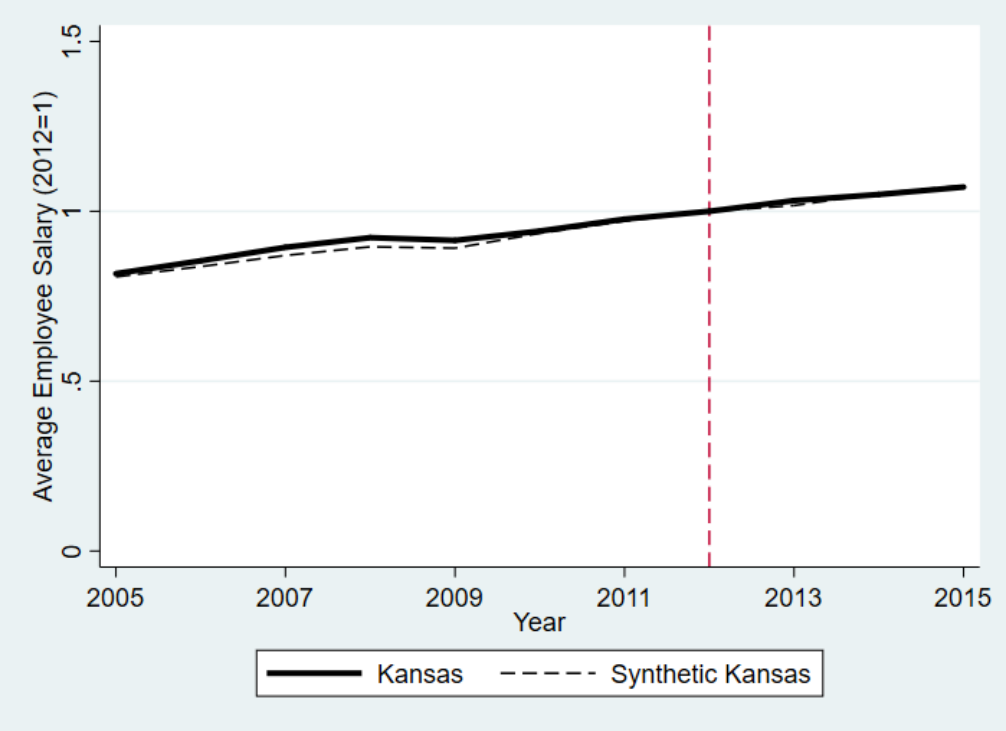
Notes: The synthetic control is the weighted average of Iowa (0.313), Minnesota (0.211), North Dakota (0.009), Oklahoma (0.267), Utah (0.081), and Virginia (0.118). The Y axis measures the real and synthetic Kansas distance from the 2012 state-specific value for number of business establishments across all industries.

Appendix Figure A.3 – Trends in Number of Employees per Business Establishment: Kansas versus Synthetic Kansas



Notes: The synthetic control is the weighted average of Colorado (0.212), Iowa (0.382), Minnesota (0.076), Oklahoma (0.220), Utah (0.075), and Virginia (0.035). The Y axis measures the real and synthetic Kansas distance from the 2012 state-specific value for number of employees per business establishment across all industries.

Appendix Figure A.4 – Trends in Average Employee Salary: Kansas versus Synthetic Kansas



Notes: The synthetic control is the weighted average of Colorado (0.192), Iowa (0.225), Minnesota (0.164), Mississippi (0.011), North Dakota (0.034), Oklahoma (0.180), Utah (0.038), Virginia (0.068), and Wisconsin (0.088). The Y axis measures the real and synthetic Kansas distance from the 2012 state-specific value for average employee salary across all industries.