Estimating the Economic Effects of US State and Local Fiscal Policy: A Synthetic Control Method Matched Regression Approach

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Abstract

In this paper, we attempt to address the limitations of previous research to provide further guidance on US state and local fiscal policymaking. We implement the synthetic control method to create pairwise matches for states in subsequent regression analysis. Several economic indicators and principal component analysis are used to construct broader narratives of state economic performance and we provide updated evidence. We compare the results with those obtained from using neighbors as matches and from standard unmatched growth regressions. The matched regressions produce more statistically significant relationships between state and local fiscal variables and economic outcomes than do the standard growth regressions. Although the findings provide additional guidance for state and local fiscal policymakers, a lack of robustness across alternative economic indicators and heterogeneity of results confirm the elusiveness of recommendations on specific policies that are applicable in all circumstances.

Keywords: State and local fiscal policy; Economic growth; Synthetic control method

JEL codes: H71; H72; R12; R38

1. Introduction

Initial state and local budget shortfalls caused by the COVID-19 pandemic (Siripurapu and Masters, 2021) brought state and local finances back to the forefront of public attention. As many as one-third of the states had been estimated to have had insufficient reserves to weather a moderate fiscal shock at the beginning of the pandemic (Leachman and Sullivan, 2020), suggesting that the state and local response would be pro-cyclical without additional federal aid. Despite the initial budget shortfalls brought about by the pandemic, many states have returned to their playbooks of proposing cutting taxes (Institute on Taxation and Economic Policy, 2022). Jonas (2012) documents the pro-cyclical state and local government policy responses that had occurred with the Great Recession of 2007-09. Numerous states enacted significant personal and corporate income tax cuts after the Great Recession (Rickman and Wang, 2018) and inflation-adjusted K-12 education spending per student remained below pre-recession levels in twenty-two states a decade later (Leachman, 2019).

The question of whether and how US state and local taxes and expenditures affect economic activity continues to vex both academic economists and policymakers. Early surveys of the literature revealed a lack of consensus among academic economists (e.g., Bartik, 1991; Wasylenko, 1997). Insufficient evidence existed to guide policymakers (McGuire, 1992), and improvements in methodology were needed to better identify the economic effects of state and local taxes and expenditures (Poot, 2000). In their recent survey, Rickman and Wang (2020) note the improvements in methodology in the literature and argue that more has been learned on the issue since the early surveys. The study concludes though that the evidence remains far from sufficient to provide recommendations on specific policies that are applicable in all circumstances. Estimated fiscal policy relationships were reported to be sensitive to sample period, geography, model specification, and specific fiscal variable examined.

An extensive number of studies of the US use all states to analyze the economic effects of the full panoply of state and local budgetary tools (see Rickman and Wang, 2020, Table 1). The use of all states though involves comparisons of those with highly differing characteristics in pooled samples which can create interpolation bias (Abadie et al., 2010; 2015). Exceptions include Conway and Rork (2006), Goff et al. (2012), and Conroy et al. (2016), which compare states to their neighbors. Neighbors are thought to possess similar underlying processes and matching on them can control for differences that are difficult to measure and often confound attempts to link state and local fiscal policy to economic outcomes. Matching controls for state differences upfront rather than partitioning the sample at the back end in regression analysis (Goff et al., 2012).

Numerous tax studies use more sophisticated matching approaches to assess single, binary fiscal policy changes. Rickman and Wang (2018, 2020) use SCM to examine whether several states (California, Kansas, Maine, Minnesota, Ohio, and Wisconsin) that made the largest changes in individual income taxes post-2010 experienced increased improved economic outcomes. Komarek (2020) uses SCM to examine the impact of the post-2010 fiscal experiments of Kansas and Wisconsin on their large urban labor markets. The synthetic control matching results of Komarek (2020) and Rickman and Wang (2018, 2020) suggest that neighbors may not be the best matches for comparison. Other SCM studies of binary fiscal policies include those analyzing the elimination of the tangible personal property tax in Ohio (Mughan and Propheter, 2017) and the temporary increase of the flat individual income tax in Illinois (Spreen, 2018). Lusch and Stekelberg (2020) use SCM to assess whether enactment of corporate tax haven legislation increases corporate income tax revenues in several states (Connecticut, Montana, Oregon, Rhode Island, and West Virginia) and the District of Columbia in exploring potential heterogeneity of outcomes following a finding of no effect using a two-way fixed effects regression of all areas.

Although the traditional uses of SCM provide an effective means of identifying causality for a single policy change, there are instances where numerous regional tax and expenditure rates and their changes are of interest such as in regression analysis. The SCM case studies also do not control for differences in post-treatment differences in budgetary responses to the policy change. Rickman and Wang (2020) note the heterogeneity in the changes in other parts of state and local budgets in response to the changes in individual income taxes and their potential links to economic outcomes.

Therefore, the purpose of this study is to further advance the methodology for identifying the connection of state and local taxes and expenditures with economic activity. In a novel approach, we use more sophisticated matching than the use of neighbors to examine differences in state tax and expenditure rates in regression analysis. Specifically, we analyze the 48 contiguous US states over a substantial period that includes more recent years, consider a large array of state and local tax and expenditure categories, and use the synthetic control method (SCM) to create a matched comparison for each state. By matching movements of the outcome variable through long periods, SCM controls for both unobservable and observable factors that can cause policy endogeneity (Abadie et al., 2015). Zou (2018) implements a similar strategy in using SCM to create US county matches to estimate the regional economic impacts of reductions in the numbers of military personnel in subsequent regression analysis. We further enhance identification in the regression analysis by controlling for post-treatment national industry-based shocks and examining a variety of economic indicators in an attempt to derive robust conclusions and construct a narrative of the ways state and local taxes and expenditures affect economic outcomes.

The next section discusses the issues involved in empirically identifying the economic effects of state and local fiscal policy. The section provides the motivation and underpinning for the empirical approach presented in Section 3. Implementation of the empirical approach then is described in Section 4. The results from the implementation of the empirical approach are presented and discussed in Section 5. The results demonstrate the importance of using matched comparisons to estimate the economic effects of state and local fiscal policies, particularly matches that are demonstrated to have similar socioeconomic characteristics and to have pre-treatment tracking of the outcome variable paths. The SCM results reveal more significant fiscal policy effects on growth in economic aggregates such as employment, income, and gross domestic product than on rates of poverty and unemployment. The type of state and local tax appears to matter more than the category of expenditures, in which the property tax is the most likely tax to negatively affect state economic performance. Consistent with SCM case studies there is an absence of evidence that reducing individual income taxes benefits state economies relative to other taxes and expenditures (Rickman and Wang, 2018; 2020). Heterogeneity of the results and the lack of a consistent broad narrative on the role of state and local fiscal policy across economic indicators limit the policy lessons that can be drawn from the exercise.

2. Identifying State and Local Tax and Expenditure Impacts

Although the influence of state and local fiscal policies on economic outcomes has been extensively studied for several decades (McBride, 2012, Mazerov, 2013, Rickman and Wang, 2020), a consensus has not emerged from the academic literature. Improvements in empirical methodology have been made in the recent literature and more has been learned. But many challenges remain in estimating the economic impacts of state and local taxes and expenditures.

For one, there is an absence of agreement on what taxes and expenditures to examine. Theoretically, within a general equilibrium framework, all types of state and local taxes and expenditures can affect state and local economies (Partridge and Rickman, 1998). If expenditures have positive economic impacts (Fisher, 1997), empirical studies in which they are omitted are less likely to find a negative impact of taxes (Goss, 1995). Solely using a measure of the overall tax burden assesses the net effects of taxes and the expenditures they are used to finance (Brewer et al., 2021), but not whether certain types of taxes or expenditures affect the economy. Many empirical studies include multiple categories of both taxes and expenditures, but there is no uniformity in the categories omitted (to avoid severe multicollinearity), in which the estimated coefficients are interpreted relative to the omitted categories, making the comparison of estimated coefficients across studies difficult (Rickman and Wang, 2020).

The lack of consensus on the economic indicators to examine presents another challenge. Despite the focus on per capita income in the literature, interpretation of the effects of state and local tax and expenditures on per capita income is perhaps the most problematic theoretically and might be the reason fewer significant effects are found for per capita income (Rickman and

Wang, 2020). From a spatial equilibrium perspective, positive regional wage and income effects could either reflect a positive labor demand effect through firm expansion or relocation or a negative labor supply effect through out-migration of households (Yu and Rickman, 2013). Reed (2021) notes that endogeneity can occur with the use of per capita income because personal income is used both in the denominator of the tax burden variable and as the dependent variable. An alternative that we pursue below is to examine several indicators and synthesize several economic indicators using principal components to derive broader narratives such as labor demand/supply interpretations of the state and local tax and expenditure effects (Wang and Rickman, 2018).

A particularly vexing challenge is potential endogeneity between economic outcomes and state and local tax and expenditures. Most recent empirical analyses of the economic impacts of state and local taxes and expenditures attempt to address potential endogeneity (Rickman and Wang, 2020, Table 2). The most common and perhaps simplest method is to use time-series lags of the tax and expenditures variables. Some studies use instrumental variables, though the instruments typically are time-series lags of variables.[1] Lagged relationships though likely simply reflect co-movement of fiscal and outcome variables over time and are not truly causal (Rickman, 2010). Estimation bias also can occur from omitted factors that are correlated with both the fiscal variables and economic outcomes.

To overcome endogeneity and identify treatment effects of fiscal policy, we use a matching approach combined with regression analysis. Pooling all US states into a common sample may create estimation bias because of interpolation across states with very different characteristics that are difficult to fully control for (Abadie et al., 2010), and does not address potential policy endogeneity. Matching on the other hand controls for non-fiscal differences across states on the front end that may be difficult or impossible to control for in regressions

[1] Examples of studies using instruments other than time-series lags include Brown et al. (2003), Agostini and Tulayasathien (2007), Hammond and Thompson (2008), and Yu and Rickman (2013).

(Goff et al., 2012). The regression model then controls for other factors on the back end not accounted for by matching.

Rather than only use neighbors as matches (Conway and Rork, 2006; Goff et al., 2012, Conroy et al., 2016), we also use the synthetic control to create pairwise matches for states.[2] In their use of the synthetic control method (SCM) for binary fiscal policies in case studies, Rickman and Wang (2018, 2020) find that neighbors do not necessarily make the best matches for comparison. Neighbors may not be sufficiently similar and outcome variables may violate the parallel trends assumption required for difference-in-differences analysis. Comparisons to neighbor states also may understate policy effects because the neighbors may be similarly influenced by the policies, leading to an understatement of the economic effects of taxes and expenditures.

SCM attempts to overcome interpolation bias by matching on characteristics of the geographic units in constructing the counterfactual comparison (Abadie and Gardeazabal, 2003). SCM also fits pre-treatment trends in outcome variables between an area treated by a tax and/or expenditure change and its constructed counterfactual. Pre-treatment fitting of outcome variables removes differences in movement in outcome variables that could otherwise be associated with subsequent fiscal policy changes, akin to establishing the absence of time-series reverse causality using leads and lags of variables such as in Peltzman (2016). Trend fitting by SCM also accounts for endogeneity from potential unobservable location-specific time trends that avoid imposing functional form assumptions (Zou, 2018).

Despite addressing many of the identification challenges, weaknesses remain in the SCM case study approach. The sole use of SCM in case studies on binary tax variables for particular areas cannot assess the full range of budgetary economic impacts. For example, Rickman and Wang (2020) found that among the states that enacted the largest cuts in state income taxes, the

[2] Goff et al. (2012) also produce alternative matching results by restricting matches to neighbors with similar land area and population size. The study reports larger tax effects on economic growth relative to unmatched pooled regression estimates. Conway and Rork (2006) reports there is not much effect on the results from matching on neighbors.

adjustments to other taxes and expenditures greatly varied across the states and may underlie the heterogeneity of findings across the case studies. Although the industry composition of a state can be used as one of the economic characteristic variables in SCM, there still can be industry-based shocks post-treatment that can confound estimation of treatment effects.

Therefore, we combine the SCM matching on the front end with regressions that include additional fiscal and control variables on the back end. Our regression model then accounts for policy variables and economic shocks not accounted for by the matching. This is a different use of SCM than the typical analysis of a single policy variable, though as Abadie (2021) acknowledges, innovations and new uses of SCM should be expected.

3. Empirical Approach

We first specify a base regression as a reduced-form relationship between state economic outcomes (Y) and fiscal variables (X), while including control variables (Z). To provide generalizable results across geography and state and local fiscal policy actions, we use data for the lower 48 contiguous and examine the wide range of state and local taxes and expenditures that have been considered in the literature. We pool three five-year growth periods of 2002-2007, 2007-2012, and 2012-2017. Five-year growth periods are common in the literature for assessing the association between state and local taxes and expenditures and economic outcomes (Rickman and Wang, 2020, Table 1) because they are less likely to suffer from measurement error and serial correlation than annual data. Using changes in the tax and expenditure variables follows the practice of studying the effects of policy changes with SCM and provides the short-run economic responses to changes in fiscal policy, though we add the 2002 levels of taxes and expenditures and the Fraser Index of Economic Freedom in sensitivity analysis below to address potential long-run policy effects.

In separate regressions, we examine five-year percent growth rates of employment, real gross state product, per capita income, and population as the dependent variables (Y).[3] We also

[3] We do not adjust income for prices because state implicit price deflators are only available from 2008 and use of the US consumer price index would not affect variable coefficients in a cross-sectional growth regression.

examine the changes in percent rates of poverty and unemployment to address equity in addition to efficiency (Mireless, 1971). Control variables (Z) include regional growth and labor market influences emanating from natural amenities, demographic composition, industry composition, and urbanization. We include time-fixed effects, though not state-fixed effects because of having only three five-year growth periods.

3.1 Geographic Comparisons

In the base regression, we pool the three five-year growth periods for the lower 48 states using ordinary least squares regressions and controlling for national effects. In a second approach, we re-compute all outcome and explanatory variables for each state as relative to their neighboring states using population weights. We redefine the variables as the simple difference between the state's (*i*) variable and the weighted mean of those of its neighbors (*j*) as defined by contiguity. The outcome variables (Y) are calculated as $Y_i' = Y_i - \Sigma_j w_{ij} Y_j$, while the explanatory variables (X) become $X_i' = X_i - \Sigma_j w_{ij} X_j$, and the control variables (Z) become $Z_i' = Z_i - \Sigma_j w_{ij} Z_j$, for all *j* not equal to *i* and where w_{ij} is the population weight of the neighbor.

Instead of using neighboring states to construct matches, in a third approach, the synthetic control method (SCM) is implemented to construct matches (Abadie and Gardeazabal, 2003; Abadie et al., 2010). SCM produces w_{ij} that sum to one in constructing a synthetic control unit. The SCM-based w_{ij} are then used in place of the neighbors-based population weights in redefining the regression variables as shown above. The differences between the actual outcomes for each state and the corresponding synthetic control for all the variables become an observation in the pooled sample for each five-year growth period.

3.2 State and Local Tax and Expenditure Measures

Interpretation of the economic effects of state and local taxes and expenditures is made difficult by the potential heterogeneity of impacts by the source of expenditure or tax. Different types of expenditures are unlikely to have equal economic effects (Fisher, 1997). The level of aggregation and the choice of taxes and expenditures to include in the analysis then can affect the estimated economic impacts of a tax or expenditure. So, in addition to including total own-source revenues, we include a wide range of detailed categories of expenditures and taxes to provide information on the likely economic effects of the range of categories commonly found in the literature. All taxes and expenditures are expressed as a share of state personal income.

3.3 Principal Components Analysis

Rather than focus on a single economic indicator, we follow Wang and Rickman (2018) and use principal component analysis of several outcome indicators to derive a narrative of state growth experiences such as whether it derives more from demand versus supply. Along with the individual outcome variables, we then use the principal components with the most explanatory power of the variables in separate regressions. The patterns of correlations of the outcome variables with the principal components are the basis for the interpretation of the channel of economic influence of the fiscal variables. We also apply principal components to the control variables to reduce their dimensionality.

3.4 Industry and Spatial Spillovers

Only some of the studies control for the industry structure of a region and they almost always simply use aggregate employment or output shares such as for agricultural or manufacturing (Rickman and Wang, 2020, Table 2). We use the industry mix component from the shift-share model (Loveridge and Selting, 1998), calculated with detailed employment data. Peltzman (2016) uses an employment-based industry mix variable in the analysis of US counties, but it was calculated with aggregate industry data. Rickman and Wang (2018; 2020) use an industry mix component based on highly-disaggregated industry data as a predictor variable in SCM analysis but post-treatment industry spillovers were not accounted for as is typical in analyses of single binary fiscal policy variables. We use industry mix variables both in the matching process and in the subsequent regression analysis of the five-year periods. We also use the industrial mix component of a state's neighbors to proxy for spatial spillovers. To the extent that neighbors are part of the state's synthetic control we implicitly control for neighboring fiscal policies.

4. Empirical Implementation

4.1 Measures of Variables Used in the Analysis

4.1.1 Outcome Measures

The outcome measures are total nonfarm wage and salary employment, per capita income, population, and real per capita gross state product at the state level, all from the US Bureau of Economic Analysis (BEA). Other state outcome variables are the unemployment rate from the US Bureau of Labor Statistics and the poverty rate from the US Bureau of the Census.[4]

4.1.2 Fiscal Policy Measures

The fiscal measures are categories of state and local taxes and expenditures as shares of state personal income from the US Census Bureau Annual Surveys of Government Finances as reported by the Urban Institute.[5] Revenue measures include personal income shares of total own revenues, property taxes, total sales and gross receipts taxes, individual income taxes, corporate income taxes, property taxes, and federal government intergovernmental revenues. Expenditure measures include personal income shares of the sum of police, fire, and corrections facilities expenditures, elementary and secondary education expenditures, higher education expenditures, healthcare and hospital expenditures, highway expenditures, the sum of natural resource expenditures and parks and recreation expenditures, public welfare expenditures, and the sum of sanitation and sewerage expenditures.

4.1.3 Control/Predictor Variable Measures

Included as potential control variables in the regression analysis and predictor variables in synthetic control analysis are thirty-two measures. All variables are measured for years prior to the five-year growth periods used in the regressions. As post-treatment controls in the regressions, we also include employment-based industry mix variables for both the state and its

[4] https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-people.html
[5] State expenditures and taxes are from the Annual Survey of Government Finances: Urban Institute-http://slfdqs.taxpolicycenter.org/pages.cfm.

neighbors for each five-year growth period using the Upjohn Institute Unsuppressed County Business Patterns Data (Bartik et al., 2018).

For the first group of pre-treatment variables are three indicators from the Economic Research Service (ERS) of the US Department of Agriculture related to the natural amenity attractiveness of the state: the county population-weighted natural amenity ranking; the population-weighted share of counties in the state that are retirement destinations; and the population-weighted share of counties that have recreation-based economies.

Second, are measures of urbanization of the state: the population-weighted share of counties in the state that have experienced consistent population loss (ERS); the population density of the state (Census Bureau); the percent of the population that is metropolitan (Census Bureau); the population-weighted share of counties that have had persistent poverty (ERS); the county population-weighted ranking along the rural-urban continuum (ERS); and per capita income (BEA). All measures are based on data from the 2000 Census of Population, including those reported by BEA and ERS.

In the third group of measures are demographic variables from the 2000 Census of Population: ethnicity shares for African-Americans, Hispanics, and Native Americans; the share who are married; the share of females; the share of working-age individuals defined as those between 25 and 54 years old; and educational attainment shares of the adult population (25 years and above) for high school completion only, associate college degree only and bachelor or post-graduate degree.

The fourth and final group of measures reflects the industry structure of the state prior to the five-year growth periods. First, are employment-based industry mix and wage-based industry mix growth rate measures for 1998-2002, with both measures using 1998 state industry employment weights from the Upjohn employment data; employment-based and wage-based industry mix growth measures for 1998-2002 calculated for the neighbors of each state; and a Gini coefficient of industry dispersion. Second, using 2002 Census County Business Patterns data we calculate the shares of total nonfarm employment in the state comprised of that in the oil and gas sector, manufacturing, durable goods vs. nondurable goods manufacturing, and professional and business services. Third, we use industry dependence measures from ERS, the population-weighted shares of counties that are mining dependent, manufacturing dependent, and farm dependent.

4.2 Principal Component Analysis of Outcome and Control/Predictor Variables

For each state, we perform principal component analysis of real GDP per capita, total nonfarm employment, per capita income, the poverty rate, the unemployment rate, and population for the entire period of 1987-2017. Based on the Kaiser Rule, we select the principal components for which the average eigenvalue exceeds one across the states. To reduce the dimensionality of the thirty-two pre-treatment variables that are used as controls in the regression analysis and predictor variables in synthetic control analysis we next perform principal component analysis on each of the four groups of the variables: natural amenities, urbanization, demographic characteristics of the population, and industry composition. We select the principal components for each group that have eigenvalues that exceed one.

4.3 Synthetic Control Analysis

We use data for 1987-2001 in constructing the counterfactuals for 2002-2017 for the lower 48 contiguous states, in which each state serves as a potential donor in the construction of counterfactuals for the other states.[6] We then use the counterfactuals for the outcome variables for analysis of three post-2002 five-year growth periods: 2002-2007, 2007-2012, and 2012-2017. The time span of the three growth periods together approximates the length of the pre-treatment period used in constructing the counterfactuals. The long pre-treatment period facilitates matching on unobservable factors that may influence state economies (Abadie et al., 2010). The weights used in constructing the counterfactual outcome variables also are used in constructing the explanatory variables, both the fiscal and control variables. SCM reduces the risk of interpolation bias that likely occurs with using a pooled sample of highly dissimilar states

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[6] We use the program package Synth in R to perform the SCM analysis http://web.stanford.edu/~jhain/synthpage.html.

without matching. The fitting of pre-treatment trends reduces the likelihood of reverse causality where differences in pre-treatment trends might lead to differing fiscal policy responses Accounting for time-varying factors also reduces the chance of endogeneity from omitted factors.

5. Results

5.1 Descriptive Statistics

Table 1 reports the means and descriptive statistics for the regression variables for each of the three five-year growth periods, including the two primary regional principal components derived from them (described below), the fiscal variables, and the two industry mix variables. From the table, we see the stronger growth during the periods containing only economic expansion years and the lower growth during the middle period that encompasses the Great Recession. The rates of poverty and unemployment also rose during the middle period on average, while declining in the other two periods. State and local expenditures and own-source revenues follow the pattern of the growth variables across the three periods.

5.2 Principal Component Results

5.2.1 Outcome Variables

Table 2 shows the results of the principal component analysis of the six outcome variables averaged across the 48 sample states. Two of the principal components have an average eigenvalue greater than one across the 48 states. The average proportion of the variance of the six variables explained by the first two principal components is 90.4 percent.

The first principal component is positively associated with the four outcome growth variables across the three periods in Table 1. The poverty rate and unemployment rate are slightly negatively correlated with the first principal component. The pattern suggests labor demand shifts dominating labor supply shifts in driving growth over the 1987-2017 period (Partridge and Rickman, 2006). The slightly negative loadings for the poverty rate and unemployment rate suggest migration responses that mitigated much of the poverty/unemployment-reducing demand effects. For fourteen states the poverty and unemployment rates have positive factor loadings with the first principal component (an average of 0.24 for poverty and 0.16 for unemployment), with comparable average loadings to those in Table 2 for the other variables.[7] This suggests the dominance of labor supply shifts over labor demand shifts for the two variables in the fourteen states. Eleven of the fourteen states are reported by Partridge and Rickman (2006) in structural vector autoregression analysis as having population growth dominated by labor supply over the period 1970-1998; the three exceptions are Connecticut, Oregon, and Wisconsin. Despite the perception of stronger labor supply shifts, per capita income is positively correlated with the first principal component for the fourteen states. Stronger labor income growth can occur with strong labor supply shifts from a combination of productivity effects and sorting of highly skilled/educated workers occurring with migration flows (Wang and Rickman, 2018).

On average across the 48 states, the second principal component is mostly positively associated with the poverty and unemployment rates. The pattern is consistent across all states with few exceptions (not shown). The four exceptions are Louisiana, North Dakota, West Virginia, and Wyoming, all intensive in energy production.[8] Consistent with the unemployment rate and poverty rate in Table 1, the second principal component declines during the two primary expansion periods and increases during the period that encompasses the Great Recession.

5.2.2 Control/Predictor Variables

The pre-treatment variables are used directly as controls in the base regression and the neighbors matching regression, while they are used indirectly as predictor variables in synthetic control matching for the third regression. But to reduce the dimensionality of the variables in all three regression approaches, we apply principal components to the thirty-two control variables. Appendix Table A1 shows the principal component factor loadings for the predictor variables for

[7] The states are Arizona, Connecticut, Delaware, Georgia, Kansas, Nevada, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, Washington, and Wisconsin.

[8] For North Dakota and Wyoming there is a large positive factor loading for the poverty rate but a large negative loading for the unemployment rate. For Louisiana and West Virginia there also is a large loading with population growth.

each group; the principal components selected from each group all had eigenvalues over one. The state principal component scores are given in Appendix Table A2.

In summary, for the three natural amenity variables, one principal component with an eigenvalue over one is extracted. Two principal components are extracted from the six urbanization variables. Three principal components are extracted from the nine demographic variables. The dimensionality of the industry composition variables is reduced from fourteen variables to five principal components. A total of eleven principal components then are extracted from the thirty-two variables and are included in the base regression and neighbors matching regression and are used as predictor variables in SCM matching.

5.3 Base Regression Results

For comparison to previous studies and evaluation of the contribution of matching, we first estimate standard pooled panel regressions for the three five-year periods: 2002-2007, 2007-2012, and 2012-2017. We follow Reed (2008), Gale et al. (2015), and Brewer et al. (2021) and implement ordinary least squares regression with robust standard errors for heteroscedasticity. The results are reported in Table 3 for total nonfarm wage and salary employment growth, real per capita GDP growth, per capita income growth, population growth, the poverty rate, the unemployment rate, and the first and second principal components of all the regional variables. Year fixed effects are included, though because of having only three growth periods we do not include state fixed effects.[9]

All eight regressions are statistically significant. The fiscal variables as a group are statistically significant below the 0.10 level in the employment growth, real per capita GDP growth, and per capita income growth regressions.[10] The employment growth regression contains the greatest number of statistically significant fiscal variables.

[9] In sensitivity analysis we included Census Division fixed effects in all regressions. Based on Wald Chi-square tests the fixed effects as a group were not close to statistical significance in any regression.

[10] Regressions with the control variables omitted, leaving in only the time fixed effects and the fiscal variables, produced statistical significance of the fiscal variables as a group in all regressions with the exception of the poverty rate regression.

Property taxes are negatively related to employment growth and positively related to the second principal component. Recall from Table 2 that principal component 2 is positively associated with the poverty and unemployment rates. Higher education expenditures are significantly negatively related to both real per capita GDP and per capita income, while expenditures on police, fire, and corrections facilities are significantly negatively associated with both employment growth and real per capita GDP growth. No other fiscal variable is statistically significant in more than one of the eight regressions.

The employment-based industry mix variable is positively and significantly related to both employment and population growth but is insignificant in the other regressions. The employment multiplier of 1.85 approximates the 1.9-2.0 range reported by Bartik and Sotherland (2019), which uses the same detailed industry data in constructing the industry mix variable but a different empirical estimation approach. The spatial employment-based industry mix variable is significant in the population growth and poverty regressions. Not shown, the amenity principal component variable is positively statistically significant in the employment and population growth regressions and negatively statistically significant in the real per capita GDP regression. The first demographic principal component is statistically positive in both the employment and real per capita GDP regressions. The first industry composition component is negatively associated with employment growth during the 2002-2017 period.[11]

5.4 Neighbors Matching Regression Results

As defined above, in the neighbors matching regression each variable is the difference between the value for the state's variable and the population-weighted means of its contiguous neighbors. We omit the spatial industry mix variable because of the comparison to neighbors. Because defining the variables for each state relative to its neighbors could induce cross-sectional

[11] Replacing the time fixed effects with national cyclic components using the method of Greenaway-McGrevy and Hood (2019) does not much affect the fiscal results for the two principal component regressions. The r-squared increases from 0.54 to 0.75 in the first principal component regression and from 0.87 to 0.94 in the second principal component regression. The number of statistically significant results remains the same for the first principal component regression, while increasing by one in the second principal component regression. See Appendix B for details.

correlation in their errors, we estimate the regressions accounting for potential spatial correlation in the errors using the spatial panel maximum likelihood approach of Baltagi et al. (2003).[12]

Table 4 reports the spatial error model regression results. Based on Wald Chi-Square statistics, with the exceptions of the regressions for population growth, the first principal component, and the unemployment rate, the fiscal variables as a group are statistically significant. Spatial autocorrelation coefficients (rho) are statistically significant in six of the eight regressions. Consistent with Goff et al. (2012), the matched-neighbors regressions produce considerably more statistically significant results for the fiscal variables relative to the unmatched regression (Table 3), both as a group and for the number of individual statistically significant results.

The own-source revenue variable as a share of personal income is significantly negatively related to employment growth and the poverty rate and positively related to per capita income growth in the Table 4 neighbors matching spatial error model regressions. The individual income tax variable is now statistically significant in four regressions, positively related to real per capita GDP and per capita income growth, and negatively related to the two regional principal components. The property tax variable continues to be estimated to negatively influence employment growth, though now also is estimated to negatively affect per capita income growth and the first regional principal component, while positively affecting the second regional principal component. Sales and gross receipts taxes positively influence growth in employment and real per capita GDP, while positively affecting the poverty rate. Federal intergovernmental revenue continues to be estimated to negatively influence employment growth and now also per capita income growth.

Expenditures on elementary and secondary education positively influence employment growth and the first regional principal component, while negatively influencing the second principal component. Higher education expenditures negatively influence real per capita GDP

[12] We use the splm package in R written by Millo and Piras (2012). The spatial weights matrix used is based on Queen contiguity.

and per capita income growth, though also reducing the unemployment rate. Highway expenditures positively influence employment growth and negatively influence per capita income growth. Natural resource and parks expenditures positively affect employment growth, per capita GDP growth, per capita income growth, and the first regional principal component, with a negative and significant coefficient for the second regional principal component. Consistent with the base regression results, police, fire, and corrections expenditures are negatively associated with employment and real per capita GDP growth, though also negatively associated with the poverty rate.

5.5 Synthetic Control Method Matching Regression Results

Table 5 presents the results from using the synthetic control method (SCM) to construct the match for each state. To avoid a separate set of state weights for each outcome variable and to obtain more robust findings, the weights are derived from applying SCM to the first and second regional components. The SCM state weights from application to the first regional principal component are also then applied to the variables in the regressions for outcome variables with which the first principal component is most correlated: employment growth, per capita GDP growth, per capita income growth, and population growth. The state weights obtained from applying SCM to the second regional principal component similarly then are also applied to the variables in the poverty and unemployment rate regressions. The SCM weights are shown in Appendix C. The principal component predictor variables are not included in the regressions because they are accounted for on the front end in the construction of the synthetic control matches. Because of neighbors possibly comprising part of the synthetic control match, as with the Table 4 regressions, we account for potential spatial correlation in the errors using the spatial panel maximum likelihood approach of Baltagi et al. (2003).[13]

[13] Because there is randomness in the construction of the synthetic control matches for the states the standard error should be bootstrapped (Zou, 2018). Using EVIEWS 10, bootstrapped standard errors for ordinary least squares (OLS) estimation of the SCM matching regressions are similar to the OLS standard errors. Only four regression coefficients that are significant in Table 5 become insignificant based on bootstrapped standard errors (two of them marginally insignificant): elementary education expenditures for the first principal component; property taxes for the second principal component; and corporate income taxes along with police, fire, and corrections expenditures for per

With few exceptions, which are explored below, SCM is assessed to produce adequate matches over the 1987-2001 period based on acceptably low root mean squared prediction errors and inspection of the SCM graphs (not shown). Except for the population growth and the poverty rate regressions, the fiscal variables as a group are statistically significant. There generally is a lower spatial correlation of the residuals compared to the neighbors matching regressions in Table 4. Consistent with the neighbors matching regressions, considerably more individual fiscal variables are significant than in the base regressions of Table 3.

The own-source revenue variable is now negatively and significantly related to all four growth outcome measures, though not with the first regional principal component variable. Consistent with a labor demand interpretation of the negative growth relationships, the own-source revenue variable is now positively and significantly related to the unemployment rate. The individual income tax variable is positive and significant in the employment, per capita GDP, per capita income, and first regional principal component regressions, consistent with the SCM single policy variable evidence of Rickman and Wang (2018; 2020). Consistent with a labor demand interpretation, the property tax variable is significantly negative in the employment growth and per capita income growth regressions and significantly positive in the second regional principal component regression. The sales and gross receipts tax variable is positive and significant in the employment, per capita GDP, and per capita income growth regressions. Combined with the own-source revenue coefficient, among the tax measures, only property taxes have clear significantly negative effects on the economy.

The higher education expenditure variable continues to be negative and significant in the per capita GDP, per capita income, and unemployment rate regressions. The natural resources and parks and recreation services variable is now only significant in the first regional principal component (positively) and second regional principal component (negatively) regressions. Police, fire, and corrections facilities expenditures are positively associated with per capita

capita income. Because of the robustness of the results for bootstrapping the standard errors, the discussion will be based on the standard errors estimated using the spatial panel maximum likelihood method.

income growth and the unemployment rate, though negatively related to the poverty rate.[14] Highway expenditures positively affect both employment and per capita GDP, in which the positive employment effects dominate the negative own-source revenue or property tax effects.

Consistent with the literature generally (McBride, 2012, Mazerov, 2013, Rickman and Wang, 2020), where the effects are statistically significant, the magnitudes of the effects are small. For employment, a general increase in own-source revenues equivalent to one percent of personal income would be predicted to reduce employment growth by 0.36 percent over five years, or approximately 0.07 percent per year. For per capita real GDP and per capita real income, the per-year own-source revenue growth effects are approximately 0.11 and 0.23 percent. If the increase in own-source revenue was from an increase in property taxes equal to one percent of personal income the employment effect is an additional 1.894 percent lower growth over five years or approximately 0.38 percent per year. However, using an average standard deviation change in property taxes as a share of personal income across the three periods from Table 1 of 0.316 percent, the associated differential property tax employment growth would be approximately 0.12 percent per year.

Although the coefficients for the other statistically significant tax variables are larger than the own-source revenue coefficient, an increase in revenues equivalent to one percent of personal income would represent dramatically larger percent increases in revenues from each source relative to the total of own sources. Because poverty and unemployment rates are measured in rates converted to percentages, the coefficients require division by 100 for interpretation. The effects of one-percent changes in the fiscal variables are presented in the Appendix D table.

5.6 Robustness Analysis

Because of previous evidence that the economic effects of state and local fiscal policies have changed over time[15] and to provide more recent evidence, in Table 6 we summarize the findings

[14]With own-source revenues as the sole fiscal variable in the regressions, its coefficient remains negative in the growth regressions but is only statistically significant in the population growth regression. The own-source revenue variable remains positive and significant in the unemployment rate regression and insignificant in the poverty rate and second regional principal component regression.

[15] See Rickman and Wang (2020, p. 24).

from estimating the Table 5 SCM matching regressions for each of the three periods. Reported are the signs of statistically significant results at or below the 0.10 level.

Overall, there does not appear to be much of a difference in the number of significant coefficients across the three periods. Only for the poverty rate during the 2007-2012 period are the fiscal variables as a group statistically insignificant. The 2007-2012 period also is the only period where a tax or expenditure variable is statistically insignificant in all equations, i.e., individual income taxes and higher education expenditures. Potential reasons for our findings of robustness across time include the use of post-2000 data that generally have been found to produce less negative tax effects (Rickman and Wang, 2020; Brewer et al., 2021). The use of detailed categories of taxes and expenditures also may capture changes in the effect of the overall tax burden on per capita income that occur because of shifting patterns of taxation and spending over time (Reed, 2021).

We consider results as robust if they are statistically significant and of the same sign in at least two of the three periods. Robust results include the negative own-source revenue effects on employment and positive effects on unemployment. Property taxes positively and robustly affect the second regional principal component. Sales and gross receipts taxes have robust positive effects on employment and per capita income while having negative effects on the unemployment rate. Expenditures on both elementary and secondary education and natural resources and parks and recreation services have positive effects on the first regional principal component and negative effects on the second regional principal component. Recall that the first regional component is most positively correlated with the growth outcome variables, while the second regional principal component is most positively correlated with the poverty and unemployment rates. Highway expenditures have significantly negative effects on the unemployment rate. Public safety expenditures (police, fire, and corrections) positively influence growth in both per capita income and population growth, while negatively affecting the poverty rate and positively affecting the unemployment rate. Public welfare expenditures are negatively associated with real per capita GDP and income and positively associated with the unemployment rate. Expenditures on sanitation and sewerage are negatively associated with the first regional principal component.

We next re-run the regressions after adding the 2002 levels of the fiscal variables and the Fraser Index of Economic Freedom in 2000. Levels of the fiscal variables capture their long-run effects on economic outcomes (Reed, 2008). Although SCM matches the pre-treatment paths of the outcome variables, the effects of the levels of the variables could change during the post-treatment years.

Based on Wald Chi-square tests the additional levels variables and economic freedom index jointly are only statistically significant in the population, real per capita GDP, and unemployment rate regressions. As shown in the first eight columns of Table 7, there is not much change in the significance of the short-run fiscal variables when compared to the Table 5 results, suggesting robustness of our short-run estimates and efficacy of the SCM matching approach in accounting for longer run levels effects. Across the eight regressions, five short-run fiscal coefficients become statistically significant that previously were insignificant, while five become insignificant that previously were insignificant.

To assess the efficacy of the SCM matching we next re-run the regressions after adding intercept and slope shifts for states with the poorest SCM matches. Poor SCM matches may be less likely to control for confounding factors that could cause endogeneity. Interactions are added for eight states that clustered together with the poorest match on the first regional principal component (based on root mean squared prediction errors) in its regression and the growth regressions for employment, per capita GDP, per capita income, and population.[16] We also add interactions for eight states that clustered together with the poorest match on the second regional principal component in its regression and those for the poverty and unemployment rates.[17] As shown in the second set of columns in Table 7, adjusting for the states with the poorest SCM

[16] The eight states are Louisiana, Michigan, Minnesota, Mississippi, New Mexico, New York, North Dakota, and Wisconsin.
[17] The eight states are Nebraska, New Hampshire, North Dakota, Utah, Vermont, Virginia, Washington, and Wyoming.

matches produces three more statistically significant results for coefficients corresponding to the non-interacted states (those with good SCM matches); nine of the fiscal variables become significant and six become insignificant compared to Table 5. The negative own-source revenue effects mostly are maintained with the variable becoming insignificant in the population growth regression and significant in the first principal component regression.

In a final robustness test, adding interactions for the fourteen states interpreted as supply-dominated (see footnote 7) produces several changes in statistical significance for the base (non-interacted) states (shown in the last eight columns of Table 7). The most notable change is the loss of statistically negative significant results for the own-source revenue variable for the growth outcome regressions, though the coefficients remain negative and marginally insignificant in some cases (not shown). The significance of the relative tax variables is unchanged, while three expenditure coefficients become significant and five become insignificant.[18]

6. Discussion and Conclusion

Our analysis of the economic effects of state and local fiscal policy in this paper produces several useful findings. Matched comparisons based on either using neighbors or the synthetic control method (SCM) produce considerably more statistically significant findings than unmatched comparisons in regression analysis. Matching produces increased statistical significance of the fiscal variables as a group, and more significant results for individual fiscal variables. Own-source revenue has statistically negative effects on employment growth and per capita GDP growth in both matching approaches. Yet, only the SCM approach produces consistent evidence of significant negative effects of own-source revenues on most outcome variables. Application of SCM produces matches with demonstrated affinities and pre-treatment tracking of outcome variables between each state and its constructed counterfactual for most states.

[18] We also re-ran the regressions after omitting the two industry mix variables that control for industry shocks. Compared to the Table 5 results, four fiscal variables become significant, while three others become insignificant, with four of the changes occurring in the employment growth regression.

The SCM-based regression results suggest proportionately more significant effects on growth in economic aggregates than on poverty and unemployment rates. Consistent with SCM case studies of single policies, reducing individual income taxes does not appear to stimulate economic growth and may reduce growth relative to other state and local taxes or expenditures (Rickman and Wang, 2018; 2020). The property tax is the most likely tax to negatively affect state economic performance. There are more statistically significant tax effects, both positive and negative, than expenditure effects on the growth aggregates, suggesting that the choice of tax instrument is more critical than the choice of expenditure. The most notable exception is that highway expenditures positively affected both employment and real per capita GDP growth.

There are fewer statistically significant effects for the regional principal component variables (constructed from the outcome variables) than for most of the individual outcome variables, making it difficult to derive broader narratives on the economic effects of state and local fiscal policy. Consistent with the findings of Komarek (2020) and Rickman and Wang (2020), there is some evidence of heterogeneity in the findings. The base state own-source revenue variable becomes significant much less often (marginally) with the addition of intercept and slope shifters for fourteen states for which labor supply is believed to play a greater growth role. This suggests that own-source revenues slightly more likely affect labor supply than demand. The general influence of the fiscal variables did not appear to be waning over time as had been reported for pre-Great Recession periods in previous studies.

The evidence of heterogeneity in the findings confirms the difficulty in obtaining recommendations on specific state and local fiscal policies that are applicable in all circumstances from empirical exercises (Reed, 2021). For some state and local taxes and expenditures, the overall size of state and local government supported by own-source revenues has negative effects, but not necessarily for all taxes and expenditures. And for findings that are statistically significant, consistent with previous studies the quantitative magnitudes are small (e.g., Gale, 2015). State and local fiscal policy differences do not appear to be the driving factors behind differences in regional growth or outcomes such as poverty and unemployment. The results though notably, indicate the importance of using geographic matching and a broad set of economic indicators in future empirical research. Despite the limitations of empirical research on state and local fiscal policies, the recommendations derived from the above analysis are in the words of Alm (2017), “far better than what otherwise would be used,” and we would add better than what often is used.

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Table 1. Descriptive Statistics

	2002-2007		2007-2012		2012-2017	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Employment Growth Rate (%)	5.839	5.096	-2.285	4.286	7.046	4.780
Per Capita Real GDP Growth Rate (%)	10.158	5.117	-0.645	9.209	4.512	4.261
Per Capita Personal Income Growth Rate (%)	28.201	12.436	11.895	10.450	14.041	5.005
Population Growth Rate (%)	4.772	4.280	4.283	2.856	3.854	3.696
Poverty Rate (%)	-0.040	1.932	2.638	1.720	-2.342	2.017
Unemployment Rate (%)	-0.983	0.862	3.029	1.374	-3.231	1.421
Regional Principal Component 1	1.261	1.292	-0.055	-0.020	1.131	1.033
Regional Principal Component 2	-0.327	-0.373	2.413	2.460	-2.249	-2.383
Corporate Income Tax Share (%)	0.187	0.153	-0.135	0.142	-0.048	0.092
Elementary/Secondary Education Expenditure Share (%)	-0.050	0.390	-0.330	0.302	-0.115	0.330
Federal Intergovernmental Revenue Share (%)	0.001	0.908	0.321	0.718	-0.052	0.571
Health & Hospitals Expenditure Share (%)	0.010	0.300	0.105	0.228	0.004	0.369
Higher Education Expenditure Share (%)	0.005	0.198	0.087	0.200	-0.040	0.188
Highway Expenditure Share (%)	-0.141	0.268	-0.001	0.319	-0.057	0.300
Individual Income Tax Share (%)	0.187	0.235	-0.231	0.257	0.036	0.243
Natural Res/Parks & Recreation Expenditure Share (%)	-0.037	0.082	-0.037	0.095	-0.033	0.124
Own-source Revenues Share (%)	5.153	1.814	-3.819	1.648	1.760	1.330
Police, Fire & Corrections Expenditure Share (%)	-0.003	0.105	-0.032	0.079	-0.034	0.133
Property Tax Share (%)	0.073	0.327	-0.005	0.328	0.003	0.293
Public Welfare Expenditure Share (%)	0.112	0.489	0.282	0.314	0.507	0.682
Sales & Gross Receipts Tax Share (%)	0.082	0.259	-0.228	0.355	0.006	0.320
Sanitation and Sewerage Expenditure Share (%)	0.051	0.187	-0.009	0.168	-0.087	0.156
Industry Mix-Own (%)	8.186	1.459	-3.918	0.964	8.827	1.068
Industry Mix-Spatial (%)	0.015	1.642	0.057	1.091	0.319	1.185
Number of Observations	48	48	48	48	48	48

Table 2. Outcome Variable Principal Component Results (1987-2017)

	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6
Eigenvalue	3.94	1.48	0.42	0.12	0.03	0.01
% Cumulative Variance Explained	65.5	90.4	97.4	99.4	99.9	1
Factor Loadings						
Total Nonfarm Employment	0.471	-0.141	0.075	0.243	0.246	0.556
Real Per Capita GDP	0.480	-0.015	0.073	0.194	0.112	-0.247
Per Capita Income	0.469	0.115	-0.015	-0.388	-0.044	0.151
Poverty Rate	-0.064	0.601	0.316	0.104	0.054	0.023
Unemployment Rate	-0.034	0.630	-0.178	0.132	0.117	0.125
Population	0.476	0.142	0.034	-0.016	-0.273	-0.433

Note: The reported eigenvalues and factor loadings are obtained as simple averages across all 48 states.

Table 3. Pooled Panel Least Squares Results (2002-2007, 2007-2012, 2012-2017)[*]

	Emp	Per GDP	Per Inc	Pop	RegCmp 1	Pov	Unemp	RegCmp 2
Industry Mix	1.845 (0.767)[b]	0.529 (1.413)	2.717 (1.993)	1.274 (0.349)[a]	11.833 (14.266)	23.748 (16.999)	-27.083 (11.842)	-19.549 (18.616)
Spatial Industry Composition	-0.317 (0.620)	-1.306 (1.042)	0.692 (1.554)	1.216 (0.377) [a]	3.506 (12.260)	29.891 (17.464)[c]	-18.489 (12.620)	2.161 (16.113)
Own-source Revenue	-0.278 (0.186)	-0.170 (0.244)	-0.233 (0.761)	-0.187 (0.130)	1.023 (4.140)	-10.381 (7.892)	4.050 (6.708)	5.755 (4.560)
Individual Income Tax	1.017 (1.059)	4.036 (1.549)[b]	5.293 (3.629)	0.075 (0.992)	2.278 (31.572)	-73.111 (62.733)	34.802 (33.607)	-18.846 (28.794)
Corporate Income Tax	-0.278 (1.881)	2.460 (2.884)	5.443 (6.200)	1.602 (1.440)	63.433 (43.044)	-14.573 (79.470)	7.079 (74.173)	-31.788 (58.292)
Property Tax	-2.782 (1.329)[b]	-1.553 (2.599)	-4.320 (3.533)	0.798 (1.017)	-19.658 (25.848)	-52.645 (54.415)	-5.459 (32.083)	74.295 (35.878)[b]
Sales & Gross Receipts Tax	1.895 (1.036)[c]	3.104 (2.417)	4.765 (3.156)	-0.118 (0.675)	29.158 (20.725)	57.643 (46.563)	-30.719 (29.718)	-7.263 (31.156)
Fed Intergovern Revenue	-1.251 (0.447)[a]	0.013 (0.466)	-0.781 (0.807)	-0.486 (0.310)	-3.955 (6.712)	8.226 (17.330)	10.172 (12.299)	13.195 (8.086)
Elem/ Sec Education	0.881 (0.894)	0.637 (1.324)	2.527 (5.075)	0.135 (0.650)	16.481 (22.271)	55.611 (44.891)	5.028 (25.998)	-3.736 (28.734)
Higher Education	0.143 (2.016)	-7.350 (3.519)[b]	-9.363 (3.916)[b]	-0.121 (0.884)	42.541 (41.644)	10.590 (73.687)	-59.388 (54.043)	44.480 (46.249)
Health & Hospitals	0.953 (0.908)	-0.502 (1.302)	-2.288 (2.353)	-0.671 (0.827)	12.954 (21.942)	-68.780 (62.678)	-35.914 (38.485)	3.673 (27.855)
Highways	2.512 (0.932)[a]	2.288 (2.076)	0.593 (4.360)	0.424 (1.385)	-9.330 (20.352)	10.590 (73.687)	0.566 (33.898)	15.933 (26.827)
Nat Res/Parks & Recreation	6.489 (3.366)[c]	2.765 (8.628)	4.070 (7.496)	0.234 (2.692)	123.823 (63.662)[c]	-17.828 (140.542)	-5.935 (77.769)	-293.539 (157.911)
Police, Fire & Corrections	-9.647 (3.065)[a]	-10.394 (4.632)[b]	-10.386 (13.026)	-0.218 (2.803)	-91.871 (65.765)	-218.486 (146.924)	110.932 (94.141)	33.384 (83.766)
Public Welfare	-0.423 (0.575)	-0.673 (0.911)	-0.694 (1.584)	0.444 (0.500)	-10.595 (15.633)	17.547 (29.290)	12.023 (21.729)	-15.684 (14.944)
Sanitation and Sewerage	-0.824 (1.808)	-4.628 (3.253)	4.503 (4.988)	-0.225 (1.254)	-3.013 (34.069)	56.712 (68.678)	-38.075 (56.028)	38.8550 (44.616)
R-squared	0.81	0.68	0.54	0.45	0.54	0.60	0.83	0.87
Regression F-statistic	17.22 (p=0.00)	8.34 (p=0.00)	4.65 (p=0.00)	4.63 (p=0.00)	4.53 (p=0.00)	8.30 (p=0.00)	26.74 (p=0.00)	26.10 (p=0.00)
Fiscal Variables Wald Chi-square	39.19 (p=0.00)	20.79 (p=0.04)	28.16 (p=0.01)	4.81 (p=0.98)	17.44 (p=0.13)	8.59 (p=0.80)	8.03 (p=0.84)	18.48 (p=0.14)
N	144	144	144	144	144	144	144	144

Notes: [*]Absolute Value White Heteroscedastic Robust-Standard Errors in parentheses
[a] denotes significance below the 0.01 level; [b] denotes significance below the 0.05 level; [c] denotes significance below the 0.10 level

Table 4. Neighbors Match Spatial Error Model Results (standard errors in parentheses)

	Emp	Per GDP	Per Inc	Pop	RegPC 1	Pov	Unemp	RegPC 2
Industry Mix	1.797 (0.277)[a]	1.471 (0.441)[a]	0.540 (0.828)	0.223 (0.308)	-4.231 (8.582)	-9.322 (16.767)	12.743 (13.190)	-7.256 (8.582)
Own-source Revenue	-0.320 (0.147)[b]	-0.180 (0.254)	0.906 (0.504)[c]	-0.310 (0.189)	-0.941 (4.871)	-30.397 (10.217)[a]	-2.218 (7.045)	-4.138 (5.378)
Individual Income Tax	0.875 (0.892)	3.926 (1.451)[a]	5.898 (2.778)[b]	0.101 (1.036)	-79.535 (28.110)[a]	24.219 (56.269)	48.985 (42.500)	-55.151 (29.215)[a]
Corporate Income Tax	0.564 (1.676)	1.442 (2.912)	11.558 (5.970)[b]	1.422 (2.255)	47.223 (55.741)	-85.863 (121.030)	56.839 (80.066)	-70.070 (66.535)
Property Tax	-1.566 (0.888)[c]	-0.855 (1.488)	-6.200 (2.907)[b]	-0.089 (1.087)	-68.891 (28.701)[b]	-31.749 (58.889)	-5.624 (42.371)	110.787 (30.801)[a]
Sales & Gross Receipts Tax	1.664 (0.815)[b]	2.605 (1.316)[b]	-0.670 (2.504)	0.279 (0.933)	3.533 (25.539)	138.860 (50.718)[a]	8.423 (38.821)	29.308 (26.198)
Fed Intergovern Revenue	-1.379 (0.333)[a]	-0.512 (0.544)	-2.995 (1.079)[a]	-0.633 (0.403)	-6.766 (10.687)	25.505 (21.855)	0.457 (15.880)	12.908 (11.474)
Elem/ Sec Education	1.610 (0.939)[c]	1.670 (1.527)	3.079 (2.898)	0.768 (1.078)	59.306 (29.607)[b]	17.091 (58.696)	0.111 (44.728)	-50.248 (30.014)[c]
Higher Education	-0.848 (1.416)	-7.379 (2.403)[a]	-8.857 (4.802)[c]	-2.448 (1.804)	51.202 (46.196)	6.508 (97.310)	-128.590 (67.576)[c]	65.544 (52.163)
Health & Hospitals	1.149 (0.851)	-0.580 (1.465)	-2.403 (2.999)	-0.862 (1.134)	-11.389 (28.066)	-20.002 (60.810)	-7.563 (40.621)	52.101 (33.748)
Highways	2.029 (0.853)[b]	0.936 (1.388)	-4.698 (2.683)[c]	0.625 (1.004)	-19.102 (26.883)	43.080 (54.365)	22.447 (40.638)	24.558 (28.755)
Nat Res/Parks &Recreation	10.472 (2.753)[a]	9.899 (4.701)[b]	19.892 (9.529)[b]	-5.217 (3.595)	215.639 (90.221)[b]	-77.097 (193.16)	-82.966 (131.37)	-259.129 (105.885)[b]
Police, Fire & Corrections	-12.342 (2.561)[a]	-9.498 (4.356)[b]	3.663 (8.735)	2.758 (3.286)	-74.091 (83.706)	-541.48 (177.04)[a]	125.58 (122.22)	-75.285 (95.749)
Public Welfare	0.197 (0.516)	-0.130 (0.867)	-0.103 (1.724)	1.560 (0.648)[b]	6.477 (16.690)	32.994 (34.946)	35.998 (24.589)	-13.005 (18.896)
Sanitation and Sewerage	0.090 (1.396)	-3.749 (2.349)	-0.268 (4.633)	-2.733 (1.736)	24.069 (45.255)	94.244 (93.873)	-57.357 (66.614)	87.231 (49.757)[c]
Rho	0.35[b]	0.04	-0.29[c]	-0.36[c]	0.10	-0.30[b]	0.34[a]	-0.62[a]
Fiscal Variables Wald Chi-square	74.28 (p=0.00)	49.07 (p=0.00)	70.66 (p=0.00)	14.77 (p=0.39)	20.59 (p=0.11)	54.87 (p=0.00)	11.78 (p=0.62)	70.83 (p=0.00)
N	144	144	144	144	144	144	144	144

Notes: [a] denotes significance below the 0.01 level; [b] denotes significance below the 0.05 level; [c] denotes significance below the 0.10 level

Table 5. Synthetic Control Method Match Spatial Error Model Results
(standard errors in parentheses)

	Emp	Per GDP	Per Inc	Pop	RegPC 1	Poverty	Unemp	RegPC 2
Industry Mix	1.644	0.204	3.186	0.600	-24.098	-15.133	-2.294	0.741
	(0.507)[a]	(0.942)	(1.526)[b]	(0.589)	(9.612)[b]	(19.415)	(12.897)	(8.065)
Spatial Industry Composition	-0.065	-1.202	0.379	0.585	-18.246	3.441	-0.455	-0.978
	(0.419)	(0.778)	(1.262)	(0.487)	(7.941)[b]	(3.011)	(2.166)	(1.173)
Own-source Revenue	-0.362	-0.546	-1.156	-0.323	-3.732	-9.998	17.208	4.081
	(0.157)[b]	(0.292)[c]	(0.476)[b]	(0.184)[c]	(2.983)	(10.804)	(6.995)[b]	(4.598)
Individual Income Tax	2.576	7.427	9.422	-0.073	48.317	-71.790	1.320	-16.081
	(1.073)[b]	(2.014)[a]	(3.389)[a]	(1.314)	(20.758)[b]	(66.413)	(42.521)	(28.601)
Corporate Income Tax	1.105	1.551	-12.459	0.336	32.924	60.012	-9.885	38.720
	(2.139)	(3.988)	(6.562)[c]	(2.537)	(40.859)	(149.923)	(97.061)	(63.952)
Property Tax	-1.894	-2.277	-9.061	-0.014	-9.539	-23.908	-41.140	85.488
	(1.008)[c]	(1.886)	(3.126)[a]	(1.209)	(19.374)	(65.587)	(42.497)	(27.926)[a]
Sales & Gross Receipts Tax	3.374	5.396	8.503	0.683	6.750	64.657	-54.869	-13.117
	(0.791)[a]	(1.478)[a]	(2.455)[a]	(0.950)	(15.181)	(53.901)	(34.713)	(23.071)
Fed Intergovern Revenue	-1.116	-0.071	0.114	-0.023	-9.948	3.985	5.463	3.099
	(0.375)[a]	(0.698)	(1.146)	(0.443)	(7.149)	(24.253)	(15.679)	(10.348)
Elem/ Sec Education	-0.435	-0.347	1.148	0.873	35.897	32.754	47.593	-15.609
	(1.020)	(1.900)	(3.108)	(1.200)	(19.442)[c]	(59.812)	(39.158)	(25.178)
Higher Education	-1.489	-9.405	-13.890	-1.880	3.212	45.039	-138.696	34.684
	(1.500)	(2.805)[a]	(4.665)[a]	(1.806)	(28.821)	(111.566)	(71.585)[c]	(47.939)
Health & Hospitals	0.717	0.408	-1.977	-0.370	9.745	-83.810	-76.432	-30.996
	(0.780)	(1.462)	(2.449)	(0.949)	(15.047)	(55.081)	(35.407)[b]	(23.634)
Highways	2.563	5.874	0.745	-1.174	9.837	91.101	-45.412	11.288
	(0.873)[a]	(1.636)[a]	(2.740)	(1.062)	(16.840)	(59.250)	(38.565)	(25.110)
Nat Res/Parks &Recreation	3.742	4.800	-1.139	-2.561	174.818	12.742	-148.397	-395.807
	(2.980)	(5.548)	(9.116)	(3.524)	(56.807)[a]	(191.903)	(124.362)	(81.757)[a]
Police, Fire & Corrections	-2.190	4.012	20.274	2.238	-1.108	-367.477	210.739	89.281
	(2.904)	(5.425)	(8.993)[b]	(3.480)	(55.689)	(166.145)[b]	(108.062)[c]	(70.437)
Public Welfare	-0.099	-1.840	-3.106	0.698	12.099	19.701	33.500	-1.893
	(0.624)	(1.162)	(1.906)	(0.736)	(11.895)	(37.629)	(24.621)	(15.865)
Sanitation and Sewerage	1.000	-5.507	2.599	-0.572	-43.278	114.483	-58.229	31.866
	(1.459)	(2.730)[b]	(4.546)	(1.760)	(28.066)	(90.218)	(58.089)	(38.615)
Rho	0.26[b]	0.19	-0.04	-0.07	0.12	-0.35[b]	-0.21	-0.49[a]
Fiscal Variables Wald Chi-square	79.88	82.80	63.13	8.41	37.28	18.94	28.33	44.55
	(p=0.00)	(p=0.00)	(p=0.00)	(p=0.87)	(p=0.00)	(p=0.17)	(p=0.01)	(p=0.00)
N	144	144	144	144	144	144	144	144

Notes: [a] denotes significance below the 0.01 level; [b] denotes significance below the 0.05 level; [c] denotes significance below the 0.10 level

Table 6. Synthetic Control Method Match Spatial Error Model Results by Period

	2002-2007								2007-2012								2012-2017							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Own-source Revenue	-			-							-				+		-				-		+	
Individual Income Tax		+				-											+				+		-	
Corporate Income Tax								-					+									-		
Property Tax								+			-	-				+			-	+		-		
Sales & Gross Receipts Tax	+	-	+				-		+	+	+		+				+						-	
Federal Intergovernmental Rev	-	+	+				-	+			+				+			-						
Elementary/ Secondary Education		-										+	+			-					+		+	-
Higher Education				-													-					+	-	+
Health & Hospitals			-										+			-						-	-	
Highways			-				+	-	+	+	+				-					-			-	+
Natural Res/Parks & Recreation					+	+						-				-			+		+			-
Police, Fire & Corrections			+	+		-	+				+	+		-	+	+				-				
Public Welfare		-	-	+		+	+		-	-	-	-				-							+	
Sanitation and Sewerage		-			-		+					-	-		-			+				+		
All fiscal variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: + indicates positive and significant below 0.10 level; - indicates negative and significant below 0.10 level; 1-employment; 2-real per capita GDP; 3-per capita income; 4-population; 5-first regional principal component; 6-poverty; 7-unemployment; 8-second regional principal component; Y-fiscal variables significant below 0.10 level based on Wald Test; N- fiscal variables insignificant below 0.10 level based on Wald Test

Table 7. Robustness Analysis

	2002 Levels Added								Worst Matches Interacted								Supply-Oriented Interacted							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Own-source Revenue	-	-	-	-					-	-	-		-		+								+	
Individual Income Tax		+	+		+				+	+	+		+				+	+	+		+			
Corporate Income Tax			-																-					
Property Tax	-		-					+			-					+	-		-					+
Sales & Gross Receipts Tax	+	+	+						+	+	+				-		+	+	+					
Federal Intergovernmental Rev	-						+		-								-							
Elementary/ Secondary Education					+										+						+			
Higher Education		-	-				-			-	-			+	-		-	-						
Health & Hospitals														-	-	-								-
Highways	+	+		-				+	+	+							+	+						
Natural Res/Parks & Recreation					+			-					+			-					+			-
Police, Fire & Corrections			+					+	-					-		+						-	+	
Public Welfare			-																				+	
Sanitation and Sewerage					-					-				+										

Notes: + indicates positive and significant below 0.10 level; - indicates negative and significant below 0.10 level; 1-employment; 2-real per capita GDP; 3-per capita income; 4-population; 5-first regional principal component; 6-poverty; 7-unemployment; 8-second regional principal component

APPENDICES

Appendix A

Appendix Table A1. Predictor Variable Principal Component Factor Loadings

Panel A. Demographics, Natural Amenities and Urbanization Predictor Principal Components (PC)						
	Natural Amenities Principal Component	Urbanization Principal Components		Demographic Principal Components		
	PC_Amen	PC_Urb1	PC_Urb2	PC_Dem1	PC_Dem2	PC_Dem3
Amenity Rank	0.675					
Recreation Dependence	0.296					
Retirement Destination	0.676					
Persistent Poverty		-0.273	-0.708			
Population Density		0.424	0.045			
Population Loss		-0.228	0.578			
Rural_Urban_Continuum		-0.495	0.214			
Percent Metro		0.480	-0.209			
Per Capita Income		0.467	0.270			
African-American				-0.320	-0.508	0.155
Hispanic				0.378	-0.330	-0.248
Native American				0.245	0.078	-0.580
Age 25-54				0.249	-0.149	0.518
Female				-0.467	-0.126	0.180
Married				-0.180	0.484	-0.037
High School Only				-0.301	0.478	0.108
Associate Only				0.364	0.351	0.228
Bachelor's and Above				0.398	0.062	0.461

Panel B. Industry Composition Principal Components						
	PC_Ind1	PC_Ind2	PC_Ind3	PC_Ind4	PC_Ind5	
Ag., Fisheries, Forestry	-0.097	0.203	0.113	-0.251	0.571	
Oil and Gas	0.198	0.414	-0.266	0.355	-0.075	
Prof_Sci_Tech	0.244	-0.366	0.092	0.292	0.264	
Manufacturing	-0.480	-0.003	-0.020	-0.030	-0.016	
Nondurables-Durables	0.070	0.259	0.204	0.100	0.600	
Farm Dependence	0.048	0.263	0.323	-0.449	-0.271	
Manufacturing Depend.	-0.429	-0.028	-0.137	0.160	-0.088	
Mining Dependence	0.218	0.381	-0.293	0.360	-0.083	
Emp. Comp. ('98-'02)	0.202	-0.456	0.000	0.004	-0.160	
Emp. Comp. ('90-'00)	0.430	-0.206	0.117	0.059	0.042	
Wage Comp. ('98-'02)	0.351	0.036	-0.010	-0.303	0.058	
Spatial Emp. Comp.	-0.034	0.193	0.488	0.335	-0.161	
Spatial Wage Comp.	0.002	0.074	0.629	0.230	-0.202	
Ind. Diversity Gini ('02)	0.270	0.277	-0.093	-0.312	-0.227	

The control/predictor variables are used directly in the first two sets of regressions and indirectly in the third set in constructing the synthetic control counterfactuals. Table 3 shows the principal component factor loadings for the predictor variables by group; the principal components selected from each group all had eigenvalues in excess of one. The state rankings for the principal components are given in Appendix Table 1. From Panel A, the first column shows the factor loadings for the sole principal component (with an eigenvalue over one) for the three natural amenity variables. The loadings are largest for the amenity rank and retirement destination variables.

The first principal component for urbanization is fairly equally related to the four variables that most likely directly measure urbanization: population density; rural-urban continuum classification; percent of the population in metropolitan areas; and per capita income. The negative sign for the rural-urban continuum code variable reflects the larger index values for having a larger share of smaller counties in the state. Persistent poverty status and population loss are inversely related to urbanization. The second principal component for urbanization is most positively related to the state share of counties with persistent population loss but negatively related to state share of counties with persistent poverty.

The first principal component for demographic characteristics is positively related to the Hispanic and Native American population shares, college graduate (bachelor's and associate's) shares, and working age population. It is negatively related to the African-American population share, the female population share, the married population share, and the share of the adult population that only completed high school. The second demographic principal component is most negatively related to the African-American and Hispanic population shares and most positively related to the married population share and the population shares with high school completion only and an associate college degree only. The third demographic principal component is most positively correlated with working age population and the Bachelors' degree share and most negatively related to the Native American population share.

From Panel B, the first principal component for industry composition is most positively correlated to the employment-based industry composition variable for 1990-2000 and most negatively correlated with manufacturing dependence. It also is positively related to the employment-based and wage-based industry composition measures for 1998-2002, more unequal industry employment shares as measured by a larger Gini coefficient in 2002, mining dependence, and greater shares of employment in professional, scientific, and technical services, and the oil and gas sector. The second principal component for industry composition is most positively related to the oil and gas sector and mining dependence of the state. It is most negatively related to the employment-based industry composition variable for 1998-2002.

The third principal component is most positively related to the relatively stronger relative industry-based growth of employment and wages of a state's neighbors. The component also is positively related to farm dependence and the difference in nondurable manufacturing and durable manufacturing employment shares. It is negatively related to the oil and gas employment share and mining dependence.

The fourth principal component for industry composition is most positively related with the oil and gas employment share and mining dependence. In contrast to the second industry composition principal component which is related to the mining sector, the fourth principal component is negatively related to farm dependence and agricultural, forestry and fishery services and positively related to the employment share of professional, scientific, and technical services. There is some positive association with spatial employment and wage growth and it is associated with a more diverse economy as reflected by the negative association with the GINI coefficient. It is also negatively associated with wage-based industry composition growth over 1998-2002. The fifth and final industry composition principal component is dominated by strongly positive associations with agricultural, forestry and fishery services and with a large difference in the nondurable manufacturing employment share relative to the durable manufacturing employment share.

Appendix Table A2. Predictor Variable Principal Component Scores

	PC Amen	PC Urb1	PC Urb2	PC Dem1	PC Dem2	PC Dem3	PC Ind1	PC Ind2	PC Ind3	PC Ind4	PC Ind5
AL	-0.27	-0.90	-0.93	-2.32	-1.35	-0.18	-2.55	1.38	-0.59	-0.33	2.20
AZ	4.64	0.57	-0.86	2.47	-0.73	-2.08	1.68	-1.25	0.93	0.26	-0.88
AR	0.40	-2.00	-0.59	-2.97	0.04	-1.19	-3.01	1.80	1.24	-0.27	0.86
CA	1.44	2.10	-0.35	4.07	-2.34	0.25	0.86	-2.59	-1.04	-0.22	1.05
CO	1.13	1.21	-0.09	2.99	-0.58	1.63	2.00	-1.61	0.73	0.76	-0.02
CT	-0.36	3.56	0.39	0.92	-0.16	1.81	0.30	-1.79	-2.55	-1.21	-0.39
DE	0.22	1.60	-0.10	-0.45	-0.28	1.14	1.83	-0.89	-1.35	-1.07	1.11
FL	1.98	1.61	-0.63	-0.94	1.34	0.10	3.12	-1.53	-0.82	-1.49	0.72
GA	-0.01	0.33	-1.02	-0.96	-2.06	1.05	-0.75	0.06	1.30	0.61	1.27
ID	1.15	-1.02	0.01	0.88	1.14	-1.24	-0.08	1.22	0.67	-2.04	2.01
IL	-1.45	1.46	0.17	0.06	-1.46	0.62	-0.43	-1.55	1.37	1.60	-0.64
IN	-1.56	0.09	0.26	-1.89	0.69	-0.35	-3.87	-0.79	-0.83	0.96	-1.97
IA	-1.26	-1.47	1.35	-1.16	2.48	-0.04	-1.71	0.37	0.11	-0.22	-0.88
KS	-1.15	-0.79	0.99	-0.25	0.84	-0.20	-1.21	0.30	0.33	0.37	-0.83
KY	-0.82	-1.97	-0.93	-2.12	0.14	-0.82	-1.54	1.38	-1.78	0.04	0.20
LA	-0.65	-1.35	-2.20	-2.48	-3.09	-0.44	2.25	1.99	-0.07	1.07	0.70
ME	0.45	-1.27	0.51	-0.40	1.94	0.66	-0.48	1.85	2.37	-0.33	1.70
MD	-1.10	2.57	0.48	0.65	-0.67	2.39	3.09	-2.00	2.51	1.47	0.28
MA	-0.99	3.59	0.17	1.02	-0.55	1.92	1.09	-2.09	-0.19	0.43	-0.29
MI	-0.85	0.43	0.94	-0.57	-0.69	0.24	-2.47	-1.72	-1.49	0.31	-1.97
MN	-1.09	0.41	0.38	1.27	1.25	1.11	-0.82	-0.98	1.33	1.12	-0.85
MS	-0.52	-3.54	-2.84	-2.59	-3.22	-0.65	-2.57	2.20	0.45	-1.21	0.40
MO	-0.26	-0.27	-0.57	-1.71	-0.01	-0.06	-0.53	-0.64	0.85	0.77	-0.42
MT	1.11	-2.81	0.69	0.95	1.51	-1.56	2.23	1.20	0.44	-1.33	1.07

NE	-1.33	-0.99	0.84	-0.31	1.34	-0.07	0.71	1.09	2.54	-1.14	-1.15
NV	3.91	1.13	-0.34	2.03	-0.19	-0.27	3.01	-0.49	-1.08	-1.30	-0.89
NH	0.27	0.45	0.49	1.39	1.56	1.99	-1.09	-1.36	-2.69	-1.49	-0.66
NJ	-0.56	4.39	0.11	0.22	-0.67	1.53	1.39	-1.73	1.54	1.39	0.47
NM	1.61	-1.97	-2.41	3.14	-2.18	-3.93	3.66	0.71	-0.55	0.64	-0.31
NY	-0.91	2.12	0.51	0.33	0.75	0.88	1.87	-2.25	-1.27	-0.54	1.06
NC	-0.29	-0.27	-0.47	-0.77	-0.17	0.59	-3.17	0.84	-0.16	0.35	1.20
ND	-1.71	-2.92	2.06	2.04	1.85	-1.22	1.75	2.64	2.21	-2.25	-1.84
OH	-1.37	0.22	1.34	-1.67	0.16	0.23	-2.72	-0.72	-0.21	1.14	-1.25
OK	-0.60	-0.87	-0.53	-0.07	0.67	-2.62	0.53	0.72	0.19	0.43	-0.76
OR	1.22	0.36	-0.24	1.05	0.85	0.30	-0.82	-0.38	1.09	0.16	1.55
PA	-0.82	0.45	1.72	-2.09	0.89	0.31	-0.72	-1.16	-0.16	0.92	0.17
RI	-0.18	3.25	-0.49	-0.09	-0.31	0.53	0.73	-1.06	-0.78	-1.44	-1.07
SC	-0.07	-0.73	-0.85	-1.47	-1.43	0.55	-3.12	1.17	-0.72	0.03	1.52
SD	-0.92	-2.51	0.80	0.07	2.11	-2.39	0.14	2.15	1.71	-3.05	-2.64
TN	-0.35	0.06	-0.45	-1.93	-0.66	0.09	-2.54	-0.04	-0.28	0.66	-0.07
TX	0.27	0.44	-1.30	1.57	-2.38	-0.59	0.97	-0.24	0.88	0.75	-0.03
UT	1.06	-0.19	-0.50	1.36	-0.96	-1.87	1.17	-0.69	-0.62	-0.26	-0.66
VT	0.92	-2.03	0.79	0.81	1.01	1.33	-0.28	-0.19	-0.20	-0.64	-0.61
VA	-0.55	1.19	-0.03	-0.35	-0.59	0.98	0.90	-1.27	1.08	1.94	1.34
WA	0.81	1.39	-0.21	2.31	0.58	0.99	-0.30	-1.12	-1.54	-1.51	1.82
WV	-0.93	-2.72	1.82	-3.05	1.28	-1.06	0.62	3.51	-1.93	1.09	0.40
WI	-0.81	-0.04	0.71	-0.31	1.13	0.17	-3.35	-0.43	0.03	0.82	-1.04
WY	1.13	-2.37	1.42	1.35	1.19	-0.55	4.23	5.99	-2.97	3.26	-0.99

Appendix B

We further use principal components to account for national cyclical effects in the regional principal components above in the pooled sample regressions and to facilitate interpretation of the regional principal components. The incidence of national shocks can vary spatially (Greenaway-McGrevy and Hood (2019), which suggests that time fixed effects imperfectly control for national cycles. The regional loadings on the national principal components are included in the base regional principal component regressions to control for spatially-varying national cyclic effects.

We extract the national cyclic effects from the 48 state loadings on each of the two regional principal components. We first select the national cyclic principal components with eigenvalues in excess of one for the first set of 48 regional principal component loadings and then for the second set of 48 regional principal component loadings. For the first regional principal component, this produces two national cyclic principal components. For the second regional principal component, this produces six national cyclic principal components.[19] The state factor loadings on each of the components then are included in the base regressions for the regional principal components to control for national effects.

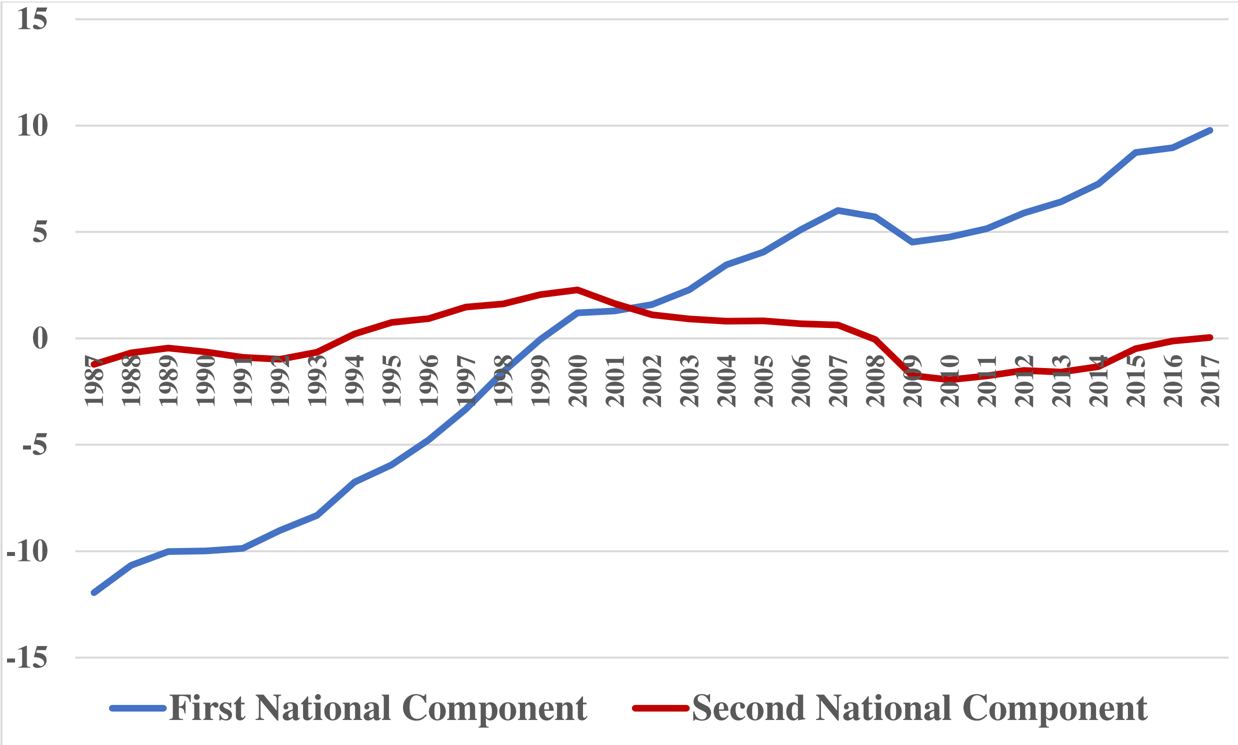
Appendix A Figure 1 displays the times series movement of the two national cyclic components (common factors) extracted from the first set of regional principal component factor loadings. That is, principal component analysis is first used to extract the common movement of the six outcome variables for each state, which results in two common factors for each state. Then principal components is applied to each of the two common factors for the 48 states extracted from the six outcome variables to derive the national cyclic influence.

The first national cyclic principal component for the first regional common factor shows general economic growth punctuated by flat spots during the 1990-1991 and 2001 recessions, the decline during the Great Recession, and a flat spot during 2015-2016. The second national cyclic

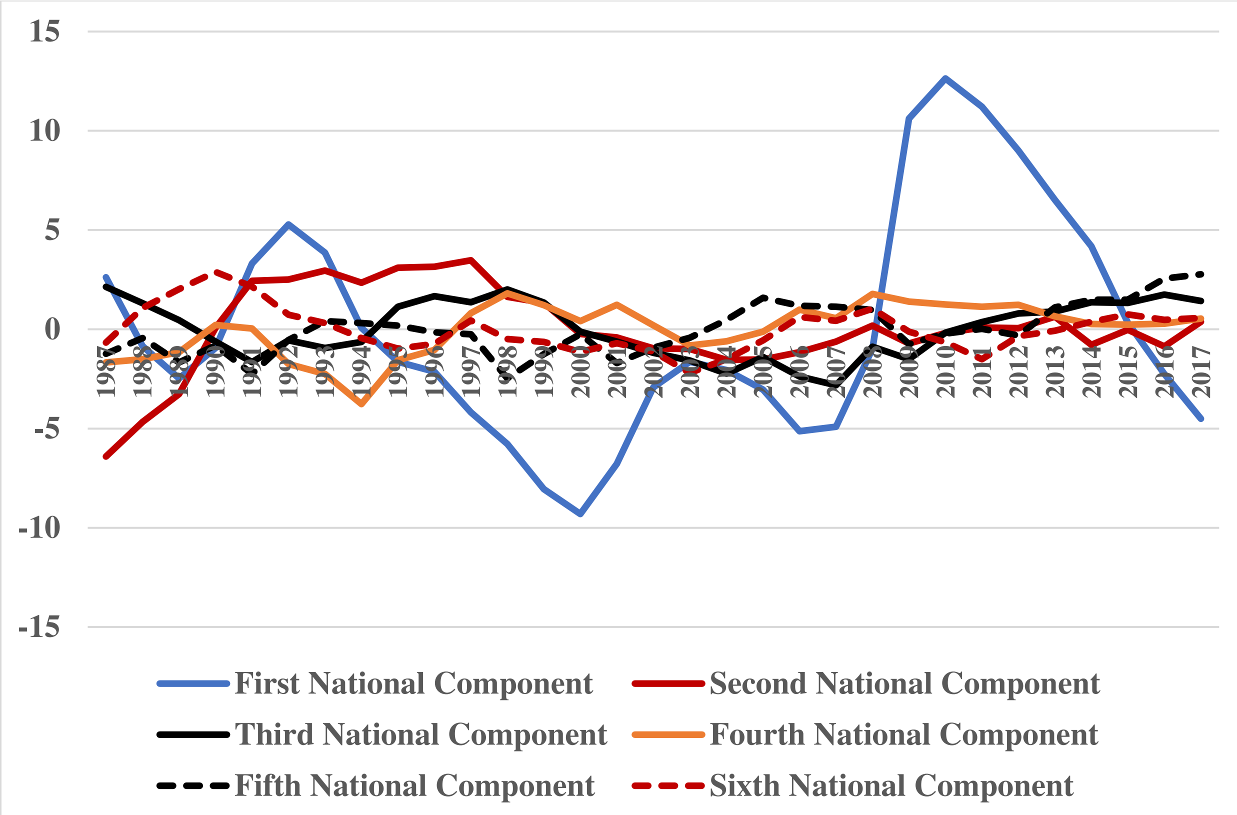
[19] Explaining over ninety-seven percent of the variation in the first regional principal component, the eigenvalues for the two national cyclic principal components are 45.37 and 1.42. Explaining over eighty-eight percent of the variation in the second regional principal component, the eigenvalues for the six national cyclic principal components are 31.13, 4.75, 1.97, 1.68, 1.60 and 1.23. See Appendix Figures 1 and 2.

principal component extracted from the first regional common factor shown in Appendix Figure 1 displays flat growth from 1987-1993, and positive growth from 1993-2000, a decline from 2000 to 2007, the Great Recession decline and absence of a recovery until 2015. The state factor loadings on each of the two national cyclic components (common factors) are then included in the base regression for the first regional principal component. Because the state factor loadings on the national cyclic components (common factors) vary, the national cyclic effects on the state's economic performance, as measured by the regional cyclic components, differ across states, which contrasts with spatially-invariant time fixed effects.

Appendix A Figure 2 displays the times series movement of the six national cyclic components extracted from the second regional principal component loadings. The movements of the first national cyclic component likely reflect the increases (decreases) in unemployment rates, decreases (increases) in labor force participation rates, and increases (decreases) in poverty rates that occur during economic contractions (expansions). The movements of the remaining five national cyclic components for the second regional principal component are small by comparison as reflected in their much smaller eigenvalues. The state factor loadings on the six national cyclic factors are included in the base regression for the second regional common factor.



Appendix B Figure 1. National Cyclic Effects in First Regional Principal Component



Appendix B Figure 2. National Cyclic Effects in Second Regional Principal Component

Appendix B. Table Pooled Panel Least Squares Results: National Cyclic Effects (2002-2007, 2007-2012, 2012-2017)*

	RegCmp 1	RegCmp 2
Industry Composition	5.520 (5.238)	-6.094 (3.853)
Spatial Industry Composition	-3.645 (6.330)	-4.173 (5.526)
Own Source Revenue	1.384 (2.900)	6.474 (3.378)[c]
Individual Income Tax	10.606 (18.313)	-7.130 (22.434)
Corporate Income Tax	7.837 (33.414)	-8.061 (46.374)
Property Tax	-27.246 (17.971)	8.136 (22.258)
Sales & Gross Receipts Tax	21.459 (13.695)	10.347 (20.348)
Federal Intergovernmental Rev	-5.88 (1.169)	-1.243 (6.595)
Elementary/ Secondary Education	39.143 (17.369)[b]	-10.545 (20.286)
Higher Education	29.205 (28.954)	77.513 (36.546)[b]
Health & Hospitals	6.359 (14.262)	12.138 (19.525)
Highways	-23.206 (16.315)	14.766 (20.084)
Natural Res/Parks & Recreation	63.027 (48.470)	-1.255 (58.314)
Police, Fire & Corrections	-80.937 (49.636)	-93.300 (58.401)
Public Welfare	-8.613 (10.973)	-18.922 (10.205)[c]
Sanitation and Sewerage	4.219 (23.845)	31.980 (31.078)
PC Amen	0.046 (0.042)	-0.037 (0.048)
PC Urban 1	-0.041 (0.051)	0.026 (0.057)
PC Urban 2	-0.031 (0.037)	0.013 (0.047)
PC Demographics 1	-0.043 (0.050)	-0.044 (0.065)
PC Demographics 2	-0.066 (0.060)	0.000 (0.061)
PC Demographics 3	-0.044 (0.055	-0.027 (0.082)
PC Industry Composition 1	0.123 (0.090)	0.003 (0.106)

PC Industry Composition 2	-0.087 (0.062)	-0.009 (0.065)
PC Industry Composition 3	0.050 (0.040)	0.007 (0.047)
PC Industry Composition 4	-0.055 (0.045)	0.016 (0.057)
PC Industry Composition 5	0.072 (0.051)	-0.032 (0.065)
PC National Cycle Effects	Y	Y
R-squared	0.75	0.94
Regression F-statistic	11.89 (p=0.00)	50.78 (p=0.00)
Fiscal Variables Wald Chi-Square	20.29 (p=0.12)	23.01 (p=0.06)
N	144	144

Notes: [*]Absolute Value White Heteroscedastic Robust-Standard Errors in Parentheses; [a] denotes significant below the 0.01 level;
[b] denotes significant below the 0.05 level; [c] denotes significant below the 0.10 level

Appendix C

	AL	AZ	AR	CA	CO	CT	DE	FL	GA	ID	IL	IN	IA	KS	KY	LA	ME	MD	MA	MI	MN	MS	MO	MT	NE	NV	NH	NJ	NM	NY	NC	ND	OH	OK	OR	PA	RI	SC	SD	TN	TX	UT	VT	VA	WA	WV	WI	WY
AL	0	0	0	0	0	0	0.072	0.103	0	0.083	0	0.022	0	0	0	0	0	0	0	0	0	0.648	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.243	0	0	0	0	0	0.033	0	0	0	0
AZ	0	0	0	0	0	0	0	0	0.139	0.005	0	0	0	0	0	0	0	0	0	0	0	0	0.109	0	0	0.304	0	0	0	0	0	0.734	0	0.14	0.326	0	0	0	0	0	0	0.271	0	0	0	0	0.266	0
AR	0	0	0	0	0	0	0	0	0	0.04	0.277	0	0.046	0	0.211	0	0	0	0	0	0	0.083	0.105	0	0	0	0	0	0	0	0	0	0.358	0	0.033	0	0	0	0	0.086	0	0	0	0	0	0.1	0	0
CA	0	0	0	0	0.022	0.192	0	0	0.094	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.043	0	0.88	0	0	0	0	0	0	0	0	0	0	0.078	0.018	0	0	0	0	0	0
CO	0	0	0	0	0	0	0.054	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.044	0	0.19	0	0	0
CT	0	0	0	0.105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.082	0	0	0
DE	0.012	0	0	0	0	0	0	0.038	0	0	0	0	0	0	0	0.288	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FL	0	0	0	0	0	0	0.074	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.267	0	0	0	0	0	0	0	0
GA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.009	0	0	0	0	0.017	0	0	0.013	0	0	0	0	0	0	0.427	0	0	0	0	0	0.039	0	0	0	0
ID	0.129	0	0	0	0	0	0	0.108	0	0	0	0	0	0	0	0	0.085	0	0	0	0	0	0	0.349	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.286	0	0	0
IL	0	0	0.231	0	0.343	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.654	0	0	0.022	0	0	0	0	0.017	0	0	0	0	0.026	0	0.006	0	0	0	0	0	0.312	0	0	0	0	0.216	0	0
IN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.111	0	0	0	0.13	0	0	0	0	0	0	0	0	0	0	0.012	0	0.238	0	0	0.264	0.219	0	0	0	0	0	0	0	0
IA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.068	0	0	0	0	0	0	0	0	0	0	0	0
KS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.139	0	0	0	0	0.173	0	0.162	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.199	0	0	0	0	0	0	0	0	0	0	0	0.019	0	0
LA	0	0	0	0	0	0	0.33	0	0.026	0	0	0.01	0	0	0	0	0	0	0.051	0	0	0.249	0.193	0	0	0	0	0	0.135	0	0.066	0	0	0	0	0	0	0	0	0	0.12	0	0	0	0	0.311	0	0
ME	0	0	0	0	0	0	0	0.129	0	0.068	0	0	0.22	0	0	0	0	0.258	0	0	0	0	0	0	0	0	0	0.24	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0.301	0	0	0	0	0
MD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.418	0	0.146	0	0	0	0.037	0	0.05	0	0	0.377	0	0	0	0	0	0	0	0	0.084	0	0	0	0	0	0	0.41	0	0	0	0.289
MA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MI	0	0	0	0	0	0	0	0	0	0	0.472	0.025	0.231	0	0	0.187	0	0	0	0	0.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.005	0.001	0	0	0	0	0
MN	0	0	0	0	0.116	0	0	0	0	0	0	0	0	0	0	0.196	0	0	0	0.346	0	0	0.322	0	0	0	0.568	0.102	0.304	0	0.03	0	0	0.138	0	0	0.011	0	0	0	0	0	0	0	0	0	0	0
MS	0.578	0	0.23	0	0	0	0	0	0.203	0	0	0	0	0	0.143	0	0	0	0	0	0	0	0.055	0	0	0	0	0	0.144	0	0	0	0	0	0	0	0	0.065	0	0.206	0	0.02	0.107	0	0	0	0	0
MO	0	0	0	0	0	0	0	0.036	0	0	0	0	0	0	0.249	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.234	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MT	0	0	0	0	0	0	0	0	0	0.443	0	0	0	0.265	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.417	0	0	0	0	0	0	0	0	0	0	0	0	0	0.223	0	0	0	0	0.364
NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.018	0	0	0	0	0	0	0	0	0	0	0.001	0.136	0	0	0	0	0	0	0.031	0	0	0	0	0	0
NV	0	0.293	0	0	0.29	0.059	0	0.144	0	0	0	0	0	0.058	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.016	0	0	0	0	0	0	0.442	0	0.486	0.064
NH	0	0	0	0	0	0.121	0	0.304	0	0	0	0	0	0	0	0	0	0	0	0	0.397	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.012	0	0	0	0	0.313	0	0	0	0	0
NJ	0	0	0	0.358	0	0	0	0	0	0	0	0.014	0	0	0	0	0.485	0.393	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.698	0	0	0	0	0	0	0	0	0	0	0
NM	0	0	0	0	0.153	0	0	0	0	0	0	0.142	0	0	0	0.099	0	0	0	0	0.273	0.021	0	0.242	0	0	0	0.05	0	0	0.169	0	0	0	0	0	0	0	0	0	0	0.074	0	0	0	0	0	0
NY	0	0.043	0	0.514	0	0.141	0	0.023	0	0	0	0	0	0	0.026	0	0	0	0.442	0	0	0	0	0	0.054	0	0.401	0	0	0	0	0	0	0.115	0	0	0	0	0	0	0.086	0.001	0	0.101	0	0	0	0
NC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.207	0	0	0	0	0	0	0	0	0	0.247	0
ND	0	0.45	0	0	0	0	0	0	0	0.084	0.023	0	0	0	0	0	0	0	0	0	0	0	0	0	0.335	0.059	0.031	0	0	0.12	0	0	0.315	0	0.001	0	0	0	0.112	0	0	0.092	0.011	0	0	0	0	0
OH	0	0	0.539	0	0	0.108	0	0	0	0	0	0	0.309	0.364	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.266	0	0	0	0.216	0	0	0	0.221	0	0.137	0	0	0	0	0	0
OK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.214	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.038	0	0	0	0.354	0	0
OR	0	0.215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.044	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PA	0	0	0	0	0	0	0	0	0	0	0	0.439	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.056	0	0	0	0	0	0	0	0	0	0	0.044	0	0	0	0
RI	0.107	0	0	0.019	0	0.192	0.135	0	0	0	0	0.03	0	0	0	0	0	0.149	0	0	0	0	0	0	0.287	0.018	0	0.153	0	0	0.265	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SC	0.173	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SD	0	0	0	0	0	0	0	0.029	0	0.019	0	0	0.137	0	0	0	0	0	0	0	0	0	0	0	0.061	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.062	0	0	0	0.283
TN	0	0	0	0	0	0	0	0	0	0	0	0.257	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TX	0	0	0	0.004	0	0	0	0	0	0	0.229	0	0	0	0	0	0	0	0.112	0	0	0	0	0	0	0	0	0	0	0	0	0	0.118	0.265	0	0	0	0	0.126	0	0	0.313	0	0.015	0	0	0	0
UT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.404	0	0	0	0	0	0	0
VT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.081	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VA	0	0	0	0	0	0	0	0	0.538	0	0	0.046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.174	0	0	0	0	0	0	0	0	0	0	0	0
WA	0	0	0	0	0.076	0.188	0.335	0.086	0	0.258	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.265	0	0	0	0	0	0	0	0	0	0.176	0	0.143	0	0	0	0	0	0.295	0	0	0	0
WV	0	0	0	0	0	0	0	0	0	0	0	0	0.056	0	0	0.23	0.012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WI	0	0	0	0	0	0	0	0	0	0	0	0	0	0.313	0.046	0	0	0.01	0.139	0	0	0	0	0	0.213	0.215	0	0	0	0	0.273	0	0.083	0	0.234	0.128	0	0	0	0	0	0	0	0	0	0	0	0
WY	0	0	0	0	0	0	0	0	0	0	0	0.016	0	0	0	0	0	0	0	0	0	0	0	0.328	0	0	0	0	0	0	0	0	0	0	0	0	0	0.122	0.469	0	0	0	0	0	0	0	0	0

	AL	AZ	AR	CA	CO	CT	DE	FL	GA	ID	IL	IN	IA	KS	KY	LA	ME	MD	MA	MI	MN	MS	MO	MT	NE	NV	NH	NJ	NM	NY	NC	ND	OH	OK	OR	PA	RI	SC	SD	TN	TX	UT	VT	VA	WA	WV	WI	WY
AL	0	0	0	0	0	0	0.005	0	0	0.229	0	0	0	0	0	0.128	0	0	0	0	0	0.541	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.619	0	0.006	0	0	0	0	0.255	0	0	0
AZ	0	0	0	0.035	0	0	0	0.065	0.063	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.047	0	0.168	0	0	0.117	0	0	0	0	0	0.161	0	0	0	0	0	0	0	0	0	0	0	0	0
AR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.229	0	0	0.239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.099	0	0.649	0	0	0	0	0.076	0
CA	0	0	0	0	0	0.157	0.088	0.257	0	0	0	0	0	0.077	0	0	0.143	0	0	0	0.028	0	0	0	0	0	0	0.008	0.313	0.729	0	0	0	0	0	0	0	0.054	0	0	0.127	0	0	0	0.18	0	0	0
CO	0	0.045	0.324	0	0	0	0	0	0	0	0.211	0	0	0	0	0	0	0	0	0	0	0	0	0	0.496	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.076	0	0	0	0	0.101	0	0.101	0
CT	0	0	0	0.239	0	0	0	0	0	0	0	0	0	0	0	0	0	0.326	0.268	0	0	0	0	0	0	0	0	0.158	0	0	0.025	0	0	0	0	0.413	0.643	0	0	0	0	0	0	0	0	0	0	0
DE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.378	0	0	0	0
FL	0	0	0	0.248	0	0	0.156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.106	0	0	0	0	0	0	0	0	0.037	0	0	0	0	0	0	0	0	0	0	0	0
GA	0.085	0.201	0	0	0	0	0.444	0	0	0	0	0	0	0	0	0.005	0	0.364	0	0	0	0	0.165	0	0	0.275	0	0.139	0	0	0	0	0.243	0	0	0	0	0	0	0.023	0	0	0	0	0	0	0	0
ID	0	0	0.052	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.119	0	0	0	0	0	0	0	0	0	0	0.361	0	0	0	0	0	0	0	0	0	0	0	0	0
IL	0	0	0	0	0.383	0	0	0	0	0	0	0	0	0.066	0	0	0	0.045	0.168	0.548	0.246	0.063	0	0	0	0	0	0	0	0	0.14	0	0	0	0	0	0	0	0	0.062	0.395	0	0	0.245	0	0	0	0
IN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.125	0	0	0	0	0	0.298	0.081	0.395	0	0	0	0	0	0	0	0.134	0	0	0	0	0	0	0	0.39	0.251	0	0	0	0	0	0	0.226	0
IA	0	0	0	0	0	0	0	0	0	0	0	0	0	0.006	0	0	0	0	0	0	0	0	0	0	0.041	0	0	0	0	0	0.058	0	0	0.084	0	0	0	0	0.419	0	0	0	0	0	0	0.035	0.082	0
KS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.206	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LA	0.154	0	0	0	0.086	0	0	0	0	0	0	0	0	0	0.119	0	0	0	0	0	0	0.012	0.197	0	0	0	0	0	0	0	0	0	0	0.158	0	0	0	0	0	0.023	0.361	0	0	0	0	0.412	0	0
ME	0	0	0	0	0	0	0.01	0	0	0.086	0	0	0.127	0	0	0	0	0	0	0	0	0	0.243	0	0	0	0	0	0	0	0.159	0	0	0	0.041	0	0	0	0	0	0	0	0.683	0.001	0	0	0	0
MD	0	0.202	0	0	0	0	0	0	0.048	0	0	0	0	0	0	0	0	0	0	0	0.098	0	0	0	0	0	0	0.244	0	0	0	0	0	0	0	0.121	0	0	0	0	0	0	0	0	0	0	0	0.301
MA	0	0	0	0	0	0	0	0	0	0	0.128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.398	0.237	0	0	0	0	0	0	0	0	0	0.05	0	0	0	0	0	0.222	0	0	0	0
MI	0	0	0	0	0	0	0	0	0	0	0.398	0.041	0	0.245	0	0	0	0	0	0	0	0	0	0	0	0	0.108	0	0	0	0.234	0	0	0	0	0	0	0	0	0	0	0.351	0.014	0	0	0	0	0
MN	0	0	0	0	0	0	0	0	0	0	0	0	0	0.134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.203	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MS	0.551	0	0	0	0	0	0	0.012	0	0	0	0	0	0	0.301	0.322	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.114	0	0	0.04	0	0	0	0.018	0	0.098	0	0	0	0	0	0	0.003	0
MO	0	0	0	0	0	0	0	0	0	0	0	0.341	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.152	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MT	0	0	0	0	0	0	0	0	0	0.485	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.224	0	0	0	0.473	0	0	0.485	0	0	0.087	0	0	0	0	0	0	0	0	0	0	0.109	0	0
NE	0	0.06	0.156	0	0.343	0	0	0	0	0	0	0	0.252	0	0	0	0	0	0	0	0	0.033	0	0.153	0	0.022	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NV	0	0.019	0	0	0.11	0	0	0	0.162	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.038	0	0	0	0	0	0	0	0	0
NH	0	0	0	0	0	0	0	0.128	0	0	0	0	0	0	0	0	0	0	0.327	0.222	0.048	0	0	0	0	0	0	0	0	0.033	0	0.292	0	0	0	0	0	0.044	0	0	0	0	0	0	0.061	0	0	0
NJ	0	0	0	0	0	0	0	0.056	0	0	0	0	0	0	0	0	0	0	0.152	0	0.018	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.058	0.215	0	0	0	0	0	0	0	0	0	0
NM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.046	0	0	0	0	0	0	0	0	0.075	0	0	0	0	0	0	0	0	0	0	0.004	0	0	0	0	0	0	0	0	0	0	0	0	0.125
NY	0	0	0	0.478	0	0.077	0.111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.228	0.212	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.587	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.344	0	0	0	0	0	0	0	0	0	0	0	0	0
ND	0	0	0	0	0	0	0	0	0.135	0.082	0	0	0	0	0	0	0	0	0	0.068	0.101	0	0	0.186	0	0	0.16	0	0.097	0.062	0	0	0	0	0	0	0.144	0	0	0	0	0	0.303	0	0	0	0	0.463
OH	0	0.425	0	0	0	0	0	0	0.531	0	0	0.028	0	0.175	0.281	0	0	0.047	0	0	0	0	0	0	0	0.14	0	0	0	0	0.137	0	0	0	0	0.405	0.155	0	0	0	0	0	0	0	0	0.325	0.468	0
OK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.054	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.096	0	0	0	0	0.019	0	0	0	0	0	0	0	0	0
OR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PA	0	0	0	0	0	0.093	0.043	0	0	0	0	0	0	0.144	0	0	0	0.218	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.251	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RI	0	0	0	0	0	0.673	0	0.124	0	0	0	0	0	0	0.054	0	0	0	0	0	0	0	0	0	0	0.095	0	0.001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SC	0.21	0	0	0	0	0	0	0.357	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.246	0	0	0	0	0	0	0	0
SD	0	0.047	0	0	0	0	0	0	0	0	0	0	0.493	0.116	0.02	0	0	0	0	0	0	0	0	0	0	0.146	0	0	0	0	0	0	0	0.024	0	0	0	0	0	0	0.039	0	0	0.144	0	0	0	0
TN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.041	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.044	0
TX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.403	0	0	0
UT	0	0	0.468	0	0.078	0	0	0	0	0	0.263	0	0	0	0	0	0	0	0	0.162	0	0	0	0	0	0	0	0	0	0	0	0.015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.27	0	0	0	0.073	0	0	0	0	0	0	0	0	0.084	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VA	0	0	0	0	0	0	0.143	0	0	0	0	0	0	0.038	0	0	0	0	0.085	0	0.076	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0.078	0	0	0	0	0	0	0
WA	0	0	0	0	0	0	0	0	0	0.117	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.091	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WV	0	0	0	0	0	0	0	0	0	0	0	0	0.053	0	0	0.411	0	0	0	0	0	0	0	0.252	0	0	0	0	0	0	0	0	0.038	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.111
WI	0	0	0	0	0	0	0	0	0	0	0	0.59	0.076	0	0	0	0	0	0	0	0.015	0	0	0	0	0.154	0	0	0	0	0	0	0.468	0.038	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WY	0	0	0	0	0	0	0	0	0.059	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.167	0	0	0	0	0	0	0	0.208	0	0	0	0.023	0	0	0.134	0.085	0	0	0	0	0	0.119	0	0

Appendix C Figure. Synthetic Control Weights: Second Regional Principal Component

Appendix D Table. Fiscal Policy Effects (%): One-Percent Increase in Revenue/Expenditure

	Emp	Per GDP	Per Inc	Pop	RegPC 1	Poverty	Unemp	RegPC 2
Own Source Revenues	-0.067	-0.101	-0.214	-0.060	0.000	0.000	0.032	0.000
Corporate Income Tax	0.000	0.000	-0.046	0.000	0.000	0.000	0.000	0.000
Individual Income Tax	0.059	0.169	0.215	0.000	1.102	0.000	0.000	0.000
Sales & Gross Receipts Tax	0.118	0.189	0.298	0.000	0.000	0.000	0.000	0.000
Property Tax	-0.060	0.000	-0.286	0.000	0.000	0.000	0.000	2.695
Elementary/ Secondary Education	0.000	0.000	0.000	0.000	1.517	0.000	0.000	0.000
Federal Intergovernmental Rev	-0.045	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Health & Hospitals	0.000	0.000	0.000	0.000	0.000	0.000	-0.013	0.000
Higher Education	0.000	-0.166	-0.244	0.000	0.000	0.000	-0.024	0.000
Highways	0.030	0.069	0.000	0.000	0.000	0.000	0.000	0.000
Natural Res/Parks & Recreation	0.000	0.000	0.000	0.000	0.900	0.000	0.000	-2.038
Police, Fire & Corrections	0.000	0.000	0.311	0.000	0.000	-0.056	0.032	0.000
Sanitation and Sewerage	0.000	-0.049	0.000	0.000	0.000	0.000	0.000	0.000
Public Welfare	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: The tax rates and rates of expenditures on which the one-percent increases are applied are the U.S. averages over the 1997-2017 period.