U.S. State and Local Fiscal Policy and Economic Activity: Do We Know More Now?

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Abstract: Early reviews of the academic literature on the economic effects of state and local taxes and expenditures suggested that not enough was known upon which to base policy. The reviews called for better data and improvements in empirical methodology. This paper reviews studies conducted since the early literature reviews to assess our current state of knowledge. The conclusion of the study is that we know more now. But our knowledge is unlikely to ever be sufficient to provide universal policy guidance. Rather, we suggest that more research is needed on specific state and local policies for specific circumstances, consistent with the general principles that guide place-based policy.

Keywords: State and local taxes; Economic growth

JEL Codes: H2; H72; R12; R38

I. Introduction

The economic effects of state and local taxes and expenditures on economic outcomes has long attracted the attention of policy makers and academic economists alike. Assessing the economic effects of a state or local fiscal policy requires identifying what an economy would look like with and without the policy. The approaches taken by economists to identifying the effects of state and local fiscal policy have been widely varying.

In his book on state and local economic development policy, Bartik (1991) surveys the early literature on the effects of state and local taxes. Bartik reported mixed findings, but on average concluded that there was a small or modest negative relationship between most state and local taxes and regional growth. McGuire (1992) reviewed the Bartik (1991) book and agreed that the literature on the effect of state and local taxes was mixed but concluded that as such the literature did not offer sufficient guidance on which to base policy. McGuire disagreed with the conclusion that there was an overall negative effect of state and local taxes. In a subsequent survey, Wasylenko (1997) also concluded that the findings of the early state and local tax studies often contradicted each other and no general conclusions could be drawn. The literature surveys noted the wide variation in empirical approaches, data sources, and time periods examined. In a subsequent survey, Poot (2000) concluded that better data were needed and methods such as instrumental variables or natural experiments were needed to address potential endogeneity between growth and fiscal policy.

Despite a large volume of studies published since the early literature reviews, whether or not recent studies have greatly improved our understanding of the economic effects of state and local taxes and expenditures has yet to be assessed. Therefore, this paper updates the early literature reviews. We assess the current state of knowledge on the issue and derive lessons to be learned from the literature for policy making.

We find that the more recent academic studies have improved upon earlier studies in terms of methodology. Recent patterns in the literature include use of more fiscal variables, use of more control variables, more routinely addressing potential endogeneity of the state and local

fiscal variables, more specification searches, assessing spatial spillover effects, allowing for nonlinearity in the fiscal policy effects, increased use of micro (individual) data, assessing the sensitivity of estimates to the time period examined, allowing for heterogeneous responses across space and increased use of case studies and natural experiments.

Yet, many of the patterns of the early literature are still evident. Studies routinely continue to use aggregate data at the state, metropolitan or county level. The studies still use different measures of taxes and tax bases. The balanced budget approach of Helms (1985) is much more widely used in aggregate analysis but the studies lack consistency in implementation, making it difficult to compare results. Many studies continue to examine long historical periods, which may no longer be relevant, and continue to assume homogeneous effects across geography.

Below, we first summarize the literature, including discussing the improvements over the early literature. We note the pros and cons of the various approaches in producing policy guidance. We provide summary tables of the studies reviewed, including their characteristics and primary findings. A primary conclusion of the review of the recent studies is that the estimated economic effects of state and local fiscal policy depend upon specific circumstances. To further examine the potential influence of underlying circumstances on estimated state and local fiscal policy effects then, we update the case study of Rickman and Wang (2018) for states recently most increasing or most reducing their personal income tax. The variation in budgetary responses to the changes in personal income taxation allows for examination of the relative effects of changing various state and local taxes and expenditures. The last section of the paper summarizes what can be concluded from this study and suggests directions for future research.

II. Recent Trends in the Literature

Tables 1 and 2 list and characterize the papers reviewed in this study. We include both published and notable unpublished papers. Table 1 details the coverage of the studies by time and geography. The table also includes the outcome and fiscal variables examined and the primary findings of the study. Table 2 lists the control variables and notes whether the issues of potential

spatial spillovers and heterogeneity were assessed. The table also includes the approach taken to address potential endogeneity of the fiscal variables.

Many of the shortcomings in the early literature have been to some degree addressed in the more recent studies. Studies increasingly examined specific fiscal policy instruments rather than simply assess the effects of the total tax burden. Most recent studies included numerous control variables to reduce the possibility of omitted variable bias. The control variables typically accounted for the effects of the national business cycle, state economic cycles, and non-fiscal policy economic shocks. Studies using panels of annual data commonly included cross-section and time fixed effects as did many studies using panels of five-year changes.

Improvements in general economic methodology found their way into the state and local fiscal policy literature. The issue of endogeneity typically has been addressed, or at least was explicitly recognized in most studies. Studies increasingly sought to exploit natural experiments, such as using bordering areas or matching estimators. Following the spatial econometric literature, there was increased recognition of potential geographic spillovers. A number of studies used micro data to more specifically identify the channels of fiscal policy influence. Finally, there also has been increased recognition that state and local fiscal policy effects may depend on underlying circumstances, shifting across time and geography. This has been suggested as one reason for academic studies finding conflicting findings (Ojede and Yamarik, 2012).

Below, we discuss the contributions and the limitations of the studies reviewed for providing guidance in state and local policy making. We discuss the characteristics of the studies and how they contribute to the identification of the economic effects of state and local taxes and expenditures. We also summarize the policy lessons that can be drawn from the results of the studies.

II.1 Budgetary Tradeoffs

Studies using aggregate data increasingly implemented the full balanced-budget (FBB) approach of Helms (1985) (Table 1). The FBB approach includes the tax and expenditure categories that

make up state and local budgets, omitting at least one category during estimation to avoid perfect collinearity. In meta-analysis, Goss (1995) concluded that the early tax studies that did not control for the potential positive effects of state and local government services more likely did not find a negative effect of taxes. This occurs because reduced taxes more likely increase growth when productive government services are held harmless, e.g., by reducing spending on welfare (Helms, 1985). In a review of early studies of state and local government services and economic development, Fisher (1997) concluded that some government services consistently were shown to positively affect economic development, notably highway transportation services, while less support was found for education and public safety services.

Consistent with the early literature, the findings from the more recent aggregate FBB studies regarding the relationship between state and local taxes and expenditures are mixed. Numerous studies found negative tax effects, but often they were noted as economically small. The tax effect can vary in the same study with alternative specifications. Numerous studies also found positive spending effects.

Brown et al. (2003) found negative tax effects but also found some positive spending effects. They then assessed the effect of a combined equal increase in each tax and expenditure. The general result was that most state and local government services were not underprovided, regardless of the tax used to finance the services. The exception was transportation services which mostly either increased growth regardless of the tax used to finance them or had no effect. Higher sales and property taxes more likely reduced growth compared to higher personal income and corporate income taxes. Using a similar model, Taylor and Brown (2006) found comparable results for the same period.

Harden and Hoyt (2003) found that corporate income tax revenue was the only category to have significantly negative effects on economic activity and was argued that it should be lower than sales taxes. They did not find consistent evidence for any expenditure category. Tomljanovich (2004) found only a temporary negative effect of the overall average tax rate. Only corporate income tax rates had a positive long-run effect, while state welfare expenditures

had a negative effect. Both studies concluded though that overall state and local fiscal policy did not much affect state economic growth.

Allowing for nonlinearities in state and local fiscal policy responses, Bania et al. (2007) found that at lower levels, increased taxes to pay for public expenditures on education and highways (the omitted categories) had positive effects on state economic activity; the effect turned negative as the tax and expenditure shares rose. The study did not examine distinct categories of taxes and only considered expenditures on education, highways and other related areas as distinct from health and welfare expenditures and other transfers.

Reed (2008) found significant negative effect of taxes used to fund general state and local expenditures; the tax negative tax result held up when used to fund the category of productive services relative to welfare expenditures and other non-tax revenues. Goff et al. (2012) also examined the effect of the tax burden relative to state government expenditures generally. The overall state tax burden was found to reduce growth, a result which was mostly consistent for personal income taxes but not corporate income taxes.

The negative tax effect of Reed (2008) held up in Reed (2009) when using the sensitivity analysis method of Leamer (1985) and not holding the level of public expenditures constant. Reed noted that the tax effect was modest and also reported that sales taxes and corporate income tax had positive effects relative to other taxes. In further analysis of the robustness of state and local fiscal policy impacts, Alm and Rogers (2011) found that the estimated tax relationship was inconsistent, ranging from negative to positive. The state income personal tax was never statistically negative but was sometimes positive and significant. State and local expenditures had more consistent and expected estimated relationships.

Ojede and Yamarik (2012) found a negative long-run tax effect that was slightly smaller than that reported by Reed (2008). They found positive productive spending effects relative to welfare spending. Sales and property taxes were found to have a negative effect, though there was no effect of the personal income tax.

Yu and Rickman (2013) examined wage rates and housing prices within the general equilibrium framework of Roback (1982) to assess state and local fiscal policy effects on nonmetropolitan county household amenity attractiveness and firm productivity. State personal income taxes relative to the omitted category were found to negatively affect household amenity attractiveness, as did the other categories of taxes including property, sales, and corporate taxes. State spending on highways and the environment and housing also increased household amenity attractiveness. Yet, state spending on education, health and government administration reduced household amenity attractiveness of the nonmetropolitan county.

In another analysis of state and local fiscal variables and county outcomes, Denaux (2007) found that variables set statewide significantly affected county income growth in North Carolina; i.e., the corporate income tax, the personal income tax and higher education spending. As expected, corporate income taxes reduced income growth, while higher education spending increased growth. An equal increase in corporate income taxes and higher education spending though slightly reduced growth. But unexpectedly, higher personal income taxes increased income growth. Denaux demonstrated the sensitivity of results to omission of various categories of taxes and expenditures, suggesting the importance of a full budget-balance approach. A near perfect correlation was found though between corporate income taxes and gasoline taxes, revealing the hazard of including too many categories of variables and the necessity of omitting key categories of variables.

Based on average state and local tax rates, property taxes were found to have relative negative effects on state per capita income growth over the entire period in Gale et al. (2015), while corporate income taxes had positive relative effects. Welfare spending had statistically negative relative effects, while investment spending − that on state and local airports, highways and transit utilities − had no relative effect. When added to the specification the top marginal personal income tax rate had no effect and did not alter the other fiscal variable results.

The results across periods for firm formation and employment relative to population in Gale et al. (2015) mirrored those for real per capita income. The top marginal income tax rate

statistically reduced firm formation, but the magnitude was small, and had no effect on employment. Property taxes had statistically significant negative effects, but quantitatively small, effects on both firm formation and employment. Adding controls for government spending and other explanatory variables did not change any of the results for firm formation and employment.

In Segura (2017), state and local government spending was aggregated into investment, services or administration. Revenue from property, sales, income taxes plus general charges together equaled aggregate own-source revenues. The variation in budget deficits also was controlled for in the specification. Among the findings of the study, use of federal transfers to fund own-source revenue cuts spurred growth as did using federal funds to pay for budget deficit spending. Cuts in investment and service expenditures were found to be preferred to increasing own-source revenues to reduce budget deficits. The author interpreted the findings as public services not justifying the taxes that pay for them, though the effect of tax cuts was small.

Ojede et al. (2017) also examined categories of state and local spending and taxes but limited the number of categories to avoid multicollinearity. The authors found that spending on higher education and highway spending significantly increased per capita personal income growth in both the short run and long run. The result held regardless of whether deficit financing was used or whether individual income or corporate income taxes were raised.

The widely varying results using the full budget balance approach point to the difficulty in sorting out the effects of specific categories of taxes and spending. Especially problematic is the estimated effects of combined equal changes in specific taxes and expenditures. The problem is succinctly put by Peltzman (2016, p.2): “We do not have experiments where, say, two otherwise identical states raise the same taxes by the same amount but one, say, spends the increment on education while the other spends it on highways.”

II.2 Endogeneity

The issue of potential endogeneity biasing estimates is more often than not addressed in the recent state and local fiscal policy literature (Table 2). The most common approach is to use time lags of the fiscal variables. Peltzman (2016) tested for time-series reverse causality using leads

and lags of variables. Many of the studies admitted that use of pre-determined variables only reduces, and does not necessarily eliminate, the likelihood of endogeneity. As noted by Rickman (2015), estimated lagged relationships only reflect the co-movement of the fiscal and outcome variables over time. The estimates do not necessarily reflect causal relationships obtained from exogenous variation in fiscal variables. There could be some other underlying process that produces the lagged time-series relationship between fiscal variables and the outcome variables.

Similarly, some studies assessed whether there were relationships between how well the objects of the study were doing economically and subsequent fiscal policy changes. Moretti and Wilson (2017) did find any link between how well innovating firms were performing and later tax changes. Border county studies and other matching approaches often attempted to establish the absence of differences in pre-existing trends prior to fiscal policy changes (e.g., Ljungqvist and Smolyansky, 2016; Rickman and Wang, 2018; Turner and Blagg, 2017).

The difficulty in finding suitable instruments led to only a few studies using instrumental variables estimation. Exceptions of studies using external instruments include Brown et al. (2003), Agostini (2007), Hammond and Thompson (2008) and Yu and Rickman (2013). Agostini (2007) used dummy variables for statutory and constitutional budget limits as instruments. Yu and Rickman (2013) used beginning-of-period levels of the fiscal variables as instruments for changes in the fiscal variables and also the percentage of votes cast for the Republican candidate in a presidential election and the percentage of presidential election turnout. Agostini and Yu and Rickman tested their instruments, finding that they were suitable. GMM estimation also includes internally provided instruments (Bania et al., 2007; Bania and Stone, 2008; Segura, 2017). Use of lagged variables as instruments in GMM again begs the question of true causality versus causality in timing of changes in the variables.

Giroud and Rauh (2017) used the narrative approach of Romer and Romer (2010). The authors searched news articles during the year of the tax change and up to two years earlier. Changes deemed as those made to address a budget deficit or to spur growth were assessed as

those exogenous to economic activity. Out of stories found for 107 tax changes, 83 fell into the exogenous category.

II.3 Natural Experiments

A number of studies implemented research designs that have been argued to be natural experiments. Use of events produced by nature attempts to replicate the process of randomized experiments in science. Natural events or scenarios can serve as instruments to identify policy effects.

The most common use of the natural experiment moniker in state and local fiscal studies has been in border county studies (e.g., Holcombe and Lacombe, 2004; Thompson and Rohlin, 2012; Rickman, 2013; Rohlin et al., 2014; Ljungqvist and Smolyanky, 2016; Peltzman, 2016 and Turner and Blagg, 2017). Counties along a state border have been argued to share a common culture, distance to major markets, geography and history (Holcombe and Lacombe, 2004; Rickman, 2013). Differences in economic activity were then argued to be related to differences in state and local fiscal policy; identification has been further enhanced by examining differences in the changes of state and local fiscal policy (Peltzman, 2016) and to the extent the border counties were small relative to the sizes of the states (Rohlin et al., 2014). With the exception of Turner and Blagg (2017), the border county studies reviewed found negative effects of higher taxes.

Complications arise that limit simple border county comparisons for identification of state and local fiscal policy effects. In their analysis of sales taxes, Thompson and Rohlin (2012) recognized that geographic and other barriers may affect cross-border shopping. They therefore separately examined counties with higher shares of residents working in another state. Identification can be enhanced by specific features of tax policy for border areas such as reciprocal agreements that required workers to pay income tax to their state of residence, which can negate the potentially negative effects of higher income taxes for firm location but not those from corporate income and sales taxes (Rohlin et al., 2014). Peltzman (2016) used statewide measures of taxes to reduce the potential for endogeneity of county-level taxes.

As with natural experiments generally (Rozenweig and Wolpin, 2000; Sims, 2010), border county study results may not generalize to state-level policy making. Border county effects may not reflect the influence of state and local government expenditure differences between the states at the aggregate level. As noted by Rickman and Wang (2018), border counties for many states do not contain the major economic centers in the states. If the difference in state and local expenditures that accompany the difference in tax rates affects the major economic centers in a state differently than its border counties, recommendations that states should reduce taxes because of their effects at the border could be harmful to the overall state economy. All else equal, such as the absence of spillover effects, tax and expenditure effects also could be expected to be stronger at the border because it only takes a minor adjustment in location to take advantage of any fiscal policy differences.

II.4 Spatial Dimension

Increased recognition has been given to the potential importance of space in estimating state and local fiscal policy effects. Conway and Rork (2006) found no effect of redefining state fiscal variables as relative to their neighbors. Goff et al. (2012) estimated regressions using matched pairs of states based on geographic contiguity and compared the results to an unmatched cross-section regression. The authors found the absence of a relationship between taxes and per capita gross state product growth when using the cross-section of 48 states, even after adding region fixed effects and industry composition variables. But they found a consistently negative and statistically significant using matched-pair samples.

In their analysis of manufacturing plants that relocated, Conroy et al. (2016) included an indicator variable for whether the pair of states were neighbors, finding that the majority of relocations were between neighboring states. Interacting the explanatory variables with the neighbor indicator though did not much affect the results. Ljungqvist and Smolyansky (2016) did not find evidence of spillovers between counties along state borders based on an alternative sample that included interior counties for one of the states. Harden and Hoyt (2003) included neighboring state taxes in the regressions but did not find any statistically significant effects.

Gale et al. (2015) reported results robust to controlling for neighboring state taxes and expenditures. Peltzman (2016) found spillover effects between border counties that reduced estimated negative effects from higher taxes when ignored.

Reflecting the trend in the regional science literature, studies increasingly accounted for spatial spillovers using spatial econometric techniques. Wooster and Lerner (2010) estimated their equation using a spatial autoregressive maximum likelihood approach to capture spatial dependencies in county retail sales. Using a Spatial Durbin model, Anderson and Bernard (2017) found that adding spatial effects in their model affected the estimated effects of the state and local tax burden on per capita income growth. Based on estimation with a dynamic Spatial Durbin model, Ojede et al. (2017) concluded there were spillover effects of state policy, suggesting cooperation was needed among states. Segura (2017) estimated a spatial dynamic panel model and found evidence of spatial spillovers that reduced the estimated effects of a state's own fiscal policy.

The problem with the spatial econometric approach is that statistically significant spatial lag variables simply represent correlation among geographic units. The correlation may arise from an overall force driving both the region and its neighbors, akin to the "reflection problem" of Manski (1993). The overall force, or peer group effect, needs to be accounted for to identify causal effects between geographic units (Lee, 2007). So, what may be deemed a spatial spillover in spatial econometric estimation, may simply reflect some of the overall group effect, affecting the estimates of a region's responses to its own fiscal policy.

II.5 Micro-level Data

Although the bulk of studies reviewed used aggregate data, studies have increasingly used micro-level data. Felix (2009) examined the effect of the top marginal corporate income tax rate, the marginal state individual income tax rate and the sales tax rate on individual wages. Gius (2011) assessed how the state personal income tax affected migration between states. Young and Varner (2011; 2015), Varner and Young (2012) and Cohen et al. (2015) examined the influence of increasing the top marginal personal income tax rate on the migration of high-income earners.

Moretti and Wilson (2017) estimated the effect of the corporate income tax and the personal income tax of high-income earners on the migration of successful patenting scientists. Giroud and Rauh (2017) assessed the link between the corporate income tax, gross receipts tax, or other business tax, sales tax, property tax, personal income tax on the number of business establishments, the accompanying number of employees and capital investment. Zidar (2017) linked exogenous federal tax changes and variation in the income distribution across states to state economic outcomes.

By a small margin, a majority of the micro studies reviewed suggested negative tax effects, while most of the remaining studies suggested no effect. Micro-level studies have limitations similar to those of natural experiments in terms of policy relevance. For example, Morretti and Wilson (2017) found that increases in personal income or corporate income tax rates reduced net in-migration of "star-scientists." Because other state and local government taxes and expenditures were omitted, the estimated effect by Moretti and Wilson was relative to these for the scientists. The effect of the tax changes on state government budgets and overall economic performance was not assessed. The top scientists may have not received benefits equal to their tax contributions, which would have provided services to others that might have benefited the overall state economy and at least in part offset the negative tax effect on the scientists. If tax increases or cuts in state and local expenditures are needed to finance tax cuts to a segment of the economy, overall economic activity may be harmed.

II.6 Heterogeneity

Importantly, studies have increasing recognized heterogeneity across geography and time in economic responses to state and local fiscal policies. Case studies implicitly are based on the premise of potential heterogeneity. The heterogeneity can arise from a plethora of sources.

Nationwide Studies

Relatively unexplored is the potential for nonlinearities in the relationships between state and local fiscal variables and economic outcome variables. Bania et al. (2007) noted that in endogenous growth models increased taxes can spur, reduce or have no effect on economic

activity, depending on the initial level of taxes and expenditures. Because of diminishing marginal productivity of productive expenditures, at low levels of taxes and productive expenditures, increased taxes can spur growth. The opposite occurs at higher levels of taxes and expenditures. Bania et al. (2007) found empirical support for the diminishing marginal productivity hypothesis. In Bania et al. (2008), states were ranked in terms of how much their growth deviated from the median based on their state and local taxes and expenditures; some states could increase growth by increasing taxes and key expenditures, while others could increase growth by pursuing an opposite strategy.

Ojede and Yamarik (2012) reported significant heterogeneity across the states, which they suggested as a probable reason why so many studies found conflicting results. The general sensitivity of their results to specification caused Anderson and Bernard (2017, p. 13) to conclude that the effects of state and local tax changes may depend on the "particular environment within and surrounding each state."

Harden and Hoyt (2003) found their results to be sensitive to the omission of small states on the border with Canada. Hammond and Thompson (2008) found differences between metropolitan and nonmetropolitan areas. Peltzman (2016) assessed the sensitivity of border-county results to county size and type of state boundary, finding modest quantitative differences. Thompson and Rohlin (2012) found that ignoring the degree of connectedness of border counties can produce biased estimates of state and local tax effects in border county studies. Heterogeneity in state and local fiscal policy responses across industries and firms (e.g., Borcher et al., 2016; Conroy et al., 2016; Giroud and Rauh, 2017) may produce heterogeneous effects across states if they have varying compositions of types of industries and firm types.

Taylor and Brown (2006) reported that the net effect of the size of state and local government changed over time, having negative effects on private economic growth during the 1980s, but more likely having a neutral effect in the 1990s. Deskins and Hill (2010) suggested that own-source tax revenues per capita reduced growth in 1985 but by 2003 had zero effect. Gale et al. (2015) reported that the effect of the overall tax burden was negative for 1977-1991

but positive for 1992-2006. Felix (2009) found that an increase in the state corporate tax rate reduced wages more during 1992-2005 than 1977-1991, suggesting that increased globalization over time may in part underlie the result. The overall tax burden variable generally was insignificant over a long time period (1934-2004) in Bauer et al. (2012), with the exception of a couple of sub-periods (1964-1979 and 1984-2004) when state fixed effects were not included in the model.

Case Studies

The sensitivity of the estimated effect to geography and time is one reason many studies use the case study approach. Case studies typically focus on one area or group of areas and a particular time period. Although the results cannot be as readily generalized to all areas as nationwide studies, case studies may be more relevant for an individual state or locality considering fiscal policy changes.

Denaux (2007) assessed the effects of state and local taxes on real per capita income growth in North Carolina counties for the period 1980-1995. Wooster and Lehner (2010) examined the effect of the high sales tax in the state of Washington using real per capita retail sales data for its counties over the 1992 to 2006 period. The micro-data studies of Young and Varner (2011) and Cohen et al. (2015) discussed above were of New Jersey, while that of Varner and Young (2012) was of California.

Rickman (2013) compared economic growth in counties across Oklahoma and its neighboring states during 1990 to 2010, paying particular attention to Texas because of its absence of personal and corporate income taxes. The author noted that the choice of direct comparison of Oklahoma with Texas was based on methodological issues that arise in most comprehensive studies of the U.S. Because previous growth advantages of state and local fiscal policy already in place could have been capitalized into wages and prices, Wang (2016) examined whether the pattern of wages and land costs in Texas revealed any advantages of their state and local fiscal policy relative to Oklahoma. It might be that the lack of an income tax in

Texas conferred it a competitive advantage, but it subsequently was offset by the higher wages and land rents that resulted.

In direct response to heterogeneity found in the nationwide studies, Rickman and Wang (2018) used the synthetic control method (SCM) matching approach (Abadie and Gardeazabal, 2003; Abadie et al., 2010; 2015) in case studies of Kansas and Wisconsin with the election of their governors in 2010. Kansas has been labelled as "one of the cleanest experiments for measuring the effects of tax cuts on economic growth in the U.S." (Gale, 2017). Using SCM, Rickman and Wang constructed control groups for counterfactual comparisons from weighted-averages of other states. The states used for comparison and weights assigned were based on matching pre-intervention characteristics of the states and pre-intervention paths of the growth variables. The matching of characteristics prior to the period of analysis and matching of pre-treatment trends reduced concerns with the endogeneity of the fiscal variables with economic growth and controlled for national and state economic cycles.

II.7 Key Lessons from the Literature for State and Local Fiscal Policy

Consistent with the reviews of the early literature, a review of the more recent literature above reveals widely varying findings. No clear consensus on the economic effects state and local fiscal policy that can be universally applied emerges from the studies. But the studies reveal a number of useful insights.

1) *The overall state and local tax burden is not a major driver of economic growth differences across states.*

The vast majority of the academic studies that examined the relationship between state and local taxes and economic growth found little or no effect. Where significant effects were found, they generally were modest at most. A corollary then is that tax cuts do not pay for themselves. Even the most negative growth effects reported for higher taxes were far from sufficient to produce revenue growth that would be necessary to offset the direct revenue losses that occur when taxes are reduced.

2) *Less is known about the effects of one tax or expenditure versus another.*

Personal income, corporate income, and sales taxes all have been found have no economic effects, positive effects or negative effects, relative to other taxes and expenditures. Even less is known about the relative growth effects of different state expenditures. The limited studies that have examined state expenditures typically have assessed the effects of investment spending such as education and highway spending versus welfare spending. The growth effects range from positive to negative for education and highway spending. Welfare spending typically was either found to have negative growth effects or no effect, when considering the taxes required to finance the spending. The conclusions often were affected by the choice of tax and expenditure variables to include in the analysis.

3) *No single study can answer the question of whether a state should increase or decrease its tax burden.*

The estimated relationship between taxes and growth is highly sensitive to the empirical approach used with each approach having its advantages and disadvantages. Policy makers should not cherry pick among the studies to only find evidence on one side of the debate. Simple economic growth comparisons used in non-academic studies of state and local taxes and spending (e.g., Arduin, Laffer and Moore Econometrics, 2011; Davies and Buffie, 2017) can be especially mis-leading and should not be used for policy making. Such studies make no attempt at identification, which the literature reveals is crucial to the understanding of state and local fiscal policy. Anecdotal stories and individual outcomes alone should not be the basis of policy. Although anecdotal stories and studies of individual outcomes provide context and insight, there are aggregate effects of state and local fiscal policy based on complex economic interactions and synergies that cannot be predicted by simple extrapolation of individual outcomes. An overall assessment of the state and local fiscal policy literature and knowledge of recent economic and policy trends at a minimum are required.

4) *The estimated state and local tax burden effect has changed over time.*

Most of the reported negative growth effects of higher state and local taxes were based on data prior to the last ten or twenty years. Studies using more recent aggregate data more likely found

no effect or positive effects of increased taxes (Taylor and Brown, 2006; Deskins and Hill, 2010; Gale et al., 2015). One possibility for the result that was mentioned in some studies is that states have become more similar in their tax and spending patterns and were more growth promoting in their fiscal policies (Taylor and Brown, 2006; Deskins and Hill, 2010).

5) *The effect of state and local tax changes on growth likely depends on the national economic environment, as well as the economic environment in the state and neighboring states.*

Some of the studies, particularly the case studies, suggested heterogeneous effects across states (e.g., Anderson and Bernard, 2017; Rickman and Wang, 2018). Differences in estimated effects may relate to differences in culture, demography, history and industry structure. The heterogeneity of results also may relate to differences in initial conditions. Cuts in taxes and spending more likely stimulate growth in states starting with a high overall tax burden (Bania et al., 2007; Bania and Stone, 2008). Reductions in state and local government spending may have particularly negative multiplier effects on the rest of the economy during periods when the national economy is below full employment (such as in the years following the Great Recession) that are not offset by positive supply-side effects of the corresponding lower taxes (Rickman and Wang, 2018).

6) *State and local taxes and expenditures may affect the economies of neighboring states.*

A number of studies found spillover effects of state and local expenditures on neighboring economies (Wooster and Lerner, 2010; Anderson and Bernard, 2017; Ojede et al., 2017; Segura, 2017). The existence of spillovers could have a number of potential implications for state and local fiscal policy, both in terms of potential cooperation and competition.

III. Recent Experiments

We further investigate how much state and local fiscal policy effects may depend on particular circumstances by updating and expanding the case study analysis of Rickman and Wang (2018). We examine the performance of states that in recent years made notable changes in state fiscal policy, particularly in personal income taxes. Because the states differed in the changes made to other taxes and expenditures in response to the personal income tax changes we also may be able

provide more insights in the spirit of the ideal experiment that Peltzman (2016) lamented did not exist. Another advantage is that the states are examined in entirety and reflect the economic response to all budgetary adjustments. The three indicators of economic performance examined are total nonfarm wage and salary employment, per capita personal income, and real per capita gross state product. These are the three indicators most often examined in the state and local fiscal policy literature.

III.1 The Experiments and the Empirical Approach

The states examined are those for which notable tax changes were made during 2011-2015. Kansas, Maine, Ohio and Wisconsin were among the states that enacted the largest cuts in personal income taxes during the period (Rickman and Wang, 2018). North Carolina dramatically cut taxes but they did not take effect January 2014, which allows less time for evaluation. Indiana likewise enacted a significant tax cut that took effect in Fiscal Year 2014. Outside of Hawaii, California and Minnesota were the two states with the largest increases in personal income taxes during the period. Thus, we examine the states of California, Kansas, Maine, Minnesota, Ohio and Wisconsin during the period.

Table 3 shows the change in state ranking over 2011-2015 for the categories of fiscal variables. The rank is based on the change in the revenue/expenditure category divided by personal income. With its rank of 50 in the category, for example, we see that Kansas had the largest reduction in personal income taxes as a share of income. The states varied in terms of changes in other taxes and expenditures.

We implement the synthetic control method (SCM) used by Rickman and Wang (2018), which is reviewed in Section III. Control groups are constructed for counterfactual comparisons from weighted-averages of other states. The states used in the construction of the control (counterfactual) units and weights assigned are based on matching pre-intervention characteristics of the states and pre-intervention growth paths of the economic outcome variables. Energy and mining states are removed from consideration of serving as a donor in the

construction of the counterfactual units to create a donor pool of states more likely to have a similar economic growth process (Abaide et al., 2015).

Characteristics of the states used in the matching are from Rickman and Wang (2018) and include: natural amenity attractiveness; position in the rural-urban hierarchy; manufacturing dependence; mining dependence; farm dependence; persistent poverty status; retirement destination; recreation dependence; long-term population loss region; population density; shift-share industry mix employment growth at the four-digit level (2002-2007); educational attainment among the adult population; and Fraser's Economic Freedom Index (Goetz et al., 2011). Except for industry mix employment growth, the characteristics are based on data prior to the beginning of the pre-treatment period. The matching of characteristics prior to the period of analysis and matching of pre-treatment trends reduces the likelihood of endogeneity of the fiscal variables with economic growth.

For each of the six states, a synthetic control analysis is performed for total nonfarm wage and salary employment, real per capita gross state product (GSP) and per capita income. With 2011 as the treatment year, the years used in the matching of the state and the construction of the synthetic control for each variable are 2006-2011; Rickman and Wang (2018) reported that the results for Kansas and Wisconsin were robust to expanding the pre-treatment period to 2001-2011. The comparison for fiscal policy analysis are based on the growth path of the state from 2011-2016 relative to the growth path of its synthetic control (counterfactual) unit. The predictions for the synthetic control units are simply the state weights applied to the economic variable of interest from 2011-2016.

III.2 Outcomes of the Experiments

For each tax-changing state, Table 4 shows the average state weight across the three economic outcome variables for each of the respective synthetic control units. The average state weights are then used to calculate the difference in ranking for each fiscal variable change (2011-2016) for each tax-changing-state relative to its synthetic control unit. The weights similarly are used to

calculate the difference for each outcome variable between the tax changing states and their synthetic control units.

The differences in rankings between the state fiscal policy changes and those of the corresponding synthetic control units are displayed in Table 5. For each of the six tax-changing-states, for each tax and expenditure category, the change in ranking for each donor state is multiplied by the synthetic control weight, and then summed. The difference between the tax-changing-state and the weighted-sum, rounded to the nearest integer, is reported in Table 5 for each tax and expenditure category.

Regarding the change for personal income taxes, the large positive numbers for Kansas, Maine, Ohio and Wisconsin reveal that the ranking in the change in personal income taxes as a share of personal income was much lower for these states than for those of their corresponding synthetic control units; i.e., these states moved down in the rankings for the effective personal income tax rate more than their respective synthetic control units. For California and Minnesota, the very negative numbers indicate that the two states increased their effective personal income tax rate rankings relative to those of their respective synthetic control units.

In order, the four states with the largest weights in the construction of California's synthetic control (column 1 in Table 4) are Arizona, Florida, Connecticut and Washington. Figure 1 shows the SCM results for California. For all three variables California considerably outperforms its synthetic control unit. The difference in rankings shown in the first column of Table 5 reveals that relative to its synthetic control unit California had a large relative increase in its personal income tax share. The ranking of the change in California's own source revenues overall is fairly comparable to that of its synthetic control unit. The increased personal income tax change for California was offset by the lower ranking for the change in the sales tax and gross receipt tax share, the property tax share and the corporate income tax share; i.e., these tax shares decreased in California compared to its synthetic control unit. Compared to its synthetic control unit, California reduced its state and local education expenditure share and increased its

public welfare expenditure share. Total state and local expenditures only decreased slightly relative to its synthetic control unit.

The four states with the largest weights in the construction of the synthetic control unit for Kansas are South Dakota, Washington, Nebraska and Idaho (column two of Table 4). Figure 2 shows the SCM results for Kansas. Kansas underperforms its synthetic control unit for real per capita GSP and total nonfarm wage and salary employment. By 2016, there was only a minor difference in per capita income between Kansas and it synthetic control unit. Personal income taxes and property taxes as shares of personal income decreased considerably in Kansas relative to its average synthetic control unit based on the relative change in rankings shown in column 2 in Table 5. The sales tax and gross receipt share increased considerably, as did the corporate income tax share. There was no change in ranking between Kansas and its synthetic control unit for own source revenues overall. Along with significantly increasing its sales tax, Kansas drained its rainy day account and shifted funds to offset the loss of personal income tax revenue (Turner and Blagg, 2017). So, the relative total state and local expenditure share increased. Education and transportation expenditures increased relative to the synthetic control unit, while there was no change in relative ranking of public welfare expenditures.

For Maine, the states with the largest weights in the construction of the synthetic control unit are Alabama, Missouri, New Hampshire, Rhode Island, New Jersey and Vermont (column 3 of Table 4). Figure 3 shows the SCM results for Maine. Maine underperforms its synthetic control unit for real per capita GSP and total nonfarm wage and salary employment. But there was only a slight difference in per capita income growth between Maine and it synthetic control unit during the 2011-2016 period.

Relative to its synthetic control unit, Maine had much greater reductions in personal income and corporate income taxes (column 3 of Table 5). But Maine had greater relative increases in sales and gross receipts and property taxes as shares of personal income. Overall, the relative own source revenue share increased by five in the rankings; the relative total state and

local expenditure share decreased by eight. State and local expenditures on education, transportation, and public welfare all decreased considerably relative to its synthetic control unit.

The largest weights for the synthetic control for Minnesota are Michigan, Iowa, New York and Vermont (column 4 of Table 4). Figure 4 shows the SCM results for Minnesota. Minnesota's growth in real per capita GSP exceeds that of the synthetic control. But there is not much difference in growth in the other two indicators for Minnesota and its synthetic control. Based on the differences in rankings for the change in fiscal category shares, Minnesota experienced much larger increases in personal income taxes, sales taxes and corporate income taxes (column 4 of Table 5). Only for property taxes did Minnesota's ranking decrease relative to its synthetic control. For total own source revenues Minnesota considerably increased its relative ranking. The share of total state and local government expenditures increased in Minnesota relative to its synthetic control. Transportation expenditures experienced the largest relative increase in Minnesota.

The states with the largest weights for Ohio are Michigan, Indiana, and Alabama (column 5 of Table 4). Tied for fourth are Pennsylvania, South Dakota and Tennessee. Figure 5 shows the SCM results for Ohio. Ohio's growth in real per capita GSP exceeds that of the synthetic control. But there is not much difference in growth in the other two indicators for Ohio and its synthetic control. Ohio had a significant relative decrease in state and local government expenditures, which shows up in expenditures on education and public welfare (column 4 of Table 5). State and local expenditures on transportation in Ohio increased relative to its synthetic control.

Finally, for Wisconsin, the largest weights are for Iowa, New Hampshire, Indiana and Michigan (column 5 of Table 4). Figure 6 shows the SCM results for Wisconsin. Wisconsin's growth in real per capita GSP and total nonfarm wage and salary employment are much lower than those of the synthetic control unit. Wisconsin's growth in per capita income slightly exceeds that of the synthetic control. The ranking of Wisconsin's personal income tax and property tax shares of personal income dropped considerably relative to those of the synthetic control units (column 5 of Table 5). The other relative tax shares did not change much, leading to a drop in the

relative own source revenue share. Wisconsin's total state and local expenditure share fell relative to its synthetic control. The expenditure drop shows up in relative state and local expenditures on education.

III.3 Key Lessons from the Six States' Fiscal Experiments

1. *States recently reducing their personal income taxes more likely harmed economic growth and states increasing their personal income taxes more likely spurred their economic growth*.

Across eighteen possible outcomes, six states and three economic outcome variables, the most likely result is stronger growth from higher personal income taxes. The next likely outcome is no effect, while the least likely outcome is a negative growth effect from higher personal income taxes. This is consistent with the case studies of Kansas and Wisconsin by Rickman and Wang (2018).

2. *The economic growth differences were not narrowing over time as would be predicted by supply responses taking time to have an effect.*

For the nine economic outcomes supporting improved growth from higher personal income taxes, the differences in growth generally were widening in 2016. If supply responses began kicking in by 2016, the growth differences would have narrowed. If supply responses do ultimately occur, they are not doing so within a time frame that allows states to avoid cutting spending or raising other taxes to offset the loss of revenue from the reductions in personal income taxes. This is confirmed by the personal income tax cutting states either increasing other taxes or reducing total expenditures.

3. *Studies should examine, and policy discussion should involve, more than a single economic indicator variable.*

Per capita income was the least affected economic outcome by the tax changes. Only for California was per capita income greatly affected. This suggests that the emphasis on per capita income in the academic literature over other economic indicators is misguided. The focus on per capita income most likely follows from its use in national economic growth studies. At the

regional level, increased wages and income can alternatively reflect either a positive labor demand effect or a negative labor supply effect.

4. *Comparisons to border states alone are not sufficient to evaluate the effectiveness of state and local tax and expenditure changes.*

Border states typically differ in important ways, including industry structure, educational attainment, amenity attractiveness and degree of urbanization. The Synthetic Control Method applied above revealed that states are better characterized as weighted averages of states, which may not always include a border state.

5. *The differences in outcomes cannot be simply explained by differences in the changes in total state and local expenditures.*

Among the tax cutting states, Ohio cut state and local expenditures the most, while Kansas cut them the least (not shown). Ohio had the thirteenth largest state and local expenditure share of personal income in 2011, while Kansas had the thirty-eighth. Minnesota increased expenditures more than California; California ranked ninth in 2011 and Minnesota ranked twenty-eighth.

6. *There is an absence of clear evidence on whether other taxes affect economic activity differently than personal income taxes.*

Based on the change in rankings from 2011 to 2015, Kansas switched from personal income taxes to sales, gross receipts and corporate income taxes. Ohio switched most strongly to sales taxes. Maine switched to sales and property taxes. Wisconsin saw a strong increase in miscellaneous revenues and a large drop in property taxes. California relatively reduced sales, property and corporate income taxes in response to increased personal income taxes. Minnesota increased corporate income taxes and sales taxes modestly, but it strongly reduced property taxes.

7. *The pattern is mixed on economic growth and individual categories of state and local expenditures, though there is some evidence supporting balanced spending in education and transportation*.

Ohio increased transportation expenditures as a share of personal income, while reducing education expenditures and public welfare expenditures. Ohio improved its ranking in transportation expenditures from fortieth in 2011 to thirtieth in 2015 (not shown); its ranking dropped from sixteenth to twentieth for education expenditures. Ohio had the largest relative drop in welfare spending in the nation. Possibly, the rebalancing of expenditures was growth promoting for Ohio relative to the other tax-cutting states.

Wisconsin improved its transportation spending ranking from seventeenth in 2011 to thirteenth in 2015. Unlike Ohio, it is less likely that Wisconsin was under spending in transportation services. Wisconsin fell from fifteenth to nineteenth over the period in education spending, though still ranking in the top half of states. Only Wisconsin had a larger than typical relative increase in public welfare spending.

Maine fell from twenty-eighth to thirty-first in education spending from 2011 to 2015, likely placing it in the under-spending area among states in terms of education spending needed to promote growth. It had yet larger drops in relative spending in transportation and public welfare though it remained twelfth in transportation spending and tenth in welfare spending.

Relative transportation expenditures increased considerably in Minnesota, while relative public welfare expenditures increased strongly in California. California also saw a notable drop in the state and local education expenditure share.

IV. Conclusion

We do know more now about the relationship between state and local fiscal policy and economic activity. But consistent with the conclusions of the early literature reviews we still do not know enough to offer recommendations on specific policies that are applicable in all circumstances. Findings on the effects of the overall tax burden, and especially on the relative effects of various categories of taxes and expenditures, continue to vary widely across studies. This likely in part

occurs because of the strengths and weaknesses of the various approaches to addressing the issue of identification and to differing model specifications. The mixed results also likely occur because of the differences in underlying circumstances of the studies. Consistent with Alm's (2017, p. 835) observation on economic policy advice more generally, it may be too much to ask that economists provide advice on state and local taxes and expenditures "that apply in all circumstances."

Economists may be most useful in helping policy makers avoid pursuing potentially harmful actions by getting them to proceed cautiously with minds wide open to all possible consequences when considering possible fiscal policy actions. Unfortunately, the lack of consensus in the economics profession on state and local fiscal policy often leaves policy makers willing to base decisions on ideology, or on non-academic analyses that make little or no attempt at identification and reflect nothing more than spurious correlations. If the goal is to enhance economic activity, the complexity of the issue revealed in this review suggests that policy makers should eschew ideology and non-academic analyses.

We can conclude that state and local tax fiscal policy is not predictably a major driver of economic growth in the U.S., particularly in more recent decades. There does not appear to be any economic benefit from deviating greatly from other states in the structure of state and local fiscal policy. The studies of Bania et al. (2007) and Bania and Stone (2008), along with the SCM analysis above suggest nonlinearities in the economic effects of state and local taxes and expenditures. A state's neighbors also are not necessarily the best model for its fiscal policies. Not only should non-academic studies be avoided, no single study should be the basis of policy. Circumstances vary too widely both across geography and time. There is not enough evidence to support the reduction in one tax, e.g., personal income taxes, or an increase in one expenditure category in all circumstances. More than one indicator of economic activity should be used in evaluating state economic performance; the indicators should reflect economic welfare of the region, which may not necessarily be those used to assess national economic performance or the performance of other types of regions.

Research on empirical methodology likely will continue to evolve and provide further knowledge on the nexus between state and local fiscal policy and economic activity. But it may be too much to ever expect universal definitive conclusions. More research should be conducted for specific economic and policy circumstances. Consistent with place-based policy generally, fiscal policy should be tailored to the culture, economy, history, institutions and politics of the state. Economic conditions of the nation and broader region also may influence the effects of specific state and local fiscal policy actions. What may be most needed is research carried out in cooperation with policy makers and stakeholders so that the research more directly answers the questions they have in particular circumstances.

References

Abadie, Alberto, Alexis Diamond and Jens Hainmueller, 2010. "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program," *Journal of the American Statistical Association* 105, 493-505.

_____, 2015. "Comparative Politics and the Synthetic Control Method," *American Journal of Political Science* 59(2), 495-510.

Abadie, Alberto, Gardeazabal, Javier, 2003. "The Economic Costs of Conflict: A Case-Control Study for the Basque Country" *American Economic Review* 93 (1),113-132.

Agostini, Claudio, 2007. "The Impact of State Corporate Taxes on FDI Location," *Public Finance Review* 35(3), 335-360.

Alm, James, 2017. "Is Economics Useful for Policy," *Southern Economic Journal* 83(4), 835-854.

Alm, James and Janet Rogers, 2011. "Do State Fiscal Policies Affect State Economic Growth?" *Public Finance Review*, 39, 483–526.

Anderson, John E. and Jennifer Bernard, 2017. "Temporal and Spatial Effects of State Taxes on Economic Growth," https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=NTA2017&paper_id=212.

Arduin, Laffer and Moore Econometrics, 2011. *Eliminating the State Income Tax in Oklahoma: An Economic Assessment,* Oklahoma Council of Public Affairs, November.

Bania, Neil, Jo Anna Gray and Joe Stone, 2007. "Growth, Taxes, and Government Expenditures: Growth Hills for U.S. States," *National Tax Journal* LX(2), 193-204.

Bania, Neil and Joe Stone, 2008. "Ranking State Fiscal Structures using Theory and Evidence," *Journal of Policy Analysis and Management* 27(4), 751-770.

Bartik, Timothy J., 1991. *Who Benefits from State and Local Economic Development Policies*? W. E. Upjohn Institute: Kalamazoo, MI.

Bauer, Paul B., Mark E. Schweitzer, and Scott A. Shane, 2012. "Knowledge Matters: The Long-Run Determinants of State Income Growth," *Journal of Regional Science* 52, 240–255.

Borcher, Erin, John Deskins and Amanda Ross, 2016. "Can State Tax Policies be Used to Grow Small and Large Businesses," *Contemporary Economic Policy* 34(2), 312-335.

Brown, Stephen P.A., Kathy J. Hayes, and Lori L. Taylor, 2003. "State and Local Policy, Factor Markets and Regional Growth," *Review of Regional Studies* 33, 40–60.

Bruce, Donald and John Deskins, 2012. "Can State Tax Policies be Used to Promote Entrepreneurial Activity," *Small Business Economics* 38, 375-397.

Cohen, Roger, Andrew Lai, and Charles Steindel, 2015. ''A Replication of 'Millionaire Migration and State Taxation of Top Incomes: Evidence from a 'Natural Experiment,''' *Public Finance Review* 43(2), 206–225.

Conroy, Tessa, Steven Deller, and Alexandra Tsvetkova, 2016. "Regional Business Climate and Interstate Manufacturing Relocation Decisions," *Regional Science and Urban Economics* 60, 155-168.

Conway, Karen Smith, and Jonathan C. Rork, 2006. "State 'Death' Taxes and Elderly Migration—The Chicken or the Egg?" *National Tax Journal* 59, 97–128.

Coomes, Paul.A. and William H. Hoyt, 2008. "Income Taxes and the Destination of Movers to Multistate MSAs," *Journal of Urban Economics* 63, 920–937.

Davies , Carl and Nick Buffie, 2017. "Trickle Down Dries Up," Institute of Taxation and Economic Policy, October. https://itep.org/wp-content/uploads/trickledowndriesup_1017.pdf.

Denaux, Zulal S., 2007. "Endogenous Growth, Taxes and Government Spending," *Review of Development Economics* 11(1), 124-138.

Deskins, John and Brian Hill, 2010. "State Taxes and Economic Growth Revisited: Have Distortions Changed?" *Annals of Regional Science* 44, 331–348.

Felix, Alison, 2009. "Do State Corporate Income Taxes Reduce Wages?" *Federal Reserve Bank of Kansas City Economic Review* Second Quarter, 77-102.

Fisher, Ronald C., 1997. "The Effects of State and Local Public Services on Economic Development," *New England Economic Review* March-April, 53–67.

Gale, William G., Aaron Krupkin and Kim Reuben, 2015. "The Relationship between Taxes and Growth at the State Level: New Evidence," *National Tax Journal* 68(4), 919-942.

Gale, William, 2017. "The Kansas Tax Cut Experiment," Brookings Institution, July 11. Accessed at https://www.brookings.edu/blog/unpacked/2017/07/11/the-kansas-tax-cut-experiment/ on January 14, 2018.

Giroud, Xavier, and Joshua Rauh, 2017. State taxation and the Reallocation of Business Activity: Evidence from Establishment-Level Data, US Census Bureau Center for Economic Studies Paper

No. CES WP-17-02.

Gius, Mark P. 2011. "The Effect of Income Taxes on Interstate Migration: An Analysis by Age and
Race," *Annals of Regional Science* 46, 205-218.

Goetz, Stephan, Mark D. Partridge, Dan S. Rickman, and Shibalee Majumdar, 2011. "Sharing the Gains of Local Economic Growth: Race to the Top vs. Race to the Bottom Economic Development Policies," *Environment and Planning C* 29, 428–456.

Goff, Brian, Alex Lebedinsky and Stephen Lile, 2012. "A Matched Pair Analysis of State Growth Differences," *Contemporary Economic Policy* 30(2), 293-305.

Goss, Ernie P., 1995. "The Effect of State and Local Taxes on Economic Development," *Southern Economic Journal* 62, 320–333.

Hammond George W, and Eric C. Thompson, 2008. "Determinants of income growth in Metropolitan and Non-Metropolitan Labour Markets," *American Journal of Agricultural Economics* 90, 517–542.

Harden, J. William, and William H. Hoyt, 2003. "Do States Choose their Mix of Taxes to Minimize Employment Losses? *National Tax Journal* 56, 7-26.

Helms, L. Jay, 1985. "The Effect of State and Local Taxes on Economic Growth: A Time-Series Cross Section Approach," *Review of Economics and Statistics* 67, 574–582.

Holcombe, Randall G. and Donald J. Lacombe, 2004. "The Effect of State Income Taxation on Per Capita Income Growth," *Public Finance Review* 32(3), 292–312.

Leamer, Edward E., 1985. "Sensitivity Analyses Would Help," *American Economic Review* 75, 1985, 308–13.

Lee Lung-fei, 2007. "Identification and Estimation of Econometric Models with Group Interactions, Contextual Factors and Fixed Effects," *Journal of Econometrics* 140, 333–374.

Ljungqvist, Alexander and Michael Smolyansky, 2016. "To Cut or Not to Cut?
On the Impact of Corporate Taxes on Employment and Income," NBER Working Paper No. 20753. National Bureau of Economic Research, Cambridge, MA.

Manski, Charles, 1993. "Identification of Endogenous Social Effects: The Reflection Problem," *The Review of Economic Studies*, 60(3), 531–542.

McGuire, Teresa J., 1992. "Review: Who Benefits from State and Local Economic Development Policies? By Timothy J. Bartik" *National Tax Journal* 45(4), 457-459.

Moretti, Enrico and Daniel J. Wilson, 2017. "The Effect of State Taxes on the Geographical Location of Top Earners: Evidence from Star Scientists," *American Economic Review* 107(7), 1858-1903.

Ojede, Andrew and Steven Yamarik, 2012. "Tax policy and State Economic Growth: The Long-run and Short-run of It" *Economics Letters* 116(2), 161-165.

Ojede, Andrew, Bebonchu Atems and Steven Yamarik, 2017. "The Direct and Indirect (Spillover) Effects of Productive Government Spending on State Economic Growth," *Growth and Change* DOI: 10.1111/grow.12231.

Peltzman, Sam, 2016. "State and Local Fiscal Policy and Growth at the Border," *Journal of Urban Economics* 95, 1-15.

Poot, Jacques, 2000. "A Synthesis of Empirical Research on the Impact of Government on Long-Run Growth," *Growth and Change* 31(Fall), 516-546.

Reed, W. Robert, 2008. "The Robust Relationship between Taxes and U.S. State Income Growth," *National Tax Journal* 61, 57–80.

_____, 2009. "The Determinants of U.S. State Economic Growth: A Less Extreme Bounds Analysis," *Economic Inquiry*, 47, 685–700.

Rickman, Dan S., 2013. "Should Oklahoma Be More Like Texas? A Taxing Decision," *The Review of Regional Studies 43* (1), 1-22.

_____, 2015. "Modern Macroeconomics and Regional Economic Modeling," *Journal of Regional Science* 50(1), 23-41.

Rickman, Dan S. and Hongbo Wang, 2018. "Two Tales of Two US States: Regional Fiscal Austerity and Economic Performance," *Regional Science and Urban Economics* 68, 46-55.

Roback Jennifer, 1982. "Wages, Rents, and the Quality of Life," *Journal of Political Economy* 90, 1257–1278.

Rohlin, Shawn, Stuart S. Rosenthal and Amanda Ross, 2014. "Tax Avoidance and Business Location in a State Border Model," *Journal of Urban Economics* 83, 34–49.

Romer, Christina D., and David H. Romer, 2010. "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks," *American Economic Review* 100(3), 763-801.

Rozenweig, Mark R. and Kenneth I. Wolpin, 2000. "Natural 'Natural Experiments' in Economics," *Journal of Economic Literature* XXXLIIII, 827-854.

Segura, Jerome, 2017. "The Effect of State and Local Taxes on Economic Growth: A Spatial Dynamic Panel Approach," *Papers in Regional Science* 96(3), 627-646.

Sims, Christopher A., 2010. "But Economics is Not an Experimental Science," *Journal of Economic Perspectives* 24(2), 59-68.

Taylor, Lori L. and Stephen P.A. Brown, 2006. "The Private Sector Impact of State and Local Government," *Contemporary Economic Policy* 24, 548–562.

Thompson, Jeffrey P. and Shawn M. Rohlin, 2012. "The Effect of Sales Taxes on Employment: New Evidence from Cross-Border Panel Data Analysis," National Tax Journal 65 (4), 1023–1042.

Tomljanovich, Marc, 2004. "The Role of State Fiscal Policy in State Economic Growth," *Contemporary Economic Policy* 22(3), 318-330.

Turner, Tracy M. and Brandon Blagg, 2017. “The Short-term Effects of the Kansas Income Tax Cuts on Employment Growth,” *Public Finance Review*. DOI: 10.1177/1091142117699274

Varner, Charles and Christobal Young, 2012. “Millionaire Migration in California: The Impact of Top Rates,” Stanford Center on Poverty and Inequality Working Paper.

Wang, Hongbo, 2016. "The Texas Economic Model, Miracle or Mirage? A Spatial Hedonic Analysis," *Annals of Regional Science 56*(2), 393-417.

Wasylenko, Michael, 1997. “Taxation and Economic Development: The State of the Economic Literature,” *New England Economic Review* March, 37–52.

Wooster, Rossita and Joshua Lehner, 2010. “Reexamining the Border Tax Effect: A Case Study Effect of Washington State,” *Contemporary Economic Policy* 28(4), 511-523.

Young, Christobal and Charles Varner, 2011. “Millionaire Migration and State Taxation of Top Incomes: Evidence from a Natural Experiment,” *National Tax Journal* 64(2, Part 1), 255-284.

_____, 2015. “A Reply to ‘Replication of ‘Millionaire’ Migration and State Taxation of Top Incomes: Evidence from a Natural Experiment,” *Public Finance Review* 43(2), 226-234.

Yu, Yihua and Dan S. Rickman, 2013. “U.S. State and Local Fiscal Policies and Nonmetropolitan Area Economic Performance: A Spatial Equilibrium Analysis,” *Papers in Regional Science* 92(3), 579-597.

Zidar, Owen, 2017. “Tax Cuts for Whom? Heterogeneous Effects of Income Tax Changes on Growth and Employment,” NBER Working Paper 21035.

Table 1. Summary of State and Local Fiscal Policy Studies Reviewed Part 1

Nationwide Studies				
Study	Sample	Empirical Approach	Fiscal Variables	Findings
Brown et al. (2003)	1977-1997; contiguous 48 states	annual; state output, private capital and employment	full balanced-budget (FBB) approach; all but miscellaneous revenues and deficit spending	negative tax effects positive spending effects; state and local services generally are not underprovided
Harden and Hoyt (2003)	1980-1994; contiguous 48 states	annual; employment	FBB approach; personal, corporate, sales, other taxes; hospitals, education, highway expenditures	negative effect of corporate income taxes; no effect for income and sales taxes; only education expenditures have a positive effect
Holcombe and Lacombe (2004)	1960-1990; counties along state borders	thirty-year growth; per capita income	top marginal personal income tax rate; state and local per capita expenditures and average state tax rate	negative effect of top marginal personal income tax rate and other taxes; positive expenditure effect
Tomljanovich (2004)	1972 to 1998; all states	annual; per capita gross domestic product growth	FBB approach; total state revenues and expenditures; property, sales, corporate and personal income tax rates; education, welfare, highway, hospital	temporary negative effect of overall tax rate; only corporate income tax rates have positively long run effect, while state welfare expenditures have a negative effect.
Taylor and Brown (2006)	1977 to 1997; contiguous 48 states	annual; ten-year rolling windows; state output, private capital, employment	FBB approach; all but miscellaneous revenues and deficit spending	size of state and local government had negative effects on private economic growth during the 1980s, more likely neutral in 1990s, positive for transportation services and negative for primary/secondary education
Conway and Rork (2006)	1970; 1980; 1990 and 2000, all states	five-year change of residence; interstate migration	estate, inheritance gift (EIG) taxes; expenditures on health and hospitals;	no effect of EIG taxes; health and hospital expenditures attracted elderly relative to youth
Bania et al. (2007)	1962 to 1997; all states, except Alaska	five-year changes; real personal income per capita growth	FBB approach; total state and local non-deficit revenues; health, welfare and other transfer payment expenditures combined, sum of expenditures on highways, education, and other	at lower levels, increased taxes to pay for public expenditures on education and highways have positive effects, the effect turns negative as the tax and expenditure shares rise

			publicly provided inputs	
Agostini (2007)	1974, 1980, 1987, 1992 and 1997; all states	long (5-7 years) changes; foreign direct investment	state corporate income taxes	negative effect of state corporate tax rate on state's share of FDI received
Hammond and Thompson (2008)	1969-1999; 722 labor market areas	annual; real per capita income	total tax revenue; public capital investment; presence of colleges and universities	importance of human capital for growth; little correlation between public capital outlays and income growth
Bania and Stone (2008)	1962 to 2002; all states, except Alaska	five-year changes; real per capita personal income growth	FBB approach; total state and local non-deficit revenues; health, welfare and other transfer payment expenditures combined, sum of expenditures on highways, education, and other publicly provided inputs	Bania et al. (2007) results plus state ranking for 2004; Oklahoma had the eleventh largest predicted potential improvement in income growth from increasing taxes to fund productive services
Coomes and Hoyt (2008)	44 multistate metropolitan areas, 286 counties in 37 states; 1992-2002	in-movers of taxpayers; adjusted gross income (AGI) of in-movers	FBB approach; state and local personal income, corporate income, property, sales taxes; primary and secondary education; higher education; fire; police; parks; highways	negative effect on in-movers from personal income and sales taxes, and from fire safety expenditures; positive effect from highway expenditures; negative effect on AGI per in-mover from personal income tax rate and positive effect from primary and secondary education spending
Reed (2008)	1970 to 1999; lower 48 states	five-year changes; per capita personal income growth	FBB approach; ratio of state and local taxes to personal income; public welfare expenditures; productive (non-welfare expenditures)	significant negative effect of taxes used to fund general state and local expenditures
Reed (2009)	1970 to 1999; lower 48 states	five-year changes; per capita personal income growth; extreme bounds analysis of Reed (2008)	FBB approach; ratio of state and local taxes to personal income; public welfare expenditures; productive (non-welfare expenditures)	negative effect of tax burden on growth across a wide range of specifications, though the effect is modest; reports that sales taxes and the corporate income tax have positive effects relative to other taxes
Felix (2009)	1977 to 2005; individuals, all states	cross-sectional every five year; wage rates	top marginal corporate income tax rate; marginal state individual income tax rate; sales tax	corporate income tax consistent negative effect, mostly positive effect of individual income and sales taxes

Deskins and Hill (2010)	1985 to 2003; all fifty states	annual; employment, gross state product	own-source tax revenues per capita	own-source tax revenues per capita reduced growth in 1985 but by 2003 had zero effect
Goetz et al. (2011)	2000 to 2007; lower 48 U.S. States	cross-sectional growth; employment rate; poverty rate; per capita income; income inequality	highway miles per capita; personal income shares of public expenditures on education, public safety, health and the environment; estate tax, the property tax share and the top marginal corporate income and personal income tax rates	no relationship between the top marginal personal income tax rate, the top corporate income tax rate, or the effective property tax rate with any outcome variable; no effect from having a greater variety of tax incentive programs; only positive influence on growth is from highway miles per capita
Gius (2011)	1993–1994, 2000–2002, 2004–2005; individuals	interstate migration	personal income tax burdens	individuals were more likely to have moved to a state with a lower tax burden
Alm and Rogers (2011)	1947 to 1997; lower 48 states	annual; real per capita income growth	FBB approach; all categories of state and local expenditures and taxes from State Government Finances report	estimated tax relationships range from negative, positive, or zero; state income personal tax is never statistically negative but is sometimes positive and significant; expenditures have more consistent and expected estimated relationships (except highway expenditures)
Bauer et al. (2012)	1934 to 2004; lower 48 states	five-year changes; per capita income	state total tax revenue net of revenue from severance taxes over state personal income serves as the measure of the state tax burden	over the entire period, the tax variable is insignificant; negative and significant for the sub-periods of 1964-1979 and 1984-2004 without state fixed effects
Bruce and Deskins (2012)	1989-2002; all fifty states	change in two measures of entrepreneurship	top marginal personal and corporate income tax rates; sales tax rate; inheritance, estate and gift tax	no economically meaningful effects of state taxes on entrepreneurial activity; negative effects of higher top marginal personal income tax rate and the existence of a state-level estate, inheritance, or gift tax; more progressive individual income taxes associated with higher entrepreneurship rates
Ojede and Yamarik (2012)	1967-2008; lower 48 states	personal income (net of transfers) growth	FBB approach; total tax burden; intergovernmental aid; state and local deficit; personal income	long-run negative tax effect, slightly smaller than that of Reed (2008); positive productive spending effect; sales and

			taxes; corporate income taxes; sales taxes; property taxes; state and local expenditures net of welfare payments	property taxes have a negative effect, no effect of personal income tax, heterogeneous effects across states in the short run
Goff et al. (2012)	1977 to 2005; lower 48 states	annual; per capita gross state product growth	FBB approach; overall state tax burden; separate variables for personal and corporate income taxes; matched pairs of states	relative to state government expenditures generally, a greater tax burden slightly reduces growth, a result generally holding true for personal income taxes but not corporate income taxes
Thompson and Rohlin (2012)	2004-2009, border counties of 47 states	employment; payroll; hiring	state sales tax	negative effects on employment, payroll and new hiring
Yu and Rickman (2013)	1990 to 2000; nonmetropolitan counties lower 48 states	ten-year growth; labor earnings and housing costs	FBB approach; numerous categories of taxes and state expenditures are included with the omitted category consisting of intergovernmental revenues, non-general revenues, non-general expenditures, and welfare expenditures	personal income taxes, property, sales and corporate taxes negatively affected household amenity attractiveness, as did spending on education, health and government administration; positive effect on amenity attractiveness from spending on highways, the environment and housing
Rohlin et al. (2014)	2002-2005, border counties, lower 48 states	newly created enterprises	per capita state government expenditures; maximum corporate and personal income tax rates; sales tax rate	new businesses locate so as to avoid higher taxes
Gale et al. (2015)	1977 to 2011; lower 48 states	five-year changes; real per capita income growth; employment; firm formation	FBB approach; average state and local tax burden is separated into components; omitted category mostly consisting of spending on government administration and education	effect of overall tax burden is negative for 1977-1991 but positive for 1992-2006; negative income growth effects of property taxes, welfare spending; positive effect of corporate income taxes; no effect of spending on airports, highways and transit utilities or top marginal personal income tax rate; property tax reduced employment growth and firm formation
Borcher et al. (2016)	1989-2011; all states	small and large business growth	top marginal personal and corporate income tax rates; sales tax rate; inheritance, estate and	sales and corporate income taxes reduce small business growth; taxes do not influence large

			gift tax	business growth
Conroy et al. (2016)	2000-2011; states	number of manufacturing firms that changed state of location	FBB approach; personal and corporate income taxes; property taxes; spending on primary and secondary education, higher education, corrections, highways and welfare.	higher education spending attracts firms, though the reverse is true for primary and secondary education spending and higher personal income taxes; effects vary with research and development spending type
Ljungqvist and Smolyansky (2016)	1970 to 2010; border counties	annual; employment; wage and salary income	top marginal corporate income tax	negative effects of corporate tax rate increases, but no positive effects of tax cuts except during recessions
Peltzman (2016)	1975-2012, border counties	annual employment; wage rate; number of business establishments	tax revenue; own source general revenue; direct general expenditures from own sources; total direct expenditures	negative effects on aggregate economic activity from fiscal expansion, including reduced job quality
Segura (2017)	1977 to 2012; lower 48 states	annual; private gross state product growth	FBB approach; spending is aggregated into investment, services or administration; property, sales, income taxes plus general charges together equal aggregate own-source revenues; budget deficit	increases in corporate income tax rates reduce employment and income in the counties affected by the tax cut, though the effects are small
Anderson and Bernard (2017)	1999 to 2013; lower 48 states	regression, five-year changes; real per capita gross state product	total state and local tax burden; property, sales, individual income and corporate income tax burdens	positive effect of corporate tax rate; negative effect of sales tax and personal income tax (weakly); sensitive to time period of analysis
Ojede et al. (2017)	1971 to 2005; lower 48 states	annual; real per capita income growth	FBB approach; tax burden, personal income tax, corporate income tax, deficit; spending on higher education and highways	regardless of financing source, productive higher education and highway spending have statistically significant positive effects
Moretti and Wilson (2017)	1976 to 2010; "star scientists"; all states	annual; individuals; migration	corporate income tax, personal income tax of high-income earners	increases in personal income or corporate income tax rates reduce net in-migration
Girard and Rauh (2017)	1977-2011; business	annual; number of business	corporate income tax, gross receipts tax, or other; sales tax,	negative effect of corporate taxes on number of establishments and employees,

	establish. all states & Wash. D.C.	establishments; employees; capital per establishment	property tax, personal income tax	and capital per plant; pass-through entities respond similarly to changes in personal tax rates
Zidar (2017)	1950-2011; individual data, all states	annual; employment growth	exogenous federal tax changes and variation in the income distribution	tax increase for bottom ninety percent of the income distribution reduced employment growth, while there is no effect for an equivalent-sized tax cut for the top ten percent
Case Studies				
Study	Sample	Empirical Approach	Fiscal Variables	Findings
Denaux (2007)	1980 to 1995; North Carolina counties	five-year averages; real per capita income growth	FBB approach; personal income, corporate income, property, sales and gasoline taxes; primary/secondary education, higher education, and highways; transfer payments are in the omitted category	corporate taxes reduces income growth, while higher education spending and personal income taxes increases growth; sales taxes, property taxes K-12 spending did not affect growth
Wooster and Lerner (2010)	1992 to 2006; Washington counties	annual; real per capita retail sales	combined state and local sales tax	differences in the state and local sales taxes in Washington's border counties with those in Idaho and Oregon reduces real per capita retail sales
Young and Varner (2011)	2004-2007 relative to 2000-2003; high-income earners in New Jersey	four-year periods; net out-migration	top marginal income tax rate	only is statistically significant net out-migration of retirees and those in the top 0.1 percent who receive all their income from investments
Varner and Young (2012)	1994-2007; high income earners in California	annual; in- and out-migration	1996 tax cut on high incomes; 2005 Mental Health Services Tax on high incomes	absence of a significant consistent effect on in-migration or out-migration from either tax change
Rickman (2013)	1990 to 2010; counties in Oklahoma and neighboring states	ten-year changes; manufacturing employment, total employment, population, real per capita income,	state binary indicator variables reflecting differences after extensive control variables	Texas manufacturing employment and population during 1990-2000 and total employment during 2000-2010 grew faster than Oklahoma's; Oklahoma's growth more often was stronger than that of Arkansas, Kansas and Missouri during

		real private domestic product per employee		the 2000-2010; per capita income grew faster in Oklahoma compared to that in Colorado during 2000-2010, but slower compared to New Mexico
Cohen et al. (2015)	2004-2007 relative to 2000-2003; high income earners in New Jersey	four-year periods; out-migration	top marginal income tax rate	statistically significant effect on out-migration; small budgetary impact though
Wang (2016)	2000 to 2006/2010; PUMAs; Oklahoma & Texas compared	levels and ten-year changes; wages and housing costs	state binary indicator variables reflecting differences after extensive control variables	only fiscal policy difference found for Texas relative to Oklahoma is the relatively lower household amenity attractiveness of the policies in Texas nonmetropolitan areas; no significant growth differences are found between the two states.
Rickman and Wang (2018)	2011-2015 less 2006-2011; Kansas & Wisconsin	difference-in-differences; per capita income, total employment, real gross state product, poverty rate; housing price; median household income; labor force/population; population	timing of tax and expenditure cuts post-2011 in treated state versus counterfactual comparison	total wage and salary nonfarm employment grew significantly slower in Kansas and Wisconsin relative to their control groups, particularly for Kansas; only for two indictors did Wisconsin outperform the control group and only for one indicator did Kansas outperform its control group; real per capita state and local expenditures grew slower in Kansas and Wisconsin relative to that in their respective control groups, especially for state and local construction expenditures in Kansas and state and local educations expenditures in Wisconsin
Turner and Blagg(2017)	2004-2014; counties in Kansas and bordering states	difference-in-differences; private sector employment; full-sample and border matching samples	comparison of pre- and post-tax cut periods in Kansas counties and those in bordering states	small relative reduction in private establishment employment and no change in proprietor employment in Kansas

Table 2. Summary of State and Local Fiscal Policy Studies Reviewed Part 2

Nationwide Studies				
Study	Spatial Spillovers	Heterogeneity	Control Variables	Accounting for Endogeneity
Brown et al. (2003)	no	no	industrial Mix, unemployment rate	instrumental variables
Harden and Hoyt (2003)	yes, statistically insignificant	yes (geography)	educational attainment, input costs, female labor force participation rate	lagged values of taxes and expenditures and instrumental variables estimation
Holcombe and Lacombe (2004)	no	no	business climate ranking; manufacturing and mining influence; population; per capita income; median age	no
Tomljanovich (2004)	no	no	none	addition of leads and lags
Bania et al. (2007)	no	yes (geography)	age 18–64 population percentage; union membership; budget balance/personal income; unemployment–compensation/personal income	GMM estimation
Taylor and Brown (2006)	no	yes (time)	Industrial mix; unemployment rate	no
Conway and Rork (2006)	yes, no effect	no	median house value; manufacturing wage; unemployment rate; crime rate; population 65 and over	lagged values of taxes
Agostini (2007)	no	no	total population; road miles/land area; real wage rate; energy price	instrumental variables
Hammond and Thompson (2008)	no	yes (geography)	fuel and electricity prices; unionization; natural amenity variables; universities/colleges; death rate	nonlinear two stage least squares
Bania and Stone (2008)	no	yes (geography)	union membership; budget balance/personal income; unemployment–compensation/personal income	GMM estimation
Coomes and Hoyt (2008)	no	yes (political)	state's employment share of metropolitan area; median income	lagged values of taxes and expenditures
Reed (2008)	no	no	education; age structure; race, gender; population; urbanization; industry structure; unionization	lagged values of tax burden
Reed (2009)	no	no	education; age structure; race, gender; population; urbanization; industry	lagged values of tax burden

			structure; unionization;	
Felix (2009)	no	yes (time)	demographic variables; occupation, industry, weather, Census division; physicians per 100,000 civilian population; student-to-teacher ratio	no
Deskins and Hill (2010)	no	yes (time)	population; wage rate/median income; population; energy price; unemployment rate; industry composition; age structure; gross state product; employment	specification of growth
Goetz et al. (2011)	no	no	per capita income; percent the state population in a metropolitan area; natural amenity attractiveness; high school attainment among the adult population	beginning-period values of explanatory variables
Gius (2011)	no	yes (individuals, time)	age; gender; race; urban residence; educational attainment; number of people in household; household income; unemployment rate change; employment status	no
Alm and Rogers (2011)	no	no	groups of demographic, geographic variables, political and national variables; specification searches	one-year lags of explanatory variables
Bauer et al. (2012)	no	yes (time)	infrastructure expenditures, climate, industry structure and education; lagged per capita income	five-year lags of explanatory variables
Bruce and Deskins (2012)	no	no	unemployment rate; median income; poverty rate; population density; age; college attainment; industry composition; job growth rate	one-year lags of explanatory variables
Ojede and Yamarik (2012)	no	yes (geography)	private investment/personal income; nonfarm employment growth	no
Goff et al. (2012)	no	no	right-to-work status; a regulatory index; beginning period per capita gross state product; miles of coastline/land area; college attainment	no
Thompson and Rohlin (2012)	no	yes (geography)	changes in the sales tax treatment of food; gender; age	use of state sales tax for border counties
Yu and Rickman (2013)	yes	no	demographic variables; housing	instrumental variables

			characteristics	
Rohlin et al. (2014)	no	no	land area	two-year lags of tax and expenditure variables
Gale et al. (2015)	yes	yes (geography, time)	unemployment rate; population density; political/institutional dummy variables; tax expenditure limitation dummy	one-year lags of revenue variables
Borcher et al. (2016)	no	yes (business size)	beginning level of small business activity; unemployment rate; median income; poverty rate; population density; age; college attainment; industry composition	one-year lag of explanatory variables
Conroy et al. (2016)	yes	yes (research and development spending)	political variables; college attainment; competitiveness index; manufacturing employment share in state; state share of national manufacturing gross product; manufacturing wage; electricity rate; unionization; unemployment rate	lagged explanatory variables
Ljungqvist and Smolyansky (2016)	yes	yes	none	beginning-year tax variable-ending-year outcome
Peltzman (2016)	yes	yes (geography)	industry composition	use of statewide fiscal measures for border counties; reverse causality test
Segura (2017)	yes	yes	none	GMM estimation
Anderson and Bernard (2017)	yes	no	control variables of Reed (2008)	no
Ojede et al. (2017)	yes	no	state private investment share; non-farm civilian employment growth; unionization	lags of fiscal variables; endogeneity tests
Moretti and Wilson (2017)	no	no	unemployment rate; population growth	check pre-existing trends and subsequent tax changes
Giroud and Rauh (2017)	no	yes (industry)	unemployment insurance; state sales tax rates, a coarse estimate of property tax burdens; and an index of business tax incentives	narrative approach of Romer and Romer (2010)
Zidar (2017)	no	yes (geography)	oil prices, real interest rates; contemporaneous policy and spending changes	exogenous changes in federal tax rates and state outcomes

Case Studies				
Study				
Denaux (2007)	no	yes (geography)	initial income; infant mortality rate; real stock value of roads/land area	no
Wooster and Lehner (2010)	no	yes (geography)	real per capita income; travel cost proxy; unemployment rate; percentages of the population that are either over 65 or younger than 18; number of retail establishments per 1,000 residents	no
Young and Varner (2011)	no	yes (geography)	none	no
Varner and Young (2012)	no	yes (geography)	none	no
Rickman (2013)	no	yes (geography, time)	natural amenity attractiveness; urbanization; industry specialization; and immigration	no
Cohen et al. (2015)	no	yes (geography)	none	no
Wang (2016)	no	yes (geography, time)	natural amenity attractiveness; urbanization; industry specialization; and immigration; household and housing characteristics	no
Rickman and Wang (2018)	no	yes (geography)	predictor variables in creating the synthetic control	check pre-existing trends
Turner and Blagg(2017)	no	yes (geography, time)	population; corporate tax rate; sales tax rate	no

Table 3. Change in Rank by Fiscal Variable: 2011-2015

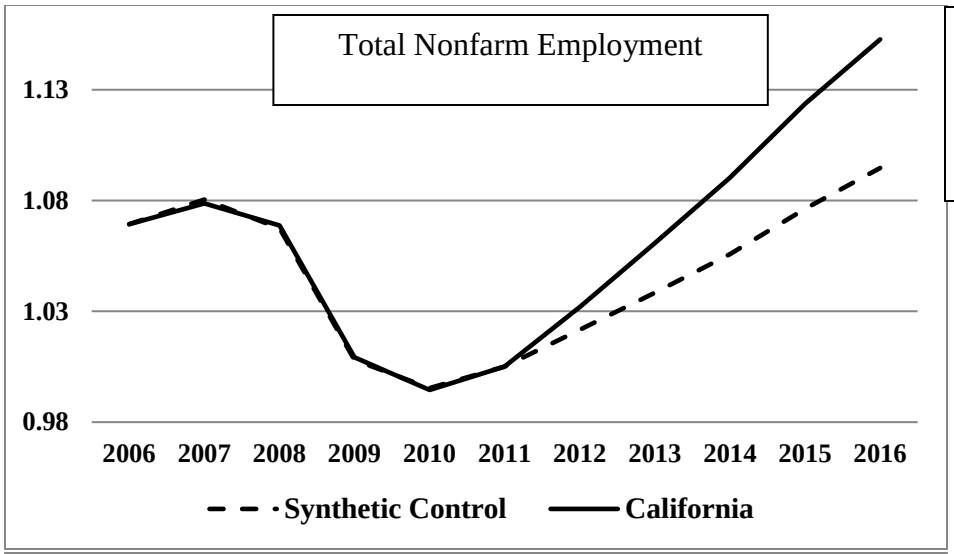
Fiscal Revenue Category/State	CA	KS	ME	MN	OH	WI
Own Source Revenues	29	22	27	16	26	44
Personal Income Taxes	2	50	45	3	49	46
Sales Taxes	43	11	8	15	2	30
Corporate Income Taxes	48	4	46	9	43	25
Property Taxes	44	29	3	43	21	50
Miscellaneous Revenues	34	32	31	30	22	9
Total State and Local Expenditures	35	16	39	22	44	31
Education Expenditures	30	9	37	23	42	40
Transportation Expenditures	25	14	41	11	12	16
Public Welfare Expenditures	7	31	48	29	50	22

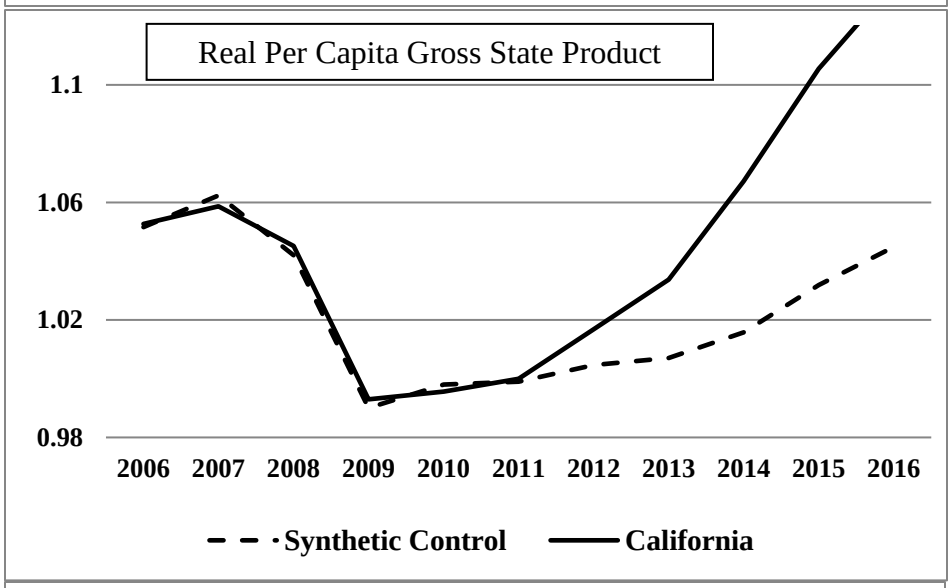
Table 4. State Weights in Construction of Synthetic Control Units

	CA	KS	ME	MN	OH	WI
AL	0.00	0.00	**0.17**	0.00	**0.10**	0.00
AZ	**0.21**	0.00	0.00	0.00	0.00	0.00
AR	0.00	0.00	0.00	0.00	0.00	0.00
CT	**0.13**	0.00	0.08	0.00	0.00	0.00
DE	0.04	0.00	0.00	0.00	0.05	0.03
FL	**0.17**	0.00	0.01	0.00	0.00	0.00
GA	0.04	0.00	0.00	0.00	0.00	0.00
ID	0.02	**0.11**	0.00	0.00	0.00	0.02
IL	0.00	0.00	0.00	0.04	0.05	0.00
IN	0.00	0.00	0.00	0.02	**0.19**	**0.14**
IA	0.00	0.08	0.00	**0.13**	0.00	**0.30**
KY	0.00	0.00	0.00	0.00	0.00	0.00
MD	0.00	0.00	0.00	0.00	0.00	0.00
MA	0.04	0.00	0.00	0.08	0.00	0.00
MI	0.00	0.00	0.00	**0.22**	**0.30**	**0.08**
MS	0.00	0.00	0.02	0.00	0.00	0.00
MO	0.00	0.00	**0.13**	0.00	0.00	0.00
NE	0.06	**0.15**	0.08	0.02	0.08	0.00
NH	0.01	0.00	**0.13**	0.05	0.00	**0.27**
NJ	0.05	0.00	**0.10**	0.06	0.02	0.00
NY	0.00	0.00	0.03	**0.13**	0.00	0.00
NC	0.00	0.08	0.00	0.02	0.00	0.04
OR	0.06	0.00	0.00	0.00	0.00	0.00
PA	0.00	0.04	0.01	0.00	**0.07**	0.03
RI	0.06	0.00	**0.12**	0.00	0.00	0.05
SC	0.00	0.06	0.00	0.00	0.00	0.00
SD	0.00	**0.30**	0.00	0.03	**0.07**	0.00
TN	0.00	0.00	0.00	0.00	**0.07**	0.00
UT	0.03	0.00	0.00	0.01	0.00	0.00
VT	0.00	0.00	**0.10**	**0.10**	0.00	0.05
VA	0.00	0.00	0.00	0.00	0.00	0.00
WA	**0.09**	**0.17**	0.01	0.09	0.00	0.00

Table 5. Change in Rank by Fiscal Variable Relative to the Synthetic Control: 2011-2015

Fiscal Revenue Category/State	CA	KS	ME	MN	OH	WI
Own Source Revenues	-3	0	-5	-16	-3	24
Personal Income Taxes	-22	19	21	-21	24	16
Sales Taxes	10	-12	-25	-18	-29	4
Corporate Income Taxes	20	-22	18	-19	29	7
Property Taxes	11	11	-30	10	-9	29
Miscellaneous Revenues	8	9	5	4	-8	-15
Total State and Local Expenditures	4	-10	8	-9	17	10
Education Expenditures	10	-12	17	3	12	18
Transportation Expenditures	-3	-16	13	-17	-13	-6
Public Welfare Expenditures	-21	0	20	1	27	-2





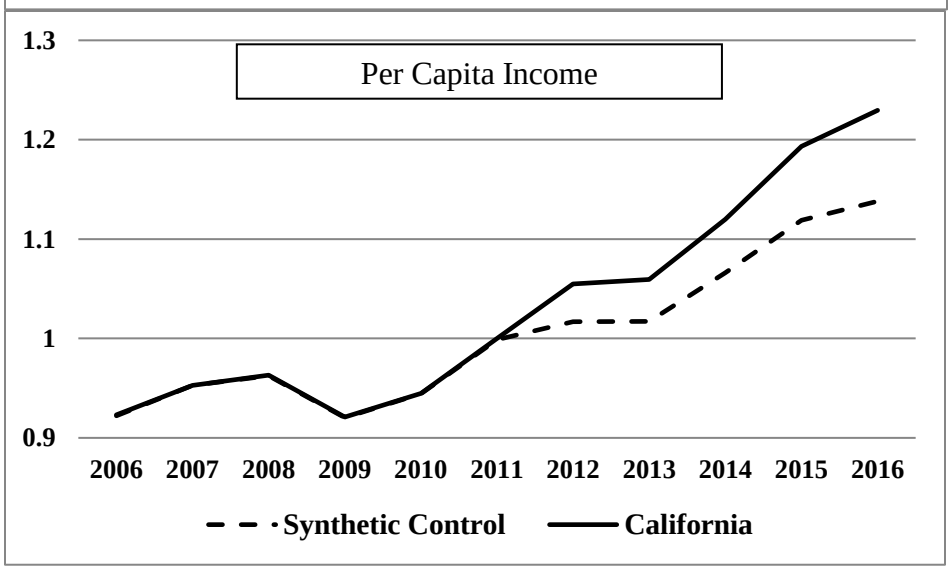


Figure 1. California SCM Results

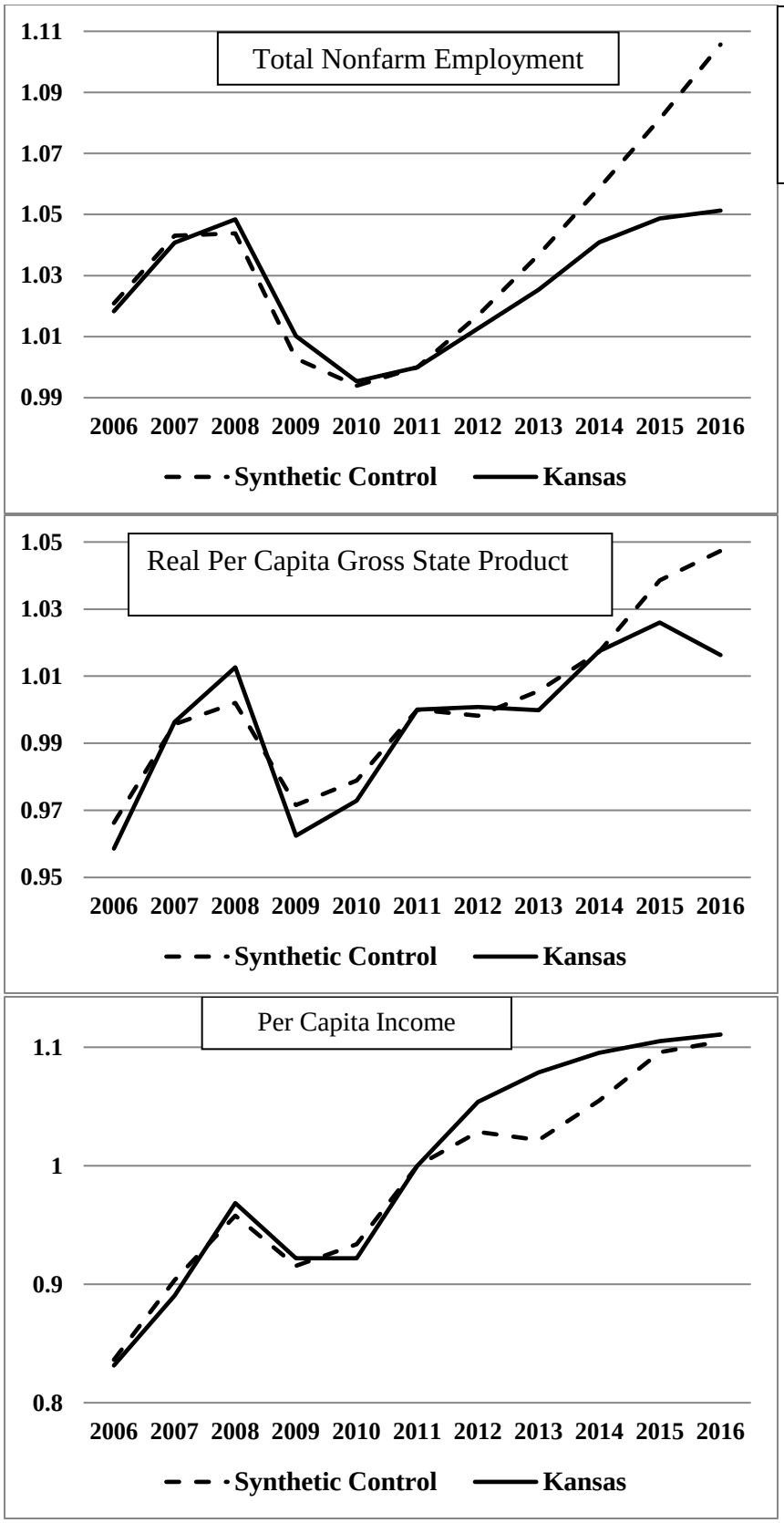
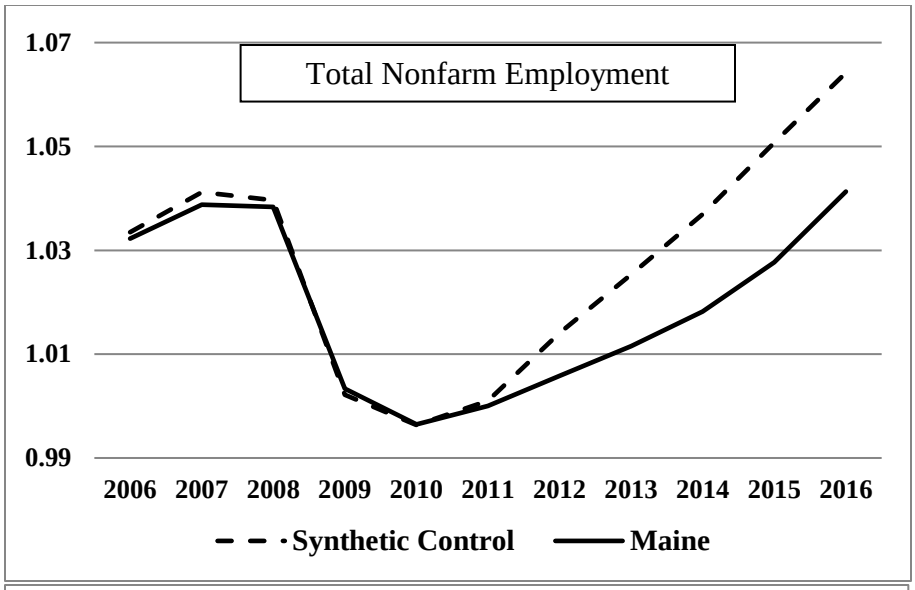
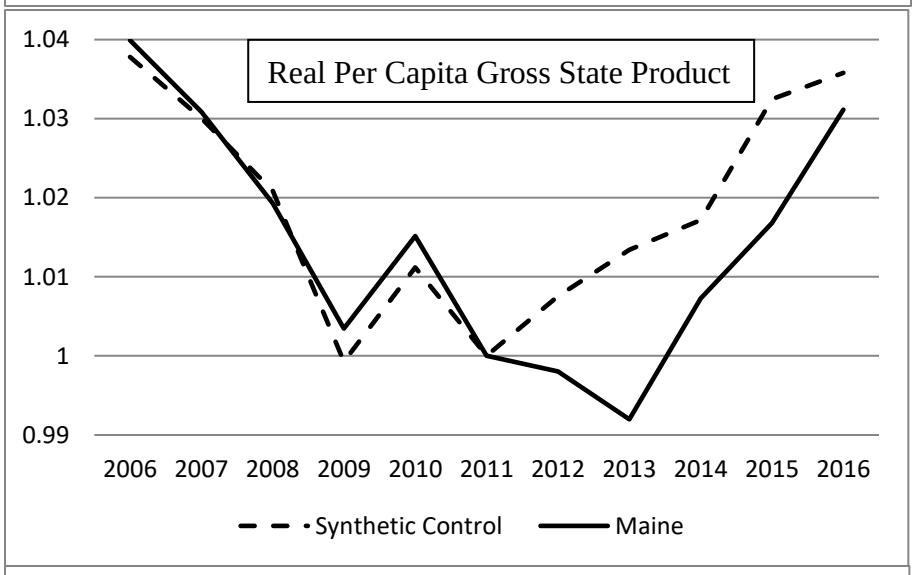


Figure 2. Kansas SCM Results





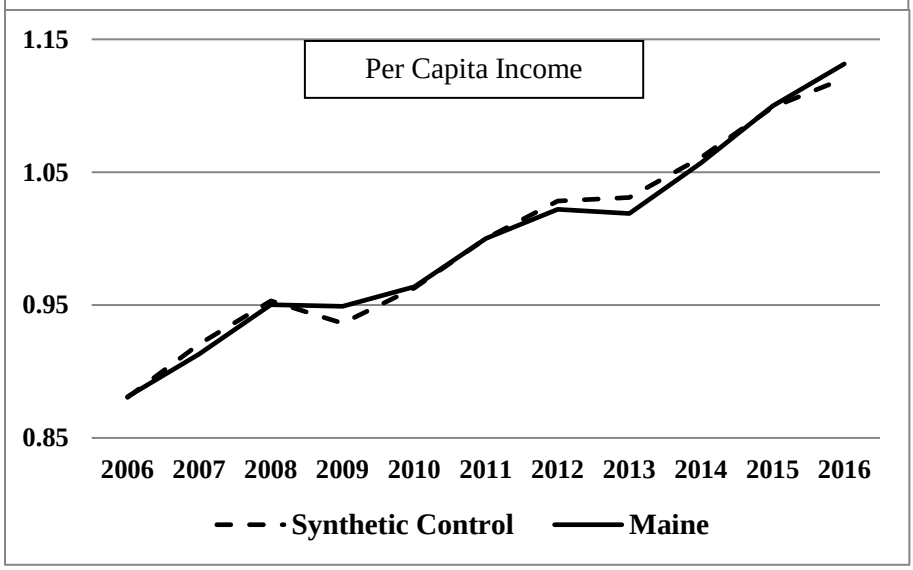


Figure 3. Maine SCM Results

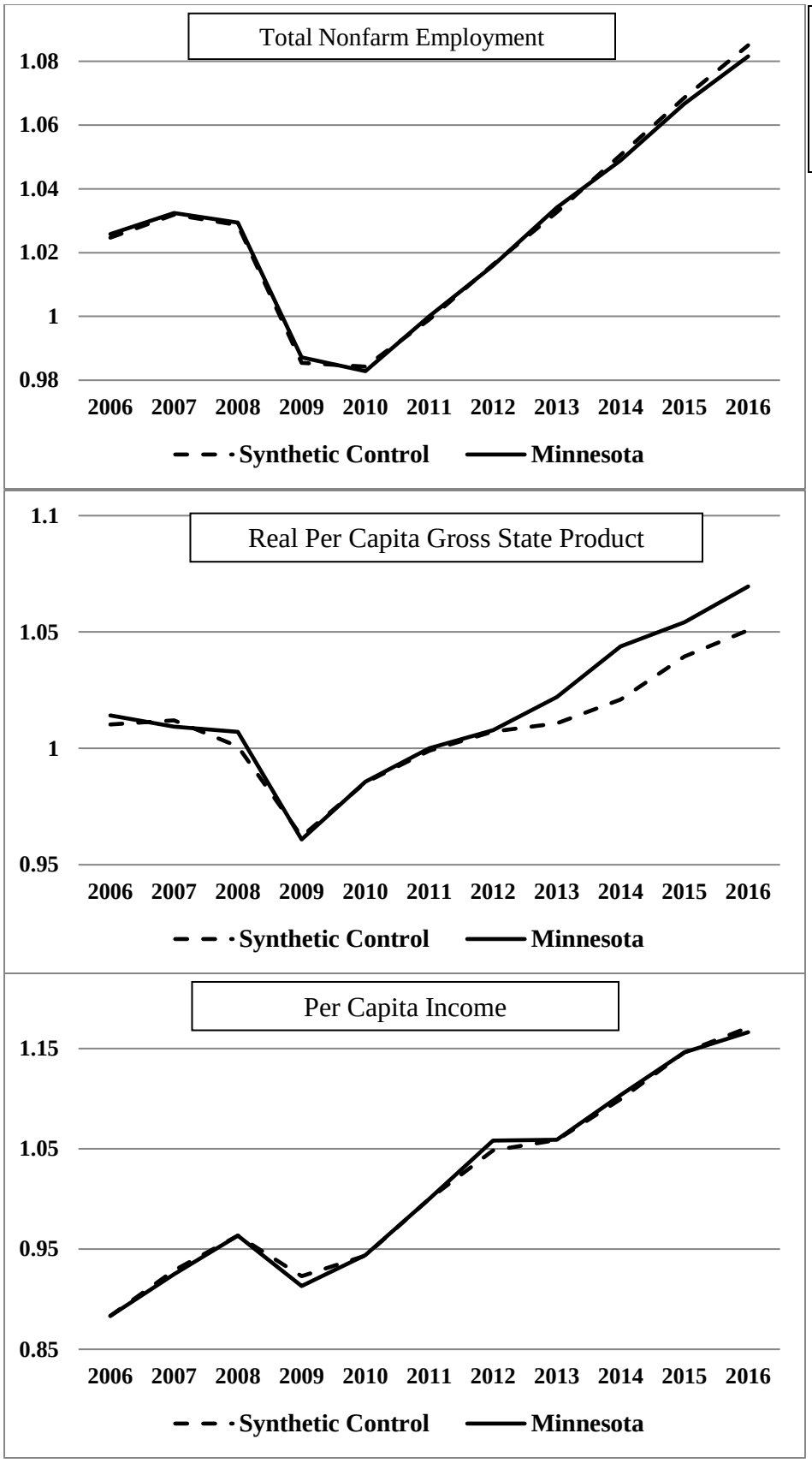


Figure 4. Minnesota SCM Results

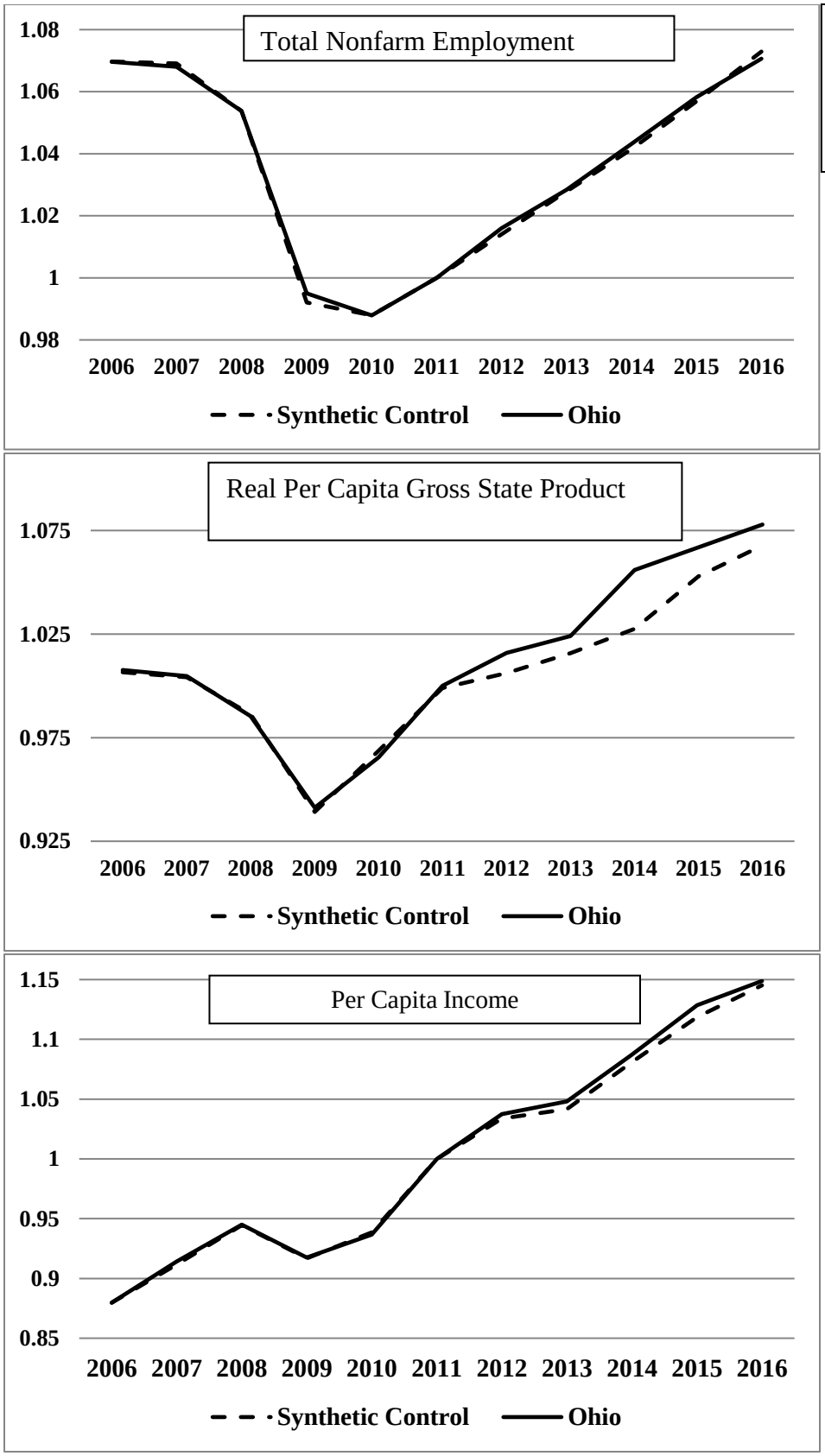


Figure 5. Ohio SCM Results

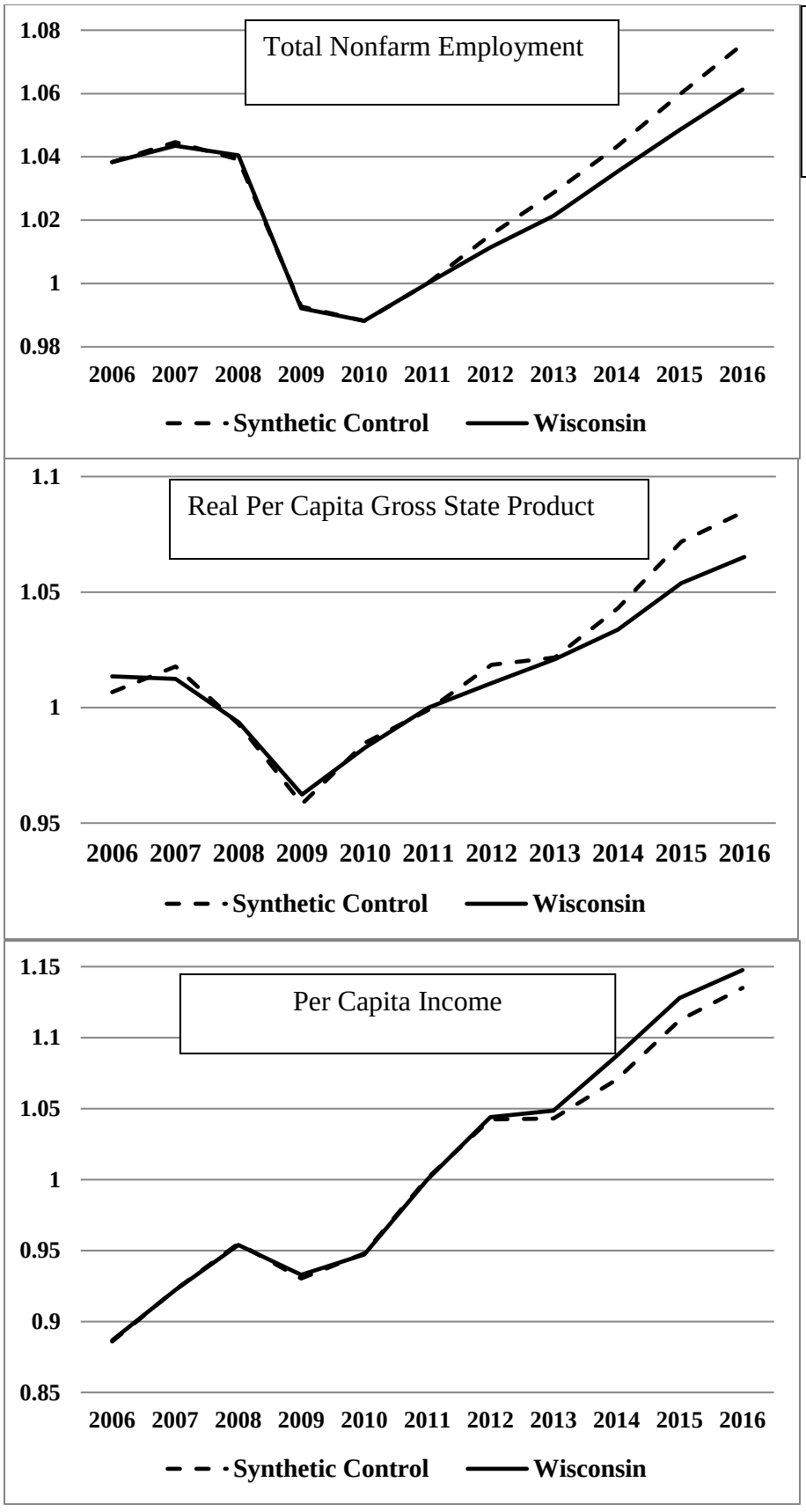


Figure 6. Wisconsin SCM Results