A SALT on Real Estate?

Housing Market and Migration Responses to the Limit on the State and Local Tax Deduction

Lawrence M. Kessler and Donald Bruce

August 2022

ABSTRACT: The 2017 Tax Cuts and Jobs Act placed a $10,000 limit on the deductibility of state and local taxes (SALT) for federal tax purposes. This policy change likely increased the cost of home ownership for some households in high-tax areas. We examine whether these costs were capitalized into the local housing market through slower growth in housing prices. Motivated by the argument that the SALT cap caused some taxpayers to relocate, we also examine whether the cap influenced migration patterns. The cap led to a sizeable reduction in home price growth but had no discernable impact on state-level migration patterns.

Keywords: State and Local Taxation, Housing, Real Estate, Migration

JEL Codes: H2, H3, H7, R2, R3

Corresponding Author: Lawrence M. Kessler, Boyd Center for Business and Economic Research and Department of Economics. Haslam College of Business, 719 Stokely Management Center. University of Tennessee, Knoxville, TN 37996. (865)974-6078. lkessler@utk.edu

Acknowledgments: The authors thank David Agrawal, Rich Beem, Eunsik Chang, Diego Medina Guerrero, Rebecca Fraenkel, Enda Hargaden, Matt Harris, and Alannah Shute for helpful comments, and Tim Kuhn for research support.

A SALT on Real Estate?

Housing Market and Migration Responses to the Limit on the State and Local Tax Deduction

"The cap on SALT deductions has been a body blow to New York families. The full SALT deduction must be restored. Without the full SALT deduction families will leave New York and the last thing we need in the midst of the health and economic devastation of Coronavirus is to lose our residents and taxpayers."

Congressman Tom Suozzi (D-Long Island, Queens), July 14, 2020.

1. Introduction

While the Tax Cuts and Jobs Act of 2017 (TCJA) is better-known for having reduced individual and corporate income tax rates, it also placed a limit on the deductibility of state and local taxes (SALT) for federal individual income tax purposes.[1] Effective with the 2018 tax year, taxpayers can only deduct up to $10,000 in state and local taxes if they choose to itemize their deductions. Combined with the substantial increases in standard deductions, which reduced overall incentives to itemize deductions, this provision dramatically increased the total burden of state and local taxes for itemizers, especially those in high-tax states.

The SALT deduction has been a feature of federal income taxation since the 1860s, predating the modern individual income tax by more than fifty years (Thorndike, 2017). And it has been under fire seemingly ever since its inception (Rosen, 1979). Supporters argue that it helps avoid double-taxation of income (at the federal and state levels) and protects state tax bases against federal intrusion. Opponents point to concerns about the fairness in the distribution of the benefits of the deduction, which favors taxpayers in higher-tax states, and the notion that it represents a non-neutral federal subsidy of state and local public services (Thorndike, 2017).[2] Despite the long-running debate over the provision's merits given its rather substantial revenue cost, the SALT deduction was never changed until the passage of the 2017 Act.

Those in favor of the SALT deduction cap have argued that the SALT deduction benefits the rich, and this new cap will reduce inequality. In comparison, the deduction's defenders, especially members of Congress from higher-tax states, have decried the $10,000 SALT deduction cap as being politically motivated to punish blue states. As demonstrated by the above quote from Rep. Suozzi, policy makers in those states are concerned that the sudden and sharp reduction in the deduction might cause some residents to relocate to other states with lower taxes and/or lower housing prices. It is worth noting, however, that this argument also implies that the unlimited SALT deduction would have encouraged migration *into* those same states due to lower federal taxes. Furthermore, if the SALT deduction cap makes home ownership more costly in some areas, this cost should be capitalized into the local housing market and potentially reduce home values in affected areas. This brings us to our central research question: does the federal deductibility of state and local taxes influence the local housing market and residential location decisions? If so, then one must move back a step to consider the overall impact of federal tax policy on sub-federal migration and housing decisions in order to address the more fundamental

[1] SALT deductions vary from state to state but typically apply to state and local property taxes as well as income or sales taxes.

[2] Similarly, Gordon and Kopczuk (2014) show that, from an equitable standpoint, property tax payments should not be deductible since those with higher property tax payments on average also have higher incomes.

question of fairness. It is wrong to imply that the pre-2017 federal tax environment—with the unlimited SALT deduction—was inherently more fair than the post-2017 deduction-limited environment without additional analysis. We attempt to help provide that analysis here, focusing on the empirical impact of SALT deductibility on housing markets and migration.

Our research is motivated by two main arguments from the current policy debate.[3] First, is the 2017 limitation on SALT deductibility only affecting the rich? To answer this question, we empirically examine whether the SALT cap impacted the housing prices among *average* homeowners in affected areas. We focus on home prices among conforming loans, as discussed below, rather than all loans in a given market. Second, did the SALT deduction cap cause families to move away from higher-taxed states? If this is occurring, we should see empirical evidence in in the form of reduced (increased) in-migration in (outmigration from) those states that have been relatively harder-hit by the 2017 Act.

We make use of a variety of housing market, tax policy, and migration information to explore these possibilities. Specifically, we gather county-level data from Zillow.com on average home values and the U.S. Federal Housing Finance Agency's (FHFA) measure of the annual house price index (HPI) for the years 2012 through 2019. Importantly, the HPI data measure price changes among mortgages purchased or guaranteed by Fannie Mae or Freddie Mac. By law, Fannie Mae and Freddie Mac are constrained by a Conforming Loan Limit (CLL), which restricts their purchases/securitization of mortgages to those with origination values below a certain amount. This limit varies by location and cost of living, and in 2019 the CLL ranged from $484,350 to $726,525 for a one-unit home. The 2019 limit rose to a maximum of roughly $1.4 million for a four-unit home.[4] If the SALT cap has any impact on home prices, it is likely to be more salient among more expensive homes and those financed with non-conforming mortgages (i.e. those above the CLL and not purchased/guaranteed by Fannie Mae or Freddie Mac). However, by using the HPI data and focusing on prices among conforming loans, we can examine whether the SALT cap has implications for *average* homeowners while factoring out any effect on home prices at the top end of the housing market.

We combine the housing market data with county-level tax data from the U.S. Internal Revenue Service (IRS) and state-level tax data from the Federation of Tax Administrators (FTA) for the 2017 calendar year, the year prior to the SALT deduction cap's implementation. Finally, we gather state-to-state migration flows data from the U.S. Census Bureau.

We use event studies and differences-in-difference (DD) methods to examine whether the cap on SALT deductions had any impact on county-level house prices and state-level migration patterns, using high federal itemization rates, high state and local tax collections per capita, and high home values (all as of 2017) to define our treatment groups.

Our work contributes to a growing literature on the housing price impacts of reduced deductibility of mortgage interest and property taxes. Davis (2019) provides convincing evidence that much of the benefits of the mortgage interest deduction are capitalized into housing prices. Similarly, Gruber, Jensen, and Kleven (2021) show that a reduction in the mortgage interest deduction in Denmark might have resulted in lower house prices. We anticipate a similar story with the property tax deduction, and thus anticipate that the SALT cap could lead to house price reductions (or at least lower housing appreciation rates) in areas with higher income tax rates, higher property tax rates, and higher percentages of itemizers.

[3] See Vesouli (2021) for a summary of the current policy debate.

[4] See https://www.fhfa.gov/DataTools/Downloads/Pages/Conforming-Loan-Limit.aspx

In a recent study that is most directly related to our work, Li and Yu (2021) examine the housing market effects of the SALT deduction cap and find that the cap did in fact lead to a reduction in the growth of home values among more affected areas.[5] In their main models, home prices are measured using data from Zillow.com, which quantify home prices across the full price distribution in a given market. In comparison, we examine whether the SALT cap had any price effect among conforming loans only. In doing so, we net out the potential negative price effects on homes in the top end of the price distribution and focus on whether the SALT cap had downstream effects impacting housing prices for more average-priced homes. This is an important piece of the policy debate, as policymakers opposed to the SALT cap have argued that the SALT deduction did not just benefit the rich, but also impacted middle-income households living in high cost of living areas. For example, in Washington D.C., the median home price was over $600,000, which is below Washington D.C.'s 2019 CLL of $726,525, and owners of a $600,000 home likely have some SALT deductions due to high real estate taxes. This potential impact on house prices could thus lead to changes in the marginal incentive to relocate away from areas with higher tax rates or housing prices in an effort to reduce total housing costs. Our paper makes advances to this emerging literature by examining the impact of the SALT deduction cap through the lens of the current policy debate. We aim to answer two important questions. First, is the SALT deduction cap only a "tax on the rich?" Second, did the SALT deduction cap cause families to move away from higher-taxed states? To answer the second question, we examine whether the SALT deduction cap had any impact on state-level migration patterns. We focus on state-level migration patterns because this gets to the heart of the policy debate as to whether the SALT cap is causing families to leave higher-taxed states. Furthermore, we are also able to examine whether the SALT cap reduced in-migration to the more affected states. Examining the potential determinants of migration patterns is especially important at present, as population growth across the U.S. has slowed dramatically over the last three decades due to an aging population coupled with a marked slowdown in fertility rates. If this pattern persists, population gains will largely be driven by migration. From an economic and fiscal standpoint, this is particularly important as population losses can have important implications for long run economic growth, the size of the state's workforce, and state tax revenues.

We find that the SALT deduction cap led to a sizeable and statistically significant reduction in housing price growth among conforming loans, as measured by the HPI, among the treated ("high-tax") counties as compared to counties with less exposure to the SALT deduction cap. Estimates indicate that these post-policy effects are more pronounced in 2019 than in 2018. This pattern is consistent with the implementation of the TCJA, which first placed a cap on SALT deductions for the 2018 tax year, which would have affected tax payments in 2019. For example, among the 100 most exposed counties in the U.S., the SALT deduction cap led to a 1.1 percentage point reduction in housing price growth in 2018 and a much more pronounced 3.7 percentage point drop in 2019 (relative to less exposed counties). Conversely, we find little evidence to suggest that the TCJA had any impact on state migration patterns. This is consistent with previous literature finding that the likelihood of moving in response to tax changes is low (Day and Winer, 2006; Coomes and Hoyt, 2008: Young and Varner, 2011; Varner et al., 2018).[6] This is not surprising given that moving is a very big and disruptive decision for most households, and people move for many different reasons. Cost of living is certainly a factor, and this tax policy, which raised the cost of home ownership, could certainly induce affected households to move. But other factors such as job prospects, climate, culture, and public provisions are important determinants as well (Blomquist,

[5] A few recent working papers also show that the SALT deduction cap had negative effects on home ownership rates (Hembre and Dantas, 2021) and house prices (Sommer and Sullivan,2021; Tong, 2021).

[6] In contrast, however, Shan (2010) finds that higher property taxes driven by the U.S. housing market boom in the early 2000s led to increased mobility among elderly homeowners. Similarly, Schmidheiny and Slotwinkski (2018) find that high-income groups in Switzerland are more likely to move away from high-tax municipalities, and Schmidheiny (2006) finds that higher income households are more likely to move to low-tax jurisdictions than are lower income households.

Berger, and Hoehn, 1988; Chen and Rosenthal, 2008; Albouy and Lue, 2015). Furthermore, it is of course still possible that the policy change induced some middle or high-income households to move out of high-taxed states, which could have potentially serious implications for state tax revenues. However, we find that the policy change had no discernable impact on per capita state tax revenues. Thus, even if middle to high-income individuals did move away from the more affected states, those moves had little impact on *statewide* migration patterns or state tax revenues.

We emphasize that these results in no way allow us to conclude that the SALT deduction cap has reduced fairness. To be sure, some of the estimated impacts surely represent the unwinding of pre-existing inequities in the tax system. However, these results do indicate that some of those who purchased houses in high tax states prior to the SALT deduction cap were likely made worse off by this policy change.

2. Policy Background

As noted above, the deduction for state and local taxes paid has been a feature of U.S. federal individual income taxation for nearly two centuries. This follows directly from the traditional Haig-Simons definition of income, which is often held up as the broadest possible indicator of one's ability to pay taxes (Haig, 1921, and Simons, 1938).[7] When it comes to state and local taxes paid, the application of Haig-Simons principles depends on whether one views state and local taxes as the price of state and local public services (and, therefore, a very important component of consumption) or the costs of earning income (and, therefore, deductible for tax purposes). Both are compelling arguments, to the extent that state and local taxes represent voluntary transactions. For more mobile taxpayers who can choose from a broad menu of residential locations, each featuring its own set of tax and spending programs, the variation in state and local taxes paid represents more of a voluntary choice (Tiebout, 1956). Indeed, some of those who opt to locate (or remain) in higher-tax jurisdictions do so out of choice rather than necessity. Their state and local taxes, or at least that portion that exceeds a local mean, therefore represent a fee for the higher level of public services made possible by the higher tax burden. For others who have limited jurisdictional mobility, however, their state and local taxes more closely represent a required (non-voluntary) cost of earning their income.

All of this is to imply that it is impossible to cleanly categorize state and local taxes for all taxpayers in all jurisdictions. Applying a uniform federal rule necessarily creates winners and losers in the Haig-Simons context. A full and unlimited deduction for state and local taxes paid, which existed until 2017, might therefore represent the most equitable outcome, as it recognizes the higher tax costs borne by less mobile taxpayers and allows them to partially offset those costs if they itemize their deductions on their federal income tax return. It is this argument that motivates the recent claims that the 2017 limitation reduced fairness.

The 2017 SALT deduction limit was obviously intended to offset the revenue reductions caused by the Act's other provisions, notably the reduction in individual and corporate marginal tax rates. It was also held up as a progressivity-enhancing response to the long-standing criticism of the deduction's regressivity, in that taxpayers in higher marginal tax rate brackets enjoyed larger benefits. On its own, however, the SALT deduction cap was

[7] Haig-Simons income is defined as the increase in an individual's ability to consume within a period of time, and is simplified as consumption plus the net change in wealth. While all sources of income are included, deductions are typically permitted for the various costs incurred in earning that income.

not able to render the overall Tax Cuts and Jobs Act progressivity-enhancing, given the reductions in marginal tax rates, especially for the highest-income taxpayers (Tax Policy Center, 2017).

It is worth highlighting the notion that the fairness of the deduction depends critically on the taxpayer's ability to benefit from it. Indeed, the unlimited SALT deduction thus provides a benefit only to itemizers with high state and local taxes, and the benefit clearly rises with the taxpayer's marginal tax rate. The same deduction of $10,000 of state and local taxes is worth only $2,500 to someone in the 25-percent bracket, but nearly $4,000 for someone in the top bracket.[8]

The same logic applies to the 2017 cap on SALT deductibility. Importantly, both before and after the cap was enacted, those who do not itemize their deductions and those whose total state and local tax payments fall below the $10,000 limit are not directly impacted by the limitation. It is also worth highlighting that the 2017 limitation only has a negative direct impact on those itemizers whose state and local taxes exceed $10,000 *and* who elect to remain in their high-tax jurisdiction. Those with the ability to relocate to lower-tax jurisdictions may choose to do so if the tax savings more than offset the costs of moving. This differential impact based on the ability to relocate certainly complicates the overall equity discussion.

The 2017 Act certainly reduced the pain of the SALT deduction cap by reducing marginal tax rates and increasing standard deductions. Itemization rates dropped significantly between 2017 and 2018 as a result, with only about ten percent of taxpayers choosing to itemize in 2018 (Tax Policy Center, 2020). Dantas and Hembre (2021) and Sommer and Sullivan (2021) are among the recent papers to focus on the changes in itemization rates in the context of the broader tax subsidy for housing. Both studies find significant effects on housing decisions, but only Sommer and Sullivan (2021) consider house price effects.

The fairness implications of the SALT cap also depend critically on the offsetting influences of (a) the phase-out of itemized deductions for high-income taxpayers, which was eliminated as part of the 2017 Act, and (b) the Alternative Minimum Tax, which disallows the SALT deduction. Both of these provisions have historically limited the value of the SALT deduction for the highest-income taxpayers. Indeed, those above the phase-out range and/or paying AMT are less likely to be significantly impacted by the SALT cap than middle-income taxpayers just below those income ranges. To be sure, the 2017 SALT cap should not be viewed as equity-enhancing because the pre-2017 distribution of SALT deduction benefits was not necessarily the most fair to being with.

By the same token, states did not simply leave their own policy environments unchanged in response to the SALT deduction cap. Several states employed a variety of creative ways to circumvent the federal limitation, such as recasting individual income taxes as charitable contributions, payroll taxes, or entity-level taxes that retained greater federal deductibility (Beebe, 2019). These efforts, met with varied success, would have only reduced the direct impact of the SALT deduction cap.

3. Taxes and Housing Markets

We demonstrate the theoretical impact of the Tax Cuts and Jobs Act of 2017, and specifically the SALT cap, in a dynamic user-cost-of-housing framework based on the work of Summers (1983) and Poterba (1984), as extended by Bruce and Holtz-Eakin (1999), Himmelberg, Mayer, and Sinai (2005), Anderson, Clemens, and

[8] Similarly, Poterba (1992) shows that the tax savings associated with the mortgage interest deduction largely went to those with higher incomes.

Hanson (2007), Poterba and Sinai (2011), Albouy and Hanson (2014), and Davis (2019), among others. This framework recognizes the various ways in which the U.S. federal income tax provides a subsidy to owner-occupied housing, as discussed in detail by Rosen (1985).

First, net imputed rental income is not taxable, although it is typically included in Haig-Simons income because it represents the value of the service flow of housing benefits to the owner-occupant. If the house had been rented out, the rental income would be taxable. But imputed (and thus foregone) rent is not included in taxable income in the U.S., although several other countries tax it (Andrews, Caldera Sánchez, and Johansson, 2011). Second, most capital gains from housing are excluded from taxability, unlike gains from the sale of other capital assets. Third, mortgage interest is deductible on mortgages up to a specified limit, which was $1 million per married household before the 2017 Act and $750,000 thereafter. Finally, and most central to our research, state and local taxes—namely, property taxes—are deductible for those who itemize.

It is worthwhile to examine the standard user-cost-of-housing framework to explore the potential impacts of the TCJA on housing markets, such that we might predict behavioral responses. Following Davis (2019), the user cost of housing for itemizers (UC), expressed as a percentage of house value, can be represented as:

$$UC = [1 - \tau_y \varphi_m \lambda - \tau_y(1-\lambda)]r_f - \varphi_m \tau_y \lambda(r_m - r_f) + (1 - \varphi_p \tau_y)\tau_p + m + \sigma - \pi_e$$

where τ_y is the marginal income tax rate, φ_m is the portion of mortgage interest that is deductible, λ is the loan-to-value (LTV) ratio, r_f is the interest rate on a risk-free alternative asset, r_m is the mortgage interest rate, φ_p is the portion of property taxes that is deductible, τ_p is the property tax rate, m is maintenance and depreciation as a share of house value, σ is a risk premium, and π_e is the expected capital gain as a share of house value.

The first term in this expression (in brackets) represents the joint cost of debt and equity, and the second term represents the tax savings from the (partial) deductibility of mortgage interest. The third term, which is the focus of our analysis, represents the cost of property taxes net of the tax benefits from their (partial) deductibility. The central parameters for our purposes are φ_m and φ_p, both of which reflect the various limitations on itemized deductions including MID and property tax caps as well as overall itemized deduction phase-outs and the AMT.

For taxpayers with state and local taxes above $10,000, the TCJA effectively reduced the value of φ_p, effectively increasing the user cost of housing by a factor of the combined income and property tax rates:

$$\delta UC/\delta\varphi_p = \tau_y \tau_p$$

Consequently, the impact of the SALT cap on user cost is expected to be highest among itemizers facing higher marginal income tax rates and/or higher property tax rates. For illustration, consider a taxpayer in the 35-percent marginal federal income tax bracket facing a 1-percent property tax rate. The user cost of housing rises by about one percent for each three-percentage-point reduction in the deductibility of property taxes. A reduction in property tax deductibility of 50 percent would increase the user cost of housing by about 17.5 percent. We now turn to a discussion of our data and empirical methods, which are intended to move beyond this theoretical illustration in order to illuminate the actual impacts of the SALT cap on housing prices and interstate migration patterns.

4. The SALT Deduction Cap and County-Level Home Prices

Data

In our first analytical section, we examine whether the costs associated with the SALT deduction cap were capitalized into local housing markets. Data for these analyses come from a number of sources. First, we collect county-level housing price data from the FHFA as measured by the all-transactions house price index (HPI). These data were collected at the annual level for the years 2012 through 2019. The HPI is a weighted, repeat-sales index, which tracks changes in house prices over time and locality among conforming mortgages purchased or guaranteed by Fannie Mae or Freddie Mac. As noted above, these home loans are restricted to those with origination values below a certain amount (CLL). This limit varies by location and cost of living, and in 2019 the CLL ranged from $484,350 to $726,525 for a one-unit home. The HPI measures price changes in sales or refinances of the same properties over time, and in doing so, it also accounts for quality changes over time, to some degree. In addition, we gathered monthly data from Zillow.com on estimates of average home values by county as measured by the Zillow Home Value Index (ZHVI). [9,10] Together, these data provide a sample of 2,180 U.S. counties. Additional housing market data on the number of property listings per county for the years 2016 through 2019 are gathered from Realtor.com.

If the SALT deduction cap has any impact on the housing market, we suspect that these effects will be localized to the higher-taxed states where taxpayers are more likely to have state and local tax deductions in excess of $10,000 per year. To investigate this, we gathered county-level tax data for the 2017 calendar year, the year prior to the SALT deduction cap, from the IRS and state-level data from the FTA. From the FTA, we collect annual data on total taxes per capita by state. The IRS data come from the size of adjusted gross income (SOI) tax tables and include county-level data on the total number of tax returns, and both the total number and dollar amount of itemized tax deductions for the 2017 calendar year. In addition, we collected county-level data on monthly nonfarm employment (seasonally adjusted) from January 2012 through December 2019 from the Bureau of Labor Statistics (BLS), annual real gross domestic product from 2012 through 2019 from the Bureau of Economic Analysis (BEA), and population and demographic data from the U.S. Census Bureau.

Due to the nature of the tax policy change, we do not expect to find large changes in housing market conditions across all counties. If capping the SALT deduction has any impact on the housing market, those effects will likely be concentrated in the counties where people are deducting more than $10,000 in state and local taxes (that is, counties in high tax states with relatively high real estate prices/values). While we do not have data on individual-level tax returns, we can use the county-level data from the IRS and Zillow and state-level FTA data to form proxies for "high tax" counties. To do so, we create an index score to rank counties based on their potential exposure to the SALT cap. Each county (and Washington D.C.) is assigned a score from 1 to 2,180 based on their relative total taxes per capita level, itemization rate, and average home value in 2017. [11] Counties are assigned a score for each of the 3 categories, with a 1 being assigned to the county with the lowest total taxes per capita level (itemization rate) [home value] and a 2,180 is assigned to the county with the highest. Each county is then assigned an index score as the summation of the three individual scores. To examine the effects of the SALT deduction cap, counties with the top-51 or top-100 highest index scores, that is

---

[9] https://www.zillow.com/research/data/

[10] Zillow's ZHVI is used to measure both the average home value and housing market appreciation in a given market (e.g. state) (Hryniw, 2019).

[11] Since the ZHVI data are monthly, the ZHVI index score is based on the average ZHVI across all months in 2017.

counties with ZHVIs and itemization rates in the right tail of their respective distributions that are located in states with per capita state and local tax collections in the right tail of the distribution, are assigned to the treatment group.[12] The control group is comprised of the 589 counties in the bottom quartile of the index's distribution. All other counties are excluded from the estimation sample, with the notion that some of these counties may have been partially impacted by the SALT deduction cap.

Figure 1 shows the counties with the top-51 highest index values and the 52nd to 100th highest values in red and orange respectively. These counties are largely located in the Northeast region and California, and represent counties most likely to be impacted by the SALT deduction cap. By comparison, counties in the bottom quartile of the index's distribution (control group) are denoted in yellow. These counties are largely located in the Southeast and Midwest regions of the U.S., and represent counties with the least exposure to the policy change.

Figure 2 plots average HPI growth across all counties in the treatment group versus those in the control group. In Panel A the treatment group consists of the counties with the 51 highest index scores, and in Panel B the treatment group includes all counties in the top 100. These descriptive figures reveal two important features of the data. First, following the policy change, housing price growth moderates for counties in the treatment group, but accelerates or remains largely unchanged for counties in the control group. This suggests that, on average, the SALT deduction cap had a negative impact on the housing market of the more exposed counties. Second, the event study and DD analyses rely on the assumption of parallel pre-treatment trends across the treatment and control groups, but Figure 2 shows that there was a large divergence in HPI growth across these two groups prior to 2015. Diverging trends in housing price growth during the earlier sample time periods is likely driven by the Great Recession and ensuing recovery which may have affected the housing markets differently across counties in the treatment versus control groups. To investigate this further, we look at more historic HPI growth patterns. Appendix Figure A1 plots average HPI growth across the two groups from 2000 through 2019. These figures show that housing markets in higher-taxed counties with higher valued homes (on average) saw a much steeper decline in home prices at the onset of the Great Recession, and as a result also saw a much more robust increase in housing price growth during the ensuing recovery. Figure A1 also shows that HPI growth trajectories across the two groups were relatively parallel prior to the Great Recession (from 2000 through 2004) and after the recession and ensuing recovery (from 2015 through 2019). For this reason, we restrict our estimation sample to the years 2015 through 2019 for our analysis, consistent with Li and Yu (2021).

Table 1 presents summary statistics for both the main treatment group (top 51) and the control group for both before and after the policy change, restricted to the 2015-2019 sample time period. Most importantly, this table shows that following the policy change HPI growth slowed for the treatment group, but accelerated for the counties in the control group. The bottom of the table also presents summary statistics on the three variables that comprise our index scores: county-level ZHVIs, county-level itemization rates, and state-level per capita tax collections, all measured in 2017. For counties in the treatment group, 46.2 percent of taxpayers itemized versus only 16 percent among those in the control group. Total state tax collections per capita were nearly 2-times higher for those in the treatment group, and home values were more than 5-times higher in treated counties.

Next, we plot average HPI growth before and after the policy change for each county in the top 51 and bottom 50. These growth rates are presented in Figure 3, with the potentially highly-affected counties (with the higher

[12] The top-51 counties are chosen as a treatment group, rather than top-50, as there was a tie in the index scores between the counties with the 50th and 51st highest scores (San Luis Obispo, CA and Nevada, CA).

index values) on the left, and bottom 50 (least-exposed counties) on the right.[13] For these graphs, we restrict the time period to 2016 through 2019 so that there is an equal number of years for the pre-period and post-period. This figure shows that growth in home prices tapered off considerably in the post period among many of the counties with the highest index values. For example, in Suffolk County, NY, home prices grew by an average of 6.1 percent per year prior to the policy change but only 4.6 percent per year afterwards. Similarly, in Washington, DC, average HPI growth fell from 8.6 percent per year during the pre-period to 5.4 percent per year in the post-period. This of course is not a universal trend across all counties in the treatment group, as both Nassau County, NY, and Westchester County, NY, saw a slight acceleration in home price growth across the two periods. However, the DD and event study analysis will allow us to uncover an average effect across the treatment and control groups. By comparison, growth in home prices seems to have accelerated across many of the counties with lower index values.

Methods and Results

We use event studies and DD specifications to examine whether the cap on SALT deductions had any impact on house prices in counties with more exposure to the SALT deduction cap. For the main analysis, counties are assigned to the "high tax" treatment group, ($D_i = 1$), if their index score is in the top 51 or top 100. Counties in the bottom quartile of the index distribution are assigned to the control group, ($D_i = 0$), while all other counties are excluded from the analysis. To formalize this, we first estimate a two-way fixed effects (DD) model of the following form:

$$y_{it} = \beta_1 post_t + \beta_2 D_i + \beta_3 (post_t \times D_i) + \beta_4 X_{it} + \gamma_i + \lambda_t + \varepsilon_{it} \qquad (1),$$

where y_{it} measures HPI growth in county i year t; $post_t$ is a dummy variable equal to 0 prior to the 2018 TCJA policy change and switches to 1 starting in 2018 and thereafter; D_i is an indicator equal to 0 for counties in the control group and equal to 1 for "high tax" counties in the treatment group; X_{it} is a vector of control variables including real GDP growth, nonfarm employment growth, and population demographics.[14] Finally, γ_i and λ_t capture county and year fixed effects respectively. Equation (1) is estimated using weighted least-squares where the weights are the average population in the county from 2015 through 2019.

Table 2 presents the DD coefficient of interest, β_3, from Equation (1). In Columns 1 through 3, the treatment group is defined as the top 51 most-exposed counties, while Columns 4 through 6 assign treatment to the top 100 most-exposed counties (as measured using the index scores). In all specifications, the control group contains the 589 counties with a SALT exposure index value in the bottom 25th percentile. Estimates for the full sample period (2015 through 2019) are reported in Columns 1 and 4, and suggest that the implementation of the SALT deduction cap led to a 2.2 to 2.4 percentage point reduction in home price growth among the high-tax counties as compared to counties with little exposure to the SALT deduction cap. Next, we control for the number of property listings in a county to investigate whether current housing market conditions mediate this effect. County-level data on active property listings come from Realtor.com and are only available from 2016

---

[13] Note, for the empirical analysis, the control group still contains the 589 counties in the bottom quartile of the index score distribution. The bottom-50 counties are shown here for illustrative/comparative purposes.
[14] Nonfarm employment growth is measured as growth in annual average employment from one year to the next.

onwards. We therefore restrict the sample period to 2016 through 2019. To ensure that the altered sample period does not impact our results, we first estimate Equation (1) with the new sample period but without controls for active property listings. These results are presented in Columns 2 and 5 and are very similar to our baseline results. Finally, in Columns 3 and 6 we add active property listings as an explanatory variable, and again uncover estimated effects that are similar to our baseline model. That is, even after controlling for housing market conditions, the SALT deduction cap leads to a 2.0 to 2.1 percentage point reduction in home price growth among the counties most exposed to the policy change. These estimates suggest that the SALT deduction cap made it more costly to own homes in counties more exposed to the policy change, and that this cost is capitalized into the local housing market through lower home prices.

Next, we consider an event study specification, which allows us to examine the post-policy effects in each year as well as investigate whether there are any pre-policy differences between the treatment and control groups. We estimate an event study model of the following form:

$$y_{it} = \gamma_i + \lambda_t + \delta_t \times D_i + \beta_1 X_{it} + \varepsilon_{it} \qquad (2)$$

Where all variables and coefficients are defined as in Equation (1), but now the coefficients of interest are the set of δ_t event year coefficients, which identify differences in HPI growth between counties in the treatment and control group in year *t* compared to 2017, the year before the SALT deduction cap was put into effect.

The event study results are plotted in Figure 4. In Panel A, the treatment group is comprised of the top 51 counties, and in Panel B the treatment group contains the top 100 counties. In both specifications, the control group contains the 589 counties with a SALT exposure index value in the bottom 25th percentile. We report the point estimates and 95% confidence intervals on the interaction terms from Equation (2). In both figures, the estimated coefficients in the years prior to the policy changes are statistically indistinguishable from zero, consistent with no trend differences between the treatment and control group prior to the policy change. After the policy change, home price growth begins to decline in the treated counties relative to the control group. All of the post-policy event study coefficients are negative, suggesting a relative decrease in home prices following the SALT deduction cap, in counties with more exposure to the SALT deduction. Furthermore, this negative effect is more pronounced in 2019, two years after the policy change. Specifically, estimates from Panel B indicate that the SALT deduction cap led to a 1.1 percentage point drop in home price growth in 2018 and a much more severe 3.7 percentage point drop in 2019. This pattern is in line with the implementation of the TCJA, which limited the SALT deduction in tax years 2018 and thereafter, and would have led to larger tax bills starting in 2019 (when individuals filed their 2018 tax returns).

Next, since our index measure is only a proxy for exposure to the SALT deduction cap, we do not have perfect information as to which counties were affected by the policy change. For this reason, we return to the DD specification from Equation (1) and re-estimate the model with shifting treatment groups. For comparative purposes, we first start with the top 51 counties as our treatment group (identical to Column 1 of Table 2). Next, we estimate Equation 1 but with a treatment group consisting of those counties with the 52nd to 100th highest index score values and those in the top 51 excluded from the sample. Then we shift treatment assignment to counties with the 101st to 150th highest index score values and so on. In all specifications, the control group contains the 589 counties with a SALT exposure index value in the bottom 25th percentile. Table 3 presents the DD coefficient of interest, β_3, from Equation (1) for the various treatment groups. Results from this table illustrate two very important points. First, the SALT deduction cap had a negative impact on home price growth for a large set of counties. For example, even counties with the 601st through 700th highest index values saw a 0.9 percentage point relative reduction in home price growth. Second, the negative price effect attenuates as the treatment group shifts to lower index values. This is best illustrated in Figure 5, which plots the estimated coefficients from Table 3 and shows that they trend closer to zero as the index score falls (moving rightward on the figure). These results suggest that the negative housing price impact is more pronounced in counties with more exposure to the SALT cap and that our index measure is a good indicator of SALT deduction exposure.

Finally, in Table 4 we examine the importance of each component used to create our exposure index. Specifically, we repeat our DD analysis while sequentially omitting one of the three components of our exposure index. Baseline results using all three components are provided in Columns (1) and (5) for comparison. To summarize the results of this exercise, regardless of whether we include the top 51 or 100 counties as our treatment group, our baseline results are primarily driven by total taxes per capita. Removing either the Zillow home index value factor (Columns 2 and 6) or the itemization rate factor (Columns 4 and 8) yields results that are qualitatively identical to our baseline results. Conversely, when we remove the total taxes per capita factor (Columns 3 and 7), effects become insignificant for the top 51 control group and only about two-thirds as large in absolute value for the top 100 control group.

5. The SALT Deduction Cap and State-Level Migration Patterns

Data

A potential explanation as to why the SALT deduction cap could have a negative impact on the housing market is out-migration. That is, it is possible that some households moved to states less impacted by the tax policy change. If the policy change leads to a large increase in the cost of home ownership in the more-affected states, we might expect to see altered migration patterns in these states, perhaps through greater out-migration from these states or less in-migration to these states. Therefore, we collect state-to-state migration flows data from the U.S. Census Bureau (1-Year American Community Survey) for the years 2011 through 2019. Using these data, we calculate state-level domestic in-migration and outmigration rates for the years 2012 through 2019.[15,16]

In addition, we collect state-level real GDP data from the BEA, and state-level population and demographic data from the U.S. Census Bureau. We then create a state-level index score to rank states (plus Washington D.C.) based on their potential exposure to the SALT deduction cap. The index is created using the same methodology as the previous section, and states are assigned a score from 1 to 51 based on their relative level of total taxes

[15] The ACS provides total migration flows for the years 2011 through 2019. Migration rates are then calculated as migration per 1,000 population, where the population estimate is based on the average population in the first time period and the second time period. For example, to calculate the 2012 outmigration rate (i.e. change in outmigration migration between 2011 and 2012), one would divide outmigration in 2012 by the average of the state's population in 2011 and its population estimate in 2012.

[16] Ideally, we would also examine county-level migration patterns, which are available through the IRS Statistics of Income (IRS-SOI). However, Basso and Peri (2020) and DeWaard et al. (2021) discuss reliability and misreporting issues with the IRS migration data from 2010 onwards.

per capita, itemization rate, and average home value (ZHVI) in 2017.[17] Then, to examine the state-level impact of the SALT deduction cap, states with the top 5, 10, or 15 highest index scores are assigned to the treatment group, while the 13 states in the bottom quartile of the index distribution are assigned to the control group. All other states are excluded from the analysis.

Figure 6 shows the states with the top 5 highest index values, the next 6th to 10th highest, and the following 11th to 15th highest values. These states, which are most likely to be affected by the SALT deduction cap, are largely located in the West and Northeast regions. By comparison, states in the bottom quartile of the index's distribution (control group) are denoted in yellow and are mostly located in the South and Southeast.

Figure 7 plots trends in both in-migration and outmigration rates for states in the treatment groups versus those in the control group. In Panel A, the treatment group contains the states with the 5 highest index scores. In Panel B, the treatment group contains those in the top 10, and in Panel C, the treatment group contains all states in the top 15. Visual inspection of these graphs suggests that treated states may have seen a slowdown in in-migration immediately following the policy change, but outmigration rates seem to have been relatively unchanged.

Table 5 presents summary statistics for both the main treatment group (top 5) and the control group for both before and after the policy change. Most importantly, following the policy change, state-to-state mobility seems to have fallen across both the treatment and control groups. More specifically, in-migration and outmigration rates are lower in the post-period for both the 5 high tax states and the 13 low tax states.

Next, we plot average in-migration and outmigration rates before and after the policy change for states with the potentially highly affected states (with the higher index values) on the left, and the least-exposed states on the right (Figure 8). For these graphs, we restrict the time period to 2016 through 2019 so that there is an equal number of years for the pre-period and post-period. These graphs show very little evidence of a post-policy change in migration patterns for the more exposed states. However, regression analysis will allow us to uncover small but statistically significant changes in relative migration patterns if they exist.

Methods and Results

Similar to Section 4, we estimate DD and event study specifications to examine the impact of the SALT deduction cap on state-level in-migration and outmigration rates. The DD specifications take the same form as Equation (1) with two exceptions. First, *i* now indexes states, and y_{it} measures the rate of in-migration or outmigration per 1,000 population in state *i* and year *t*. Second, nonfarm employment growth is no longer included as a control variable in *X*, as employment growth is a function of population growth and migration patterns. Similarly, the event studies take a similar form as Equation (2).

Table 6 reports the state-level DD coefficient of interest, β_3, from Equation (1). For each model, the treatment group is defined as the top 5, 10, or 15 most-exposed states, while the control group is always the 13 states with a SALT exposure index value in the bottom 25th percentile. These results suggest that the SALT deduction cap had no statistically significant impact on statewide migration patterns. Similarly, Figure 9 presents results

[17] In the previous section, the Zillow ZHVI data were measured at the county level, whereas in this section we are utilizing state-level ZHVI data.

associated with the event study specifications, and again indicates that the SALT deduction cap had no discernable impact on statewide in-migration or outmigration flows.

In contrast, Li and Yu (2021) find some evidence that the TCJA led to a slight increase in net move-out rates (i.e. outmigration minus in-migration) among households with income above the national average who were living in counties with a higher tax burden. However, their analysis does not differentiate between those moving into the county versus those moving out, and more importantly they do not differentiate between intrastate and interstate movers. Their finding that the TCJA does induce some people to move, be it to a nearby county in the same state or a different state altogether, is still very important as it indicates that the tax policy led some households to make very costly decisions. In comparison, our state-level analysis gets to the heart of the policy debate by examining whether the new policy caused households to leave the state entirely, which would have important implications for state economic conditions, such as the size of the labor force and tax revenue collections.

To be sure, even though potential behavioral responses do not appear to show up in the state-to-state migration data, the possibility exists that some of the most heavily-impacted taxpayers might be using other means to shuffle real estate portfolios or move other assets to minimize negative tax impacts. In this sense, it could still be possible to "move" financially without physically relocating to another state (Bruce, Fox, and Yang, 2010; Slemrod, 2010).

6. Tax Revenue Impact

The previous section shows that the SALT deduction cap had no impact on *statewide* migration patterns. However, a recent working paper by Drukker (2021) finds that the SALT deduction cap did alter moving patterns among some high-income households. If the SALT deduction cap caused some high-income individuals to move away from the more affected areas, this could have potentially serious implications for state tax revenues through the collection of state income and state property taxes. To investigate this, Figure 10 plots trends in year-over-year growth in total state tax collections per capita for states in the treatment groups versus those in the control group. Similarly, Table 7 reports summary statistics on both the dollar value and annual growth in total tax collections per capita for both the main treatment group (top 5) and the control group for both before and after the policy change. These results provide little evidence to suggest that tax revenues in the treated states fell following the policy change. Thus, even if high-income individuals did move away from the more affected states, those moves had little impact on state tax revenues.[18]

7. Conclusion

The federal tax policy changes enacted in 2017 sharply reduced the deductibility of state and local taxes to a maximum of $10,000 per household. We estimate county-level (state-level) DD and event study models for a time period surrounding this major shift in policy to explore the extent to which it impacted housing prices

[18] This is consistent with Martinez (2022) who found that the creation of a tax haven in the canton of Obwalden, Switzerland led to an increase in the number of high-income residents, but had no impact tax revenue per capita.

(migration patterns). Our assignment of treatment and control counties/states is motivated in part by a standard user-cost of housing model, which indicates that impacts should be highest for areas with higher state and local taxes, higher average federal income tax rates, and higher housing prices. Focusing on a small subset of counties with the greatest expected impact, we find evidence that the SALT deduction cap led to slower housing price growth but had no impact on statewide migration patterns.

Our results suggest that the SALT deduction cap has a more nuanced effect than what has been commonly portrayed in the current policy debate. It is widely contended that the SALT deduction cap would be a “tax on the rich,” however, our housing models indicate that the cap led to a reduction of home prices among *conforming* loans in areas more likely to be affected by the cap. That is, in counties with greater exposure to the SALT deduction, home prices did not just fall for the very expensive homes, but also for average-priced homes, which would qualify for a conforming loan. The second main argument in the policy debate is that the SALT deduction cap could cause some families to move away from the higher taxed states. Our state-level migration models suggest that this did not occur in the short term.

To be sure, we emphasize that it is not clear that the SALT deduction cap reduced fairness. The extent to which our estimates represent a reduction in fairness depends critically upon one’s view of the degree of fairness in the pre-TCJA policy landscape. Specifically, the possibility exists that the cap removed unfair tax advantages enjoyed by high-income and high-mortgage-debt taxpayers in a small number of states. The most likely summary is that the combination of the simultaneous reductions in marginal tax rates and increases in standard deductions greatly reduced the independent impact of the SALT deduction cap on migration and housing prices, as reflected in our analysis. Further, any discussion on whether to keep or repeal the SALT deduction cap should balance the facts that the previous SALT deductions provided a federally funded tax advantage to high-tax high-income states, but also that individuals who purchased homes in these states prior to the policy change were left worse off as the SALT deduction cap was essentially an unexpected transfer of wealth from the homeowner back to the federal government.

References

Albouy, David, and Andrew Hanson. 2014. “Are Houses Too Big or In The Wrong Place? Tax Benefits to Housing and Inefficiencies in Location and Consumption.” In *Tax Policy and the Economy* Volume 28, Jeffrey Brown, editor.

Albouy, David, and Bert Lue. 2015 "Driving to opportunity: Local rents, wages, commuting, and sub-metropolitan quality of life." *Journal of Urban Economics* 89: 74-92.

Anderson, John E., Jeffrey Clemens, and Andrew Hanson. 2007. "Capping the Mortgage Interest Deduction." *National Tax Journal* 60(4): 769-85.

Andrews, Dan, Aida Caldera Sánchez, and Åsa Johansson. 2011. "Housing Markets and Structural Policies in OECD Countries," OECD Economics Department Working Paper No. 836, OECD Publishing, Paris. Available at https://doi.org/10.1787/5kgk8t2k9vf3-en (accessed July 16, 2020).

Basso, G., & Peri, G. (2020). “Internal mobility: The greater responsiveness of foreign-born to economic conditions.” Journal of Economic Perspectives, 34(3), 77-98.

Beebe, Joyce. 2019. *The Current Fiscal Federalism and the State and Local Tax Deduction Limit*. Baker Institute Report no. 02.12.19. Rice University’s Baker Institute for Public Policy, Houston, Texas.

Blomquist, Glenn C., Mark C. Berger, and John P. Hoehn. 1988. "New estimates of quality of life in urban areas." *The American Economic Review*, 89-107.

Brainerd, William C., and James Tobin. 1977. "Asset Markets and the Cost of Capital," Chapter 11 in *Economic Progress, Private Values, and Public Policy: Essays in Honor of William Fellner*, Fellner, W., Balassa, B.A. and Nelson, R.R., Eds., Amsterdam: North-Holland Publishing Company, 235-262.

Bruce, Donald, William F. Fox, and Zhou Yang. 2010. “Base Mobility and State Personal Income Taxes,” *National Tax Journal* 63(4, Part 2): 945-966.

Bruce, Donald, and Douglas Holtz-Eakin. 1999. “Fundamental Tax Reform and Residential Housing,” *Journal of Housing Economics* 8(4): 249-271.

Cavallo, Eduardo, Sebastian Galiani, Ilan Noy, and Juan Pantano. 2013. “Catastrophic Natural Disasters and Economic Growth.” *Review of Economics and Statistics* 95(5): 1549-1561.

Chen, Yong, and Stuart S. Rosenthal. 2008 "Local amenities and life-cycle migration: Do people move for jobs or fun?" *Journal of Urban Economics* 64(3): 519-537.

Coomes, Paul A., and William H. Hoyt, 2008. "Income Taxes and the Destination of Movers to Multistate MSAs." *Journal of Urban Economics* 63(3): 920-9

Dantas, Raissa, and Erik Hembre. 2021. “Tax Incentives and Housing Decisions: Investigating Effects of the Tax Cuts and Jobs Act,” SSRN Electronic Journal. DOI: 10.2139/ssrn.3779520.

Davis, Matthew. 2019. “The Distributional Impact of Mortgage Interest Subsidies: Evidence from Variation in State Tax Policies,” Job Market Paper, The Wharton School, University of Pennsylvania.

Day, Kathleen M., and Stanley L. Winer, 2006. "Policy-Induced Internal Migration: An Empirical Investigation of the Canadian Case." *International Tax and Public Finance* 13(5): 535-564.

DeWaard, Jack, Mathew Hauer, Elizabeth Fussell, Katherine J. Curtis, Stephan D. Whitaker, Kathryn McConnell, Kobie Price, David Egan-Robertson, Michael Soto, and Catalina Anampa Castro. 2021. "User Beware: Concerning Findings from the Post 2011–2012 US Internal Revenue Service Migration Data." Population Research and Policy Review: 1-12.

Drukker, Austin. 2021 “Internal Migration and the Effective Price of State and Local Taxes.”

Gordon, Roger H., and Wojciech Kopczuk. 2014. "The choice of the personal income tax base." *Journal of Public Economics* 118: 97-110.

Gruber, Jonathan, Amalie Jensen, and Henrik Kleven. 2021. “Do People Respond to the Mortgage Interest Deduction? Quasi-experimental Evidence from Denmark,” *American Economic Journal: Economic Policy* 13(2)273-303.

Haig, Robert M. 1921. "The Concept of Income—Economic and Legal Aspects," in *The Federal Income Tax*, Robert M. Haig, editor. New York: Columbia University Press.

Hayashi, Fumio. 1982. “Tobin’s Marginal q and Average q,” *Econometrica* 50: 213–224.

Hembre, Erik, and Raissa Dantas. "Tax incentives and housing decisions: Investigating effects of the tax cut and jobs act." Available at SSRN 3779520 (2021).

Himmelberg, Charles, Christopher Mayer, and Todd Sinai. 2005. “Assessing High House Prices: Bubbles, Fundamentals and Misperceptions.” *Journal of Economic Perspectives* 19(4): 67-92.

Hryniw, Natalia. 2019. Zillow Home Value Index Methodology, 2019 Revision: Getting Under the Hood. Zillow.com. Accessed 06 July 2020. https://www.zillow.com/research/zhvi-methodology-2019-deep-26226/

Li, Wenli, and G. Yu Edison. 2022. "Real estate taxes and home value: Evidence from TCJA." *Review of Economic Dynamics* 43: 125-151.

Martínez, Isabel Z. 2022. "Mobility Responses to the Establishment of a Residential Tax Haven: Evidence From Switzerland." *Journal of Urban Economics*, 103441.

Poterba, James M. 1984. “Tax Subsidies to Owner-Occupied Housing: An Asset Market Approach,” *Quarterly Journal of Economics* 99(4): 729–752.

Poterba, James M. 1992. "Taxation and housing: old questions, new answers." *The American Economic Review* 82: 237-242.

Poterba, James, and Todd Sinai. 2008. “Tax Expenditures for Owner-Occupied Housing: Deductions for Property Taxes and Mortgage Interest and the Exclusion of Imputed Rental Income.” *American Economic Review* 98(2): 84-89.

Poterba, James M., and Todd Sinai. 2011. “Revenue Costs and Incentive Effects of the Mortgage Interest Deduction for Owner-Occupied Housing.” *National Tax Journal* 64(2): 531–64.

Rosen, Harvey S. 1979. "Housing decisions and the US income tax: An econometric analysis." *Journal of Public Economics* 11(1): 1-23.

Rosen, Harvey S. 1985. "Housing Subsidies: Effects on Housing Decisions, Efficiency, and Equity.” *Handbook of Public Economics* 1: 375-420. Elsevier.

Schmidheiny, Kurt. 2006. "Income segregation and local progressive taxation: Empirical evidence from Switzerland." *Journal of Public Economics* 90(3): 429-458.

Schmidheiny, Kurt, and Michaela Slotwinski. 2018. "Tax-induced mobility: Evidence from a foreigners' tax scheme in Switzerland." *Journal of Public Economics* 167: 293-324.

Shan, Hui. 2010. "Property taxes and elderly mobility." *Journal of Urban Economics* 67(2): 194-205.

Simons, Henry. 1938. *Personal Income Taxation*. Chicago: University of Chicago Press.

Slemrod, Joel. 2010. "Location,(REAL) location,(TAX) location: An essay on mobility's place in optimal taxation." *National Tax Journal* 63(4): 843-864.

Sommer, Kamila, and Paul Sullivan. 2021. "The Effect of the Tax Cuts and Jobs Act on the Housing Market," Working Paper. Available at http://www-personal.umich.edu/~paulsull/TCJA_Housing_Market.pdf.

Summers, Lawrence H. 1983. "The Asset Price Approach to the Analysis of Capital Income Taxation," *Proceedings of the National Tax Association's Annual Conference on Taxation* 76: 112-120.

Tax Policy Center. 2020. "How Did the TCJA Change the Standard Deduction and Itemized Deductions?" *Tax Policy Center Briefing Book: Key Elements of the U.S. Tax System.* Accessed 21 May 2021. https://www.taxpolicycenter.org/briefing-book/how-did-tcja-change-standard-deduction-and-itemized-deductions

Tax Policy Center. 2017. *Distributional Analysis of the Conference Agreement for the Tax Cuts and Jobs Act*. Accessed 21 May 2021. https://www.taxpolicycenter.org/publications/distributional-analysis-conference-agreement-tax-cuts-and-jobs-act/full

Thorndike, Joseph J. 2017. "The SALT Deduction Has Always Been Hard to Defend — And to Kill," *Tax Notes* 157 (October 17, 2017): 176-179.

Tiebout, Charles M. 1956. "A Pure Theory of Local Expenditures," *Journal of Political Economy* 64(5): 416–424.

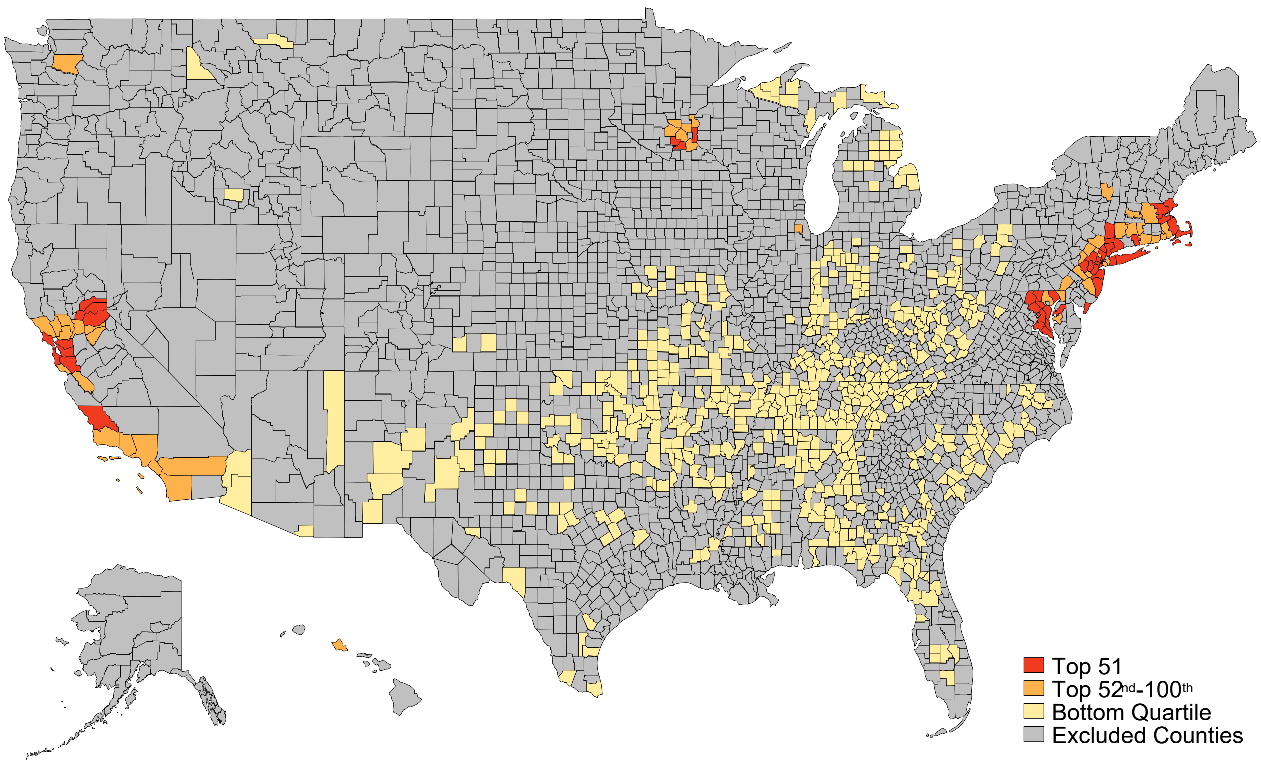
Tong, Zhong Yi. "The Impact of the State and Local Tax (SALT) Deduction Cap on US Home Prices."

Varner, Charles, Cristobal Young, and Allen Prohofsky. "Millionaire migration in California: administrative data for three waves of tax reform." In 111th Annual Conference on Taxation. NTA, 2018.

Vesouli, Abby (2021). "A Wonky Tax Break for the Well-Off Is a Bigger Problem for Democrats Than You'd Think." Time. December 16, 2021. https://time.com/6128775/salt-cap-democrats-divided/

Young, Cristobal, and Charles Varner. 2011. "Millionaire Migration and State Taxation of Top Incomes: Evidence from a Natural Experiment." *National Tax Journal* 64(2): 255–83.

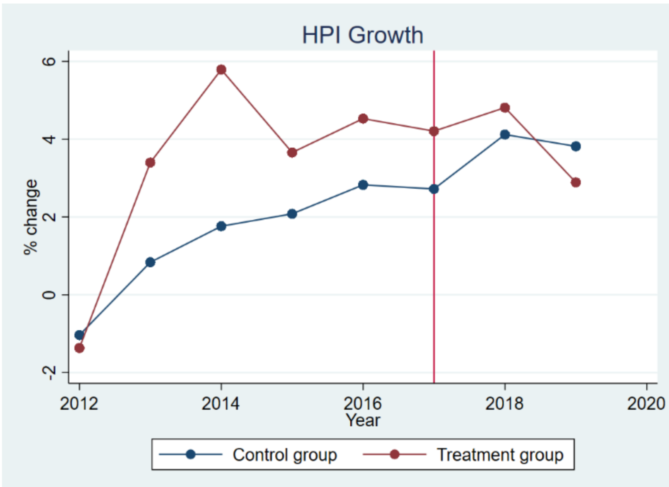
Figure 1: Location of Counties in Treatment and Control Group



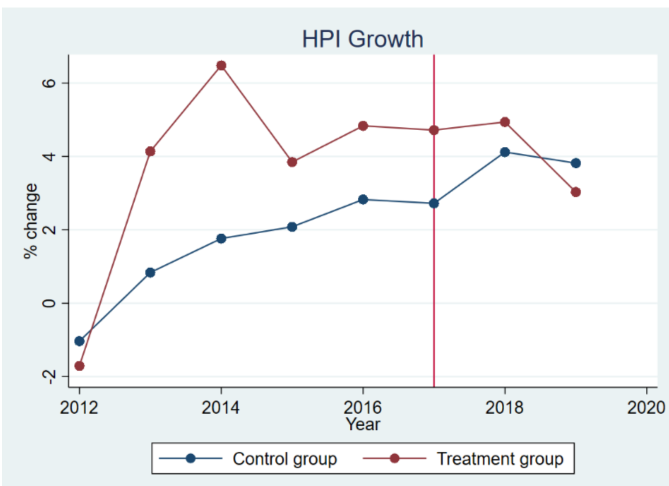
Note: Figure shows the counties in the treatment group as those with a SALT exposure index value in either the top 51 or the 52nd to 100th highest index values. The control group contains the 589 counties in the bottom quartile of the index distribution. Top-51 counties are chosen, rather than top-50, as there was a tie in the index scores between the counties with the 50th and 51st highest scores (San Luis Obispo, CA and Nevada, CA).

Figure 2: Average HPI Growth Over Time Among Counties with High Exposure to the SALT Deduction Cap (Treatment Group) Versus Counties with Low Exposure (Control Group)

Panel A: Top 51 versus Bottom Quartile



Panel B: Top 100 versus Bottom Quartile



Note: Plots are formed by calculating the average HPI growth rate at time t among counties in the treatment group (red) and counties in the control group (blue). The treatment group consists of the top 51 (Panel A) and top 100 (Panel B) counties with the highest SALT exposure index values. The control group is always the 589 counties in the bottom quartile of the index's distribution.

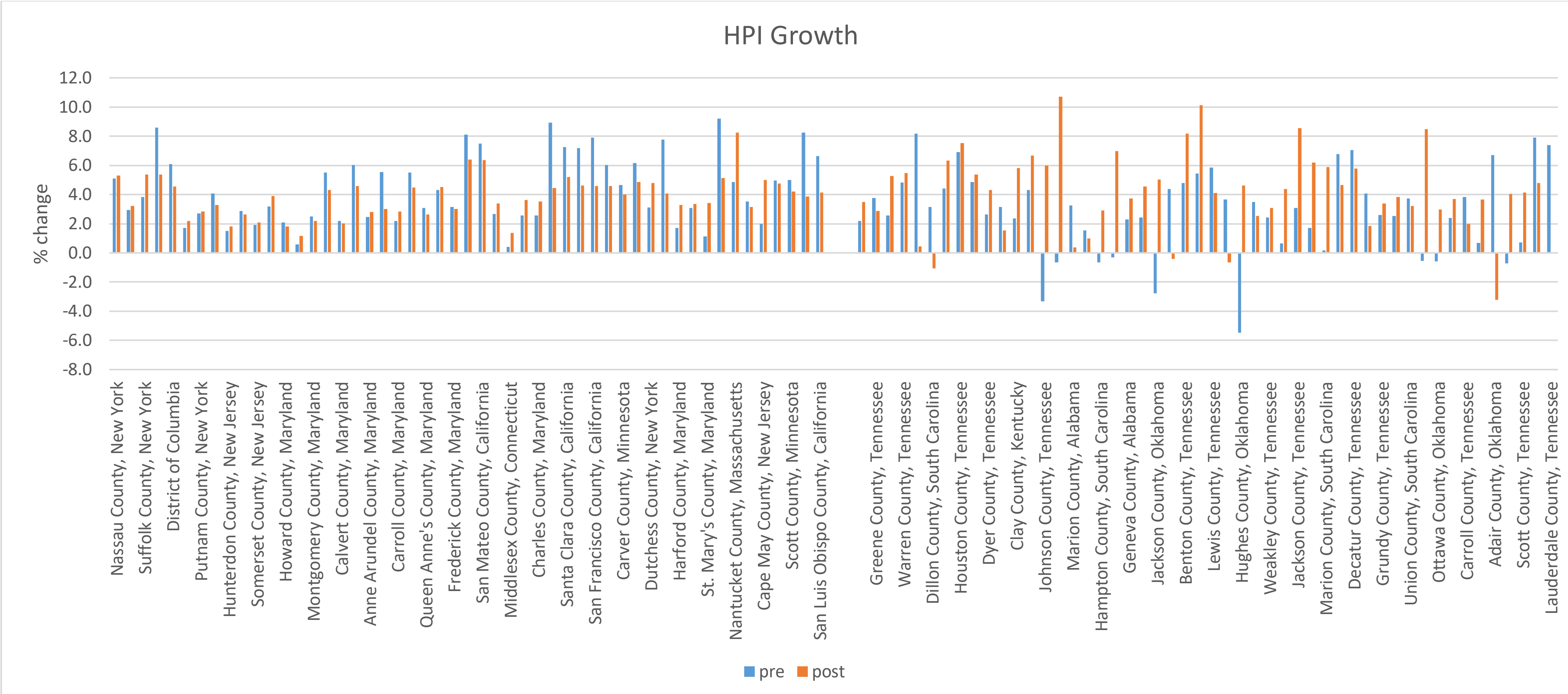
Table 1: County-Level Descriptive Statistics

	Top-51 (treatment group)			Bottom 25th Percentile (control group, 589 counties)		
	Full time period (2015-2019)	Pre	Post	Full time period (2015-2019)	Pre	Post
HPI growth	4.019	4.131	3.851	3.113	2.543	3.968
	(2.769)	(2.908)	(2.552)	(5.180)	(5.258)	(4.942)
Nonfarm employment growth (%)	1.656	1.997	1.145	0.327	0.255	0.436
	(1.755)	(1.854)	(1.461)	(3.444)	(3.258)	(3.704)
Real GDP growth (%)	2.167	2.337	1.913	0.523	0.347	0.786
	(2.955)	(2.935)	(2.982)	(6.696)	(6.953)	(6.286)
Female population (%)	0.509	0.509	0.509	0.502	0.502	0.502
	(0.008)	(0.008)	(0.008)	(0.021)	(0.021)	(0.021)
Black population (%)	0.116	0.115	0.118	0.123	0.123	0.123
	(0.128)	(0.128)	(0.128)	(0.169)	(0.170)	(0.169)
Hispanic population (%)	0.130	0.128	0.134	0.0727	0.0714	0.0748
	(0.0749)	(0.0745)	(0.0757)	(0.130)	(0.129)	(0.131)
Percentage of population by age						
0 to 15 years of age	0.177	0.178	0.175	0.184	0.185	0.183
	(0.023)	(0.023)	(0.024)	(0.023)	(0.023)	(0.022)
15 to 19 years of age	0.0630	0.0635	0.0622	0.0631	0.0636	0.0624
	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)
20 to 24 years of age	0.0608	0.0615	0.0596	0.0610	0.0620	0.0595
	(0.009)	(0.009)	(0.009)	(0.017)	(0.017)	(0.016)
25 to 34 years of age	0.125	0.124	0.125	0.118	0.117	0.120
	(0.028)	(0.029)	(0.028)	(0.015)	(0.015)	(0.015)
35 to 44 years of age	0.125	0.125	0.126	0.115	0.116	0.115
	(0.015)	(0.015)	(0.015)	(0.011)	(0.011)	(0.010)

45 to 54 years of age	0.143	0.147	0.137	0.129	0.131	0.125
	(0.014)	(0.014)	(0.012)	(0.011)	(0.010)	(0.010)
55 to 64 years of age	0.140	0.139	0.141	0.140	0.139	0.140
	(0.016)	(0.017)	(0.016)	(0.016)	(0.016)	(0.015)
Average Number of Property Listings	1954.1	1987.4	1920.7	160.5	174.6	146.4
	(1885.1)	(1904.2)	(1874.6)	(204.6)	(218.0)	(189.4)
2017 itemization rate	0.462			0.160		
	(0.052)			(0.034)		
2017 total taxes per capita (state-level)	6957.5			3830.3		
	(1088.7)			(371.2)		
2017 average Zillow Home Value Index (ZHVI)	499223.9			91860.2		
	(274093.9)			(22345.6)		
N	51 counties			589 counties		

Notes: All data are at the county level unless otherwise specified. The main treatment group is chosen as the top 51 counties rather than top 50, as there was a tie in the index scores between the counties with the 50th and 51st highest scores (San Luis Obispo, CA and Nevada, CA).

Figure 3 Average HPI Growth Before and After Policy Change



Notes: Sample time period is restricted to 2016 through 2019 so that the pre-period and post-period are the same length of time. Figure measures HPI growth before and after the policy change for each county. Counties are ranked based on index values measuring their potential exposure to the SALT deduction cap. The top 51 (potentially) most-affected states (with the higher index values) are on the left and the 50 counties least likely to be affected are on the right.

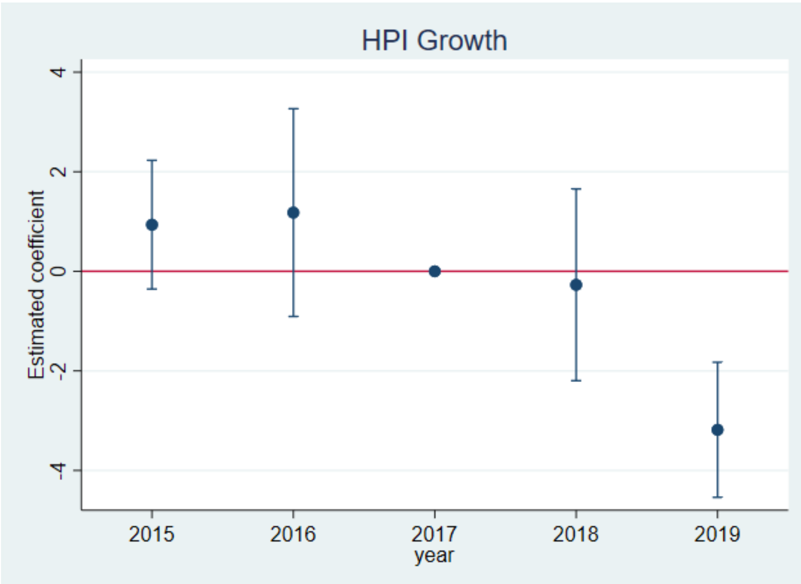
Table 2: Differences-in-Difference Estimates, County-Level HPI Growth. Top-51 Counties vs Bottom Quartile and Top-100 Counties vs Bottom Quartile.

	Top 51			Top 100		
	(1)	(2)	(3)	(4)	(5)	(6)
DD Estimate	-2.20***	-2.07***	-1.95***	-2.44***	-2.44***	-2.13***
	(0.382)	(0.345)	(0.341)	(0.390)	(0.477)	(0.363)
N	3200	2560	2560	3445	2756	2756
Control for property listings			Y			Y
Years	2015-2019	2016-2019	2016-2019	2015-2019	2016-2019	2016-2019

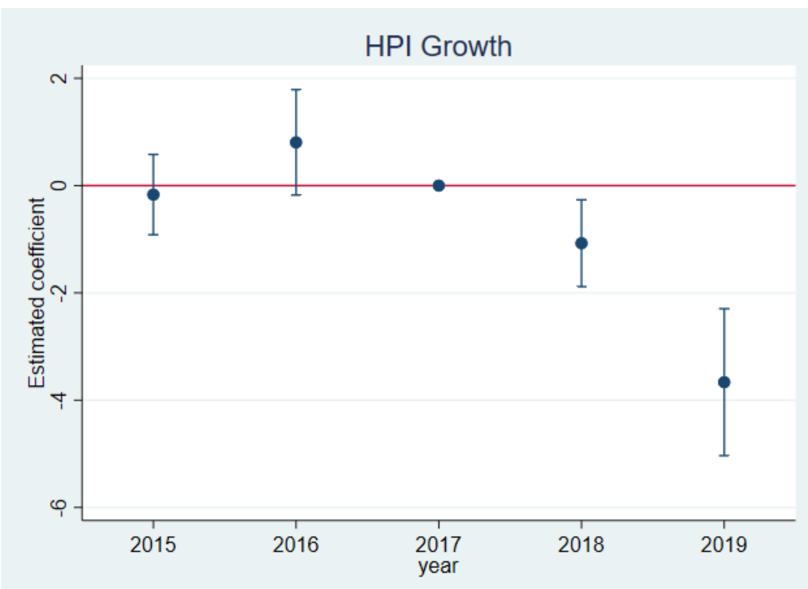
Specifications include county and year fixed effects; real GDP growth, nonfarm employment growth, percent female, Black, Hispanic; percent of the population under age 15, between 15 and 19, between 20 and 24, between 25 and 34, between 35 and 44, and between 55 and 64. Specifications (2) and (5) are restricted to the years 2016 through 2019, which are the years in which data on active property listings are available, then Specifications (3) and (6) control for the average number of monthly active property listings each year. Regressions are weighted by average county population between 2015 and 2019 and standard errors are clustered at the state level. The treatment group consists of the top 51 (Panel A) and top 100 (Panel B) counties with the highest SALT exposure index values. The control group is always the 589 counties in the bottom quartile of the index's distribution.

Figure 4: Event Studies, County-Level HPI Growth

A. Top 51 vs Bottom Quartile



B. Top 100 vs Bottom Quartile



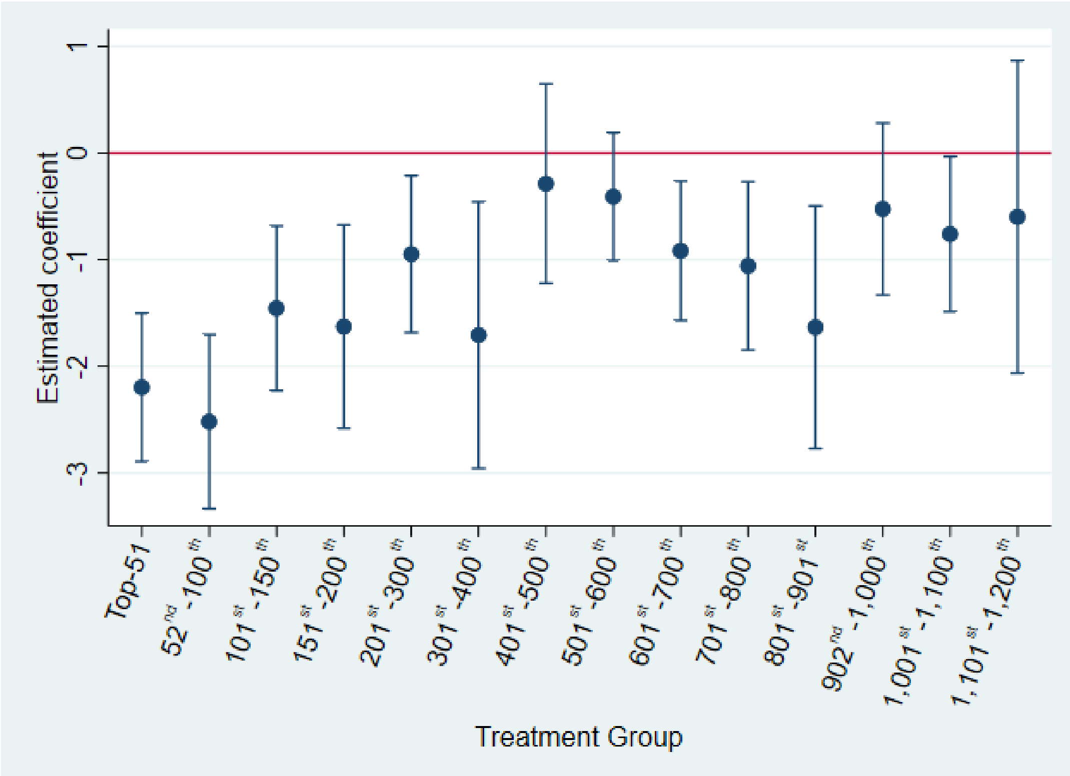
Note: Each figure reports point estimates and 95% confidence intervals on the interaction terms from Equation (2) with 2017 normalized to zero. Specifications include county and year fixed effects; real GDP growth, nonfarm employment growth, percent female, Black, Hispanic; percent of the population under age 15, between 15 and 19, between 20 and 24, between 25 and 34, between 35 and 44, and between 55 and 64. Regressions are weighted by average county population between 2015 and 2019 and standard errors are clustered at the state level. The treatment group consists of the top 51 (Panel A) and top 100 (Panel B) counties with the highest SALT exposure index values. The control group is always the 589 counties in the bottom quartile of the index's distribution.

Table 3: Differences-in-Difference Estimates on HPI Growth with Shifting Treatment Group

Exposure to SALT Cap	**Top 51**	**52nd-100th**	**101st-150th**	**151st-200th**	**201st-300th**	**301st-400th**	**401st-500th**	**501st-600th**	**601st-700th**	**701st-800th**	**801st-901st**	**902nd-1,000th**	**1,001st-1,100th**	**1,101st 1,200th**
HPI Growth	-2.20***	-2.52***	-1.46***	-1.63***	-0.95**	-1.71***	-0.29	-0.41	-0.92***	-1.06***	-1.63***	-0.52	-0.76**	-0.60
	(0.342)	(0.402)	(0.382)	(0.471)	(0.365)	(0.618)	(0.464)	(0.296)	(0.323)	(0.390)	(0.562)	(0.399)	(0.359)	(0.721)
N	3200	3190	3195	3195	3445	3445	3445	3445	3445	3445	3450	3440	3445	3445

In all specifications, the control group includes the 589 counties with a SALT exposure index value in the bottom 25th percentile. The treatment group in the first column contains the 51 counties with the highest SALT exposure index values. For Specification 2, the treatment group shifts to only those counties with the 52nd through 100th highest SALT exposure index measures, and those in the top 51 are excluded from the analysis. For Specification 3, the treatment group is only those counties with the 101st to 150th highest index values. This pattern continues for Columns 4 through 14. All specifications include county and year fixed effects; real GDP growth, nonfarm employment growth, percent female, Black, Hispanic; percent of the population under age 15, between 15 and 19, between 20 and 24, between 25 and 34, between 35 and 44, and between 55 and 64. Regressions are weighted by average county population between 2015 and 2019 and standard errors are clustered at the state level.

Figure 5: Differences-in-Difference Estimates on HPI Growth with Shifting Treatment Group



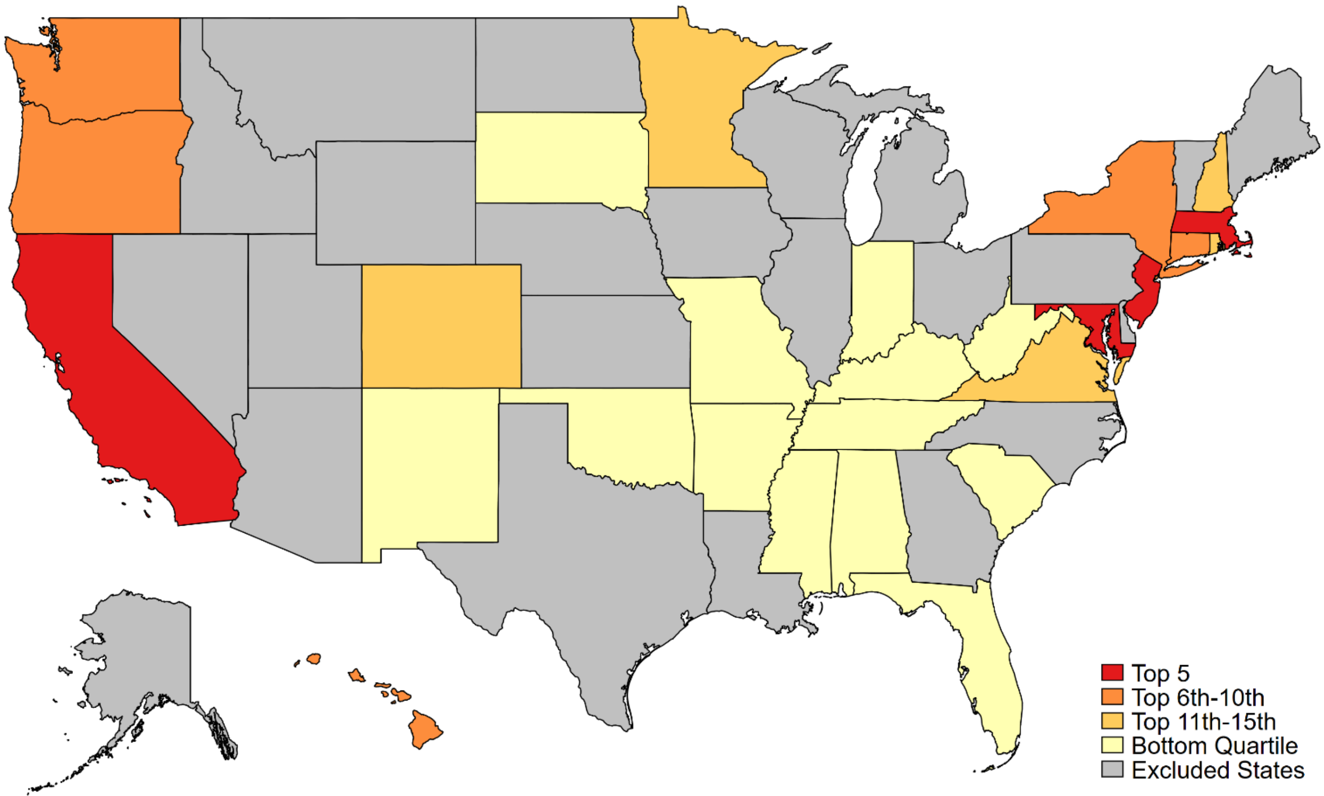
Notes: This figure is a graphical representation of Table 3, and plots the estimated effects from 13 different DD models where the treatment group shifts to lower SALT exposure values. In all specifications, the control group includes the 589 counties with a SALT exposure index value in the bottom 25th percentile. From left to right, the treatment group in the first model contains the 51 counties with the highest SALT exposure index values. For the second model, the treatment group shifts to only those counties with the 52nd through 100th highest SALT exposure index measures, and those in the top 51 are excluded from the analysis. For specification 3, the treatment group is only those counties with the 101st to 150th highest index values. And so on. All specifications include county and year fixed effects; real GDP growth, nonfarm employment growth, percent female, Black, Hispanic; percent of the population under age 15, between 15 and 19, between 20 and 24, between 25 and 34, between 35 and 44, and between 55 and 64. Regressions are weighted by average county population between 2015 and 2019 and standard errors are clustered at the state level.

Table 4: Differences-in-Difference Estimates with Altered SALT Exposure Index Component. County-Level HPI Growth. Top-51 Counties vs Bottom Quartile and Top-100 Counties vs Bottom Quartile.

	Top 51				Top 100			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DD Estimate	-2.20***	-2.13***	-0.62	-2.01***	-2.44***	-2.44***	-1.63***	-2.58***
	(0.382)	(0.298)	(0.422)	(0.410)	(0.390)	(0.339)	(0.571)	(0.417)
Index Components								
Itemization Rate	Y	Y	Y		Y	Y	Y	
Total taxes per capita	Y	Y		Y	Y	Y		Y
Zillow Home Value Index	Y		Y	Y	Y		Y	Y

Specifications include county and year fixed effects; real GDP growth, nonfarm employment growth, percent female, Black, Hispanic; percent of the population under age 15, between 15 and 19, between 20 and 24, between 25 and 34, between 35 and 44, and between 55 and 64. Specifications (2) and (5) are restricted to the years 2016 through 2019, which are the years in which data on active property listings are available, then Specifications (3) and (6) control for the average number of monthly active property listings each year. Regressions are weighted by average county population between 2015 and 2019 and standard errors are clustered at the state level. The treatment group consists of the top 51 (Panel A) and top 100 (Panel B) counties with the highest SALT exposure index values. The control group is always the 589 counties in the bottom quartile of the index's distribution.

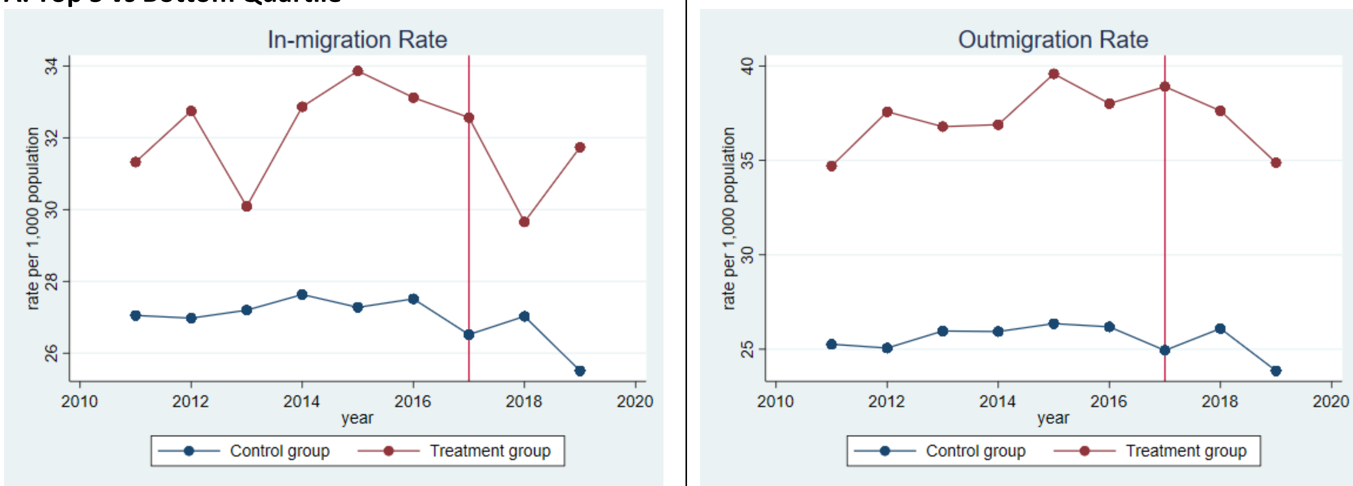
Figure 6: Location of States in Treatment and Control Groups



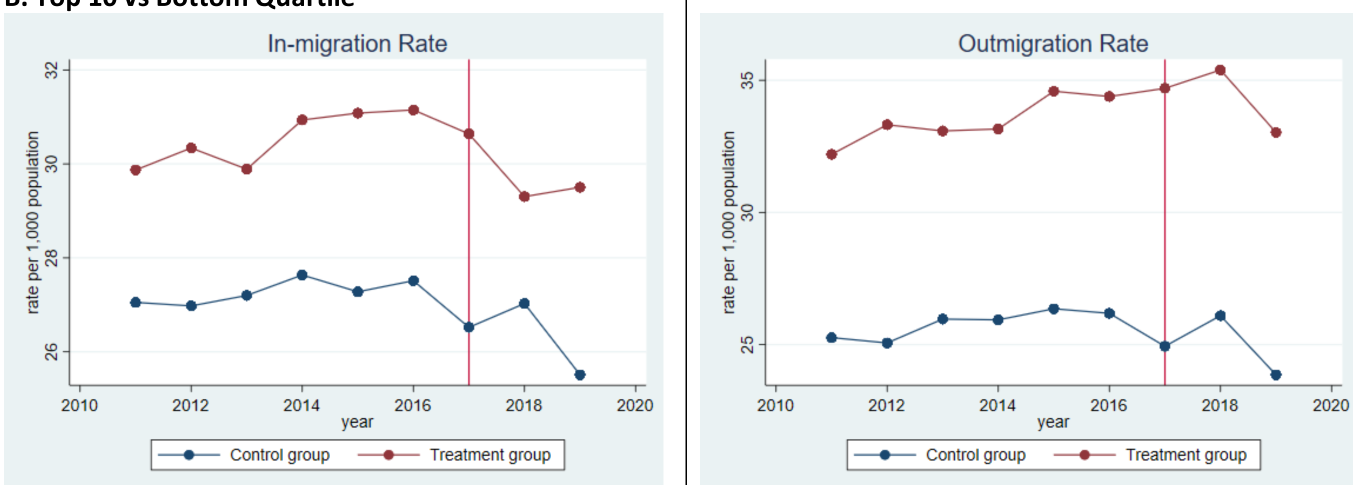
Note: Figure shows the states in the treatment group as those with a SALT exposure index value in the top-15 separated out as top 5, next 6th to 10th highest, and next 11th to 15th highest. The control group contains the 13 states in the bottom quartile of the index distribution. All other states are excluded from the analysis.

Figure 7: Average In-migration and Outmigration Rates Over Time Among States with High Exposure to the SALT Deduction Cap (Treatment Group) Versus Counties with Low Exposure (Control Group)

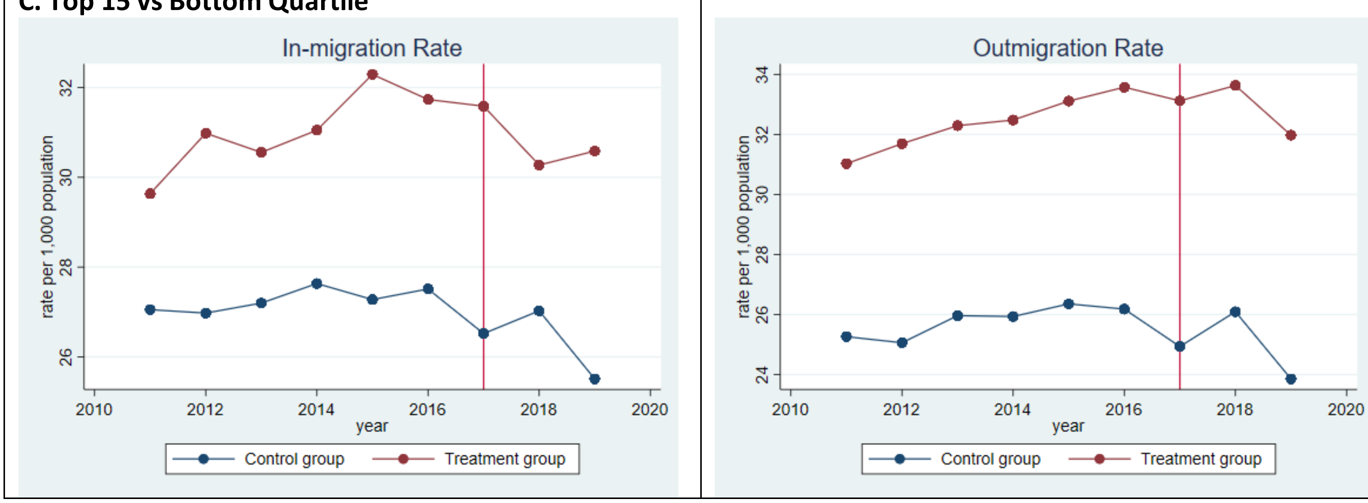
A. Top 5 vs Bottom Quartile



B. Top 10 vs Bottom Quartile



C. Top 15 vs Bottom Quartile



Note: Plots are formed by calculating the average migration rate at time t among sates in the treatment group (red) and states in the control group (blue). The treatment group consists of the top 5 (Panel A), 10 (Panel B), and 15 (Panel C) states with the highest SALT exposure index values. The control group is always the 13 states in the bottom quartile of the index's distribution.

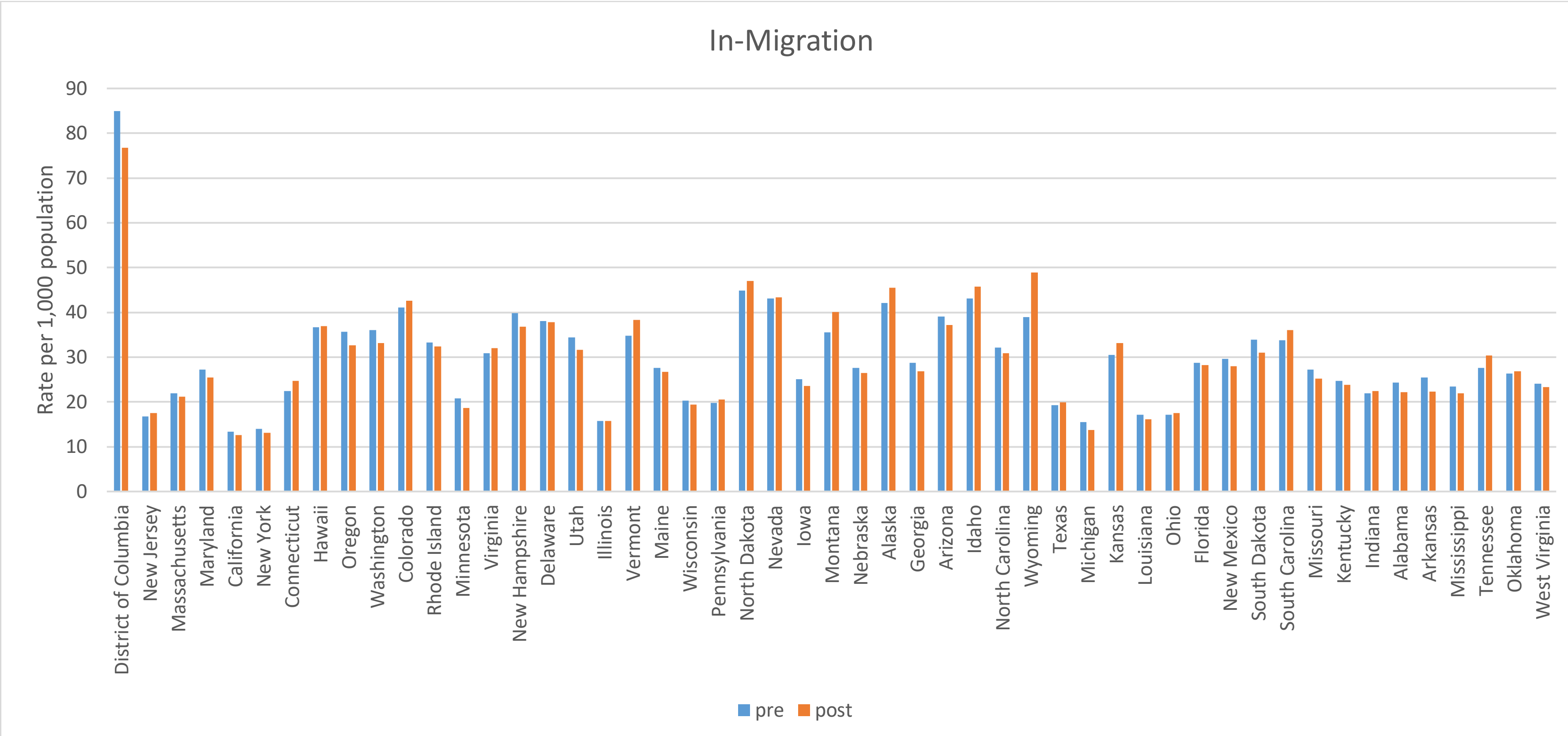
Table 5: State Level Descriptive Statistics

	Top 5 (treatment group)			Bottom quartile (control group)		
	Full time period (2011-2019)	Pre	Post	Full time period (2011-2019)	Pre	Post
In-migration rate (per 1,000 population)	32.08	32.54	30.70	26.96	27.19	26.27
	(26.39)	(27.24)	(25.01)	(4.081)	(3.990)	(4.350)
Outmigration rate (per 1,000 population)	37.53	37.96	36.25	25.55	25.74	24.98
	(27.50)	(28.86)	(24.33)	(4.076)	(3.931)	(4.518)
Real GDP growth (%)	2.014	1.881	2.414	1.528	1.328	2.126
	(1.273)	(1.374)	(0.839)	(1.384)	(1.483)	(0.786)
Female population (%)	0.514	0.514	0.514	0.509	0.509	0.509
	(0.007)	(0.007)	(0.008)	(0.005)	(0.005)	(0.006)
Black population (%)	0.217	0.218	0.216	0.144	0.144	0.144
	(0.159)	(0.161)	(0.159)	(0.104)	(0.105)	(0.105)
Hispanic population (%)	0.180	0.178	0.188	0.0988	0.0971	0.104
	(0.111)	(0.112)	(0.115)	(0.125)	(0.125)	(0.129)
Percentage of population by age						
0 to 15 years of age	0.177	0.177	0.175	0.191	0.192	0.187
	(0.015)	(0.016)	(0.013)	(0.012)	(0.012)	(0.012)
15 to 19 years of age	0.0635	0.0642	0.0615	0.0651	0.0654	0.0641
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
20 to 24 years of age	0.0708	0.0720	0.0671	0.0695	0.0706	0.0661
	(0.007)	(0.008)	(0.005)	(0.004)	(0.003)	(0.003)
25 to 34 years of age	0.158	0.157	0.159	0.131	0.130	0.132
	(0.039)	(0.039)	(0.040)	(0.005)	(0.005)	(0.005)

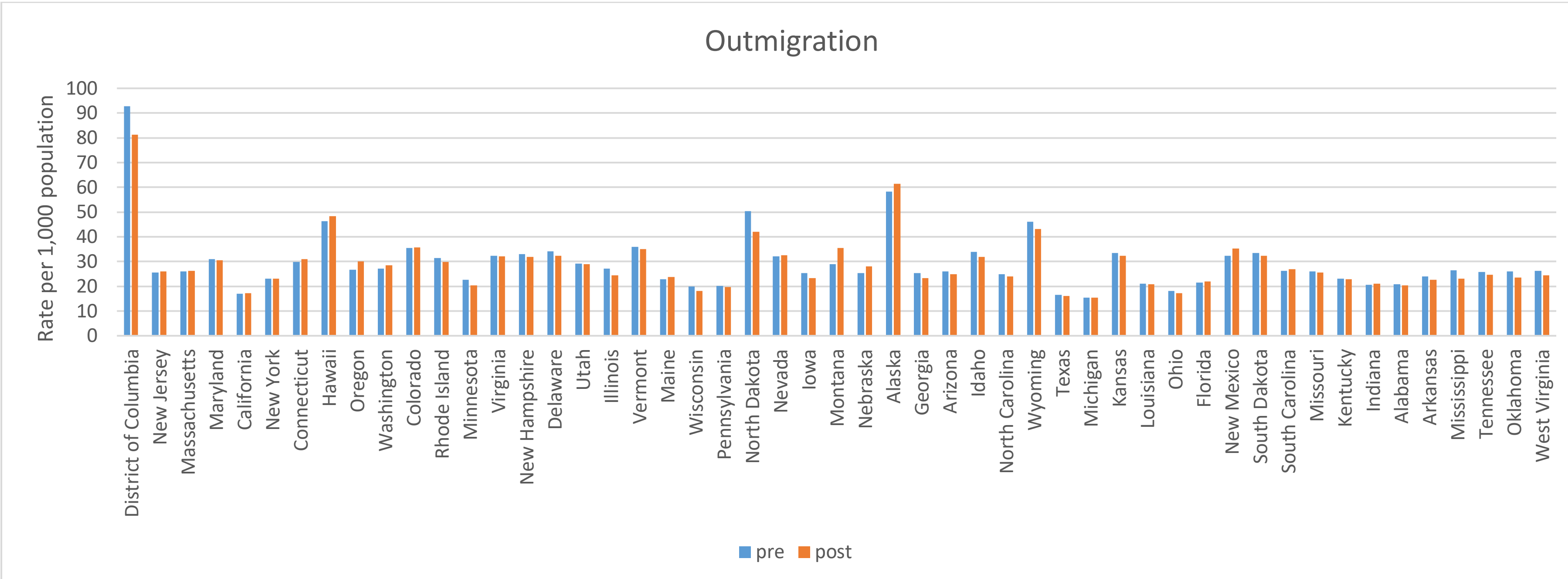
35 to 44 years of age	0.132	0.131	0.133	0.122	0.122	0.122
	(0.008)	(0.006)	(0.011)	(0.003)	(0.004)	(0.002)
45 to 54 years of age	0.135	0.138	0.127	0.130	0.132	0.123
	(0.013)	(0.013)	(0.012)	(0.008)	(0.006)	(0.006)
55 to 64 years of age	0.123	0.123	0.126	0.131	0.130	0.132
	(0.012)	(0.011)	(0.015)	(0.005)	(0.006)	(0.004)
2017 itemization rate	0.407			0.236		
	(0.042)			(0.034)		
2017 total taxes per capita	7,347.51			3777.518		
	(1,909.13)			(275.08)		
2017 average Zillow Home Value Index (ZHVI)	418,131.2			146,359.9		
	(124,992.9)			(34,961.3)		
N	5 states			13 states		

Figure 8: Average Migration Rates Before and After Policy Change

Panel A



Panel B



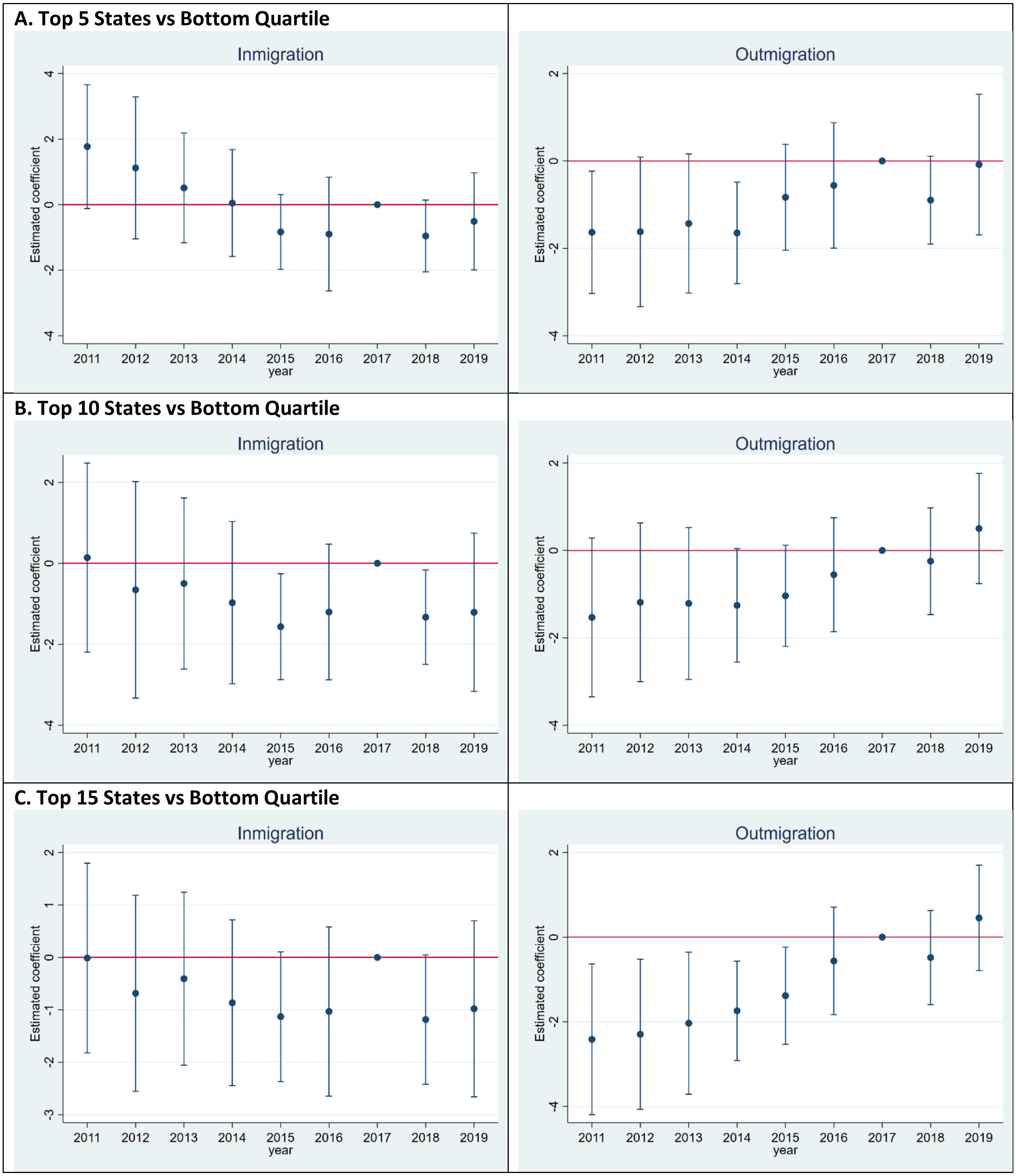
Notes: Sample time period is restricted to 2016 through 2019 so that the pre-period and post-period are the same length of time. Figures measure the average domestic in-migration and outmigration rates before and after the policy change for all 50 states and Washington D.C. States are ranked based on index values measuring their potential exposure to the SALT deduction cap. The (potentially) most affected states (with the higher index values) are on the left, and as we move rightward, the index scores falls.

Table 6: Differences-in-Differences Estimates, State-level Migration Patterns. Top-5 States Vs. Bottom Quartile, Top-10 Vs. Bottom Quartile, Top-15 Vs. Bottom Quartile.

	In-migration			Outmigration		
	Top 5	Top 10	Top 15	Top 5	Top 10	Top 15
DD Estimate	-0.33	-0.42	-0.40	0.08	0.68	0.78
	(0.494)	(0.523)	(0.499)	(0.439)	(0.489)	(0.499)
N	162	207	252	162	207	252

Specifications include state and year fixed effects; real GDP growth, percent female, Black, Hispanic; percent of the population under age 15, between 15 and 19, between 20 and 24, between 25 and 34, between 35 and 44, and between 55 and 64. Regressions are weighted by average state population between 2011 and 2019 and standard errors are clustered at the state level. The treatment group consists of the top 5, 10, and 15 states with the highest SALT exposure index values. The control group is always the 13 states in the bottom quartile of the index's distribution.

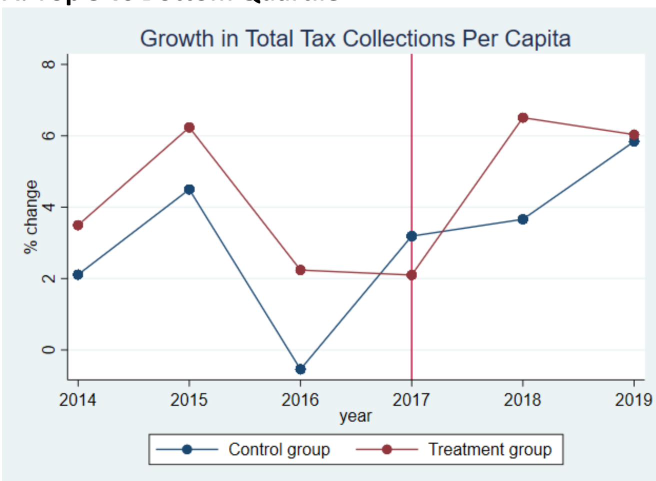
Figure 9: Event Studies, State-Level Domestic Migration Rates



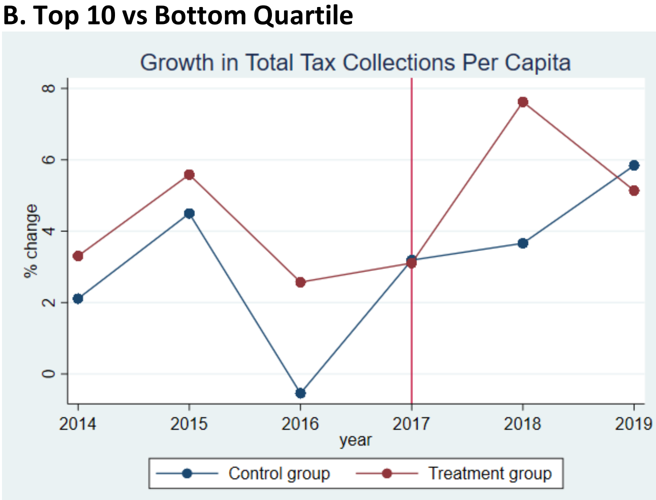
Notes: Each figure reports point estimates and 95% confidence intervals on the interaction terms from a state-level version of Equation (2) with 2017 normalized to zero. Specifications include state and year fixed effects; real GDP growth, percent female, Black, Hispanic; percent of the population under age 15, between 15 and 19, between 20 and 24, between 25 and 34, between 35 and 44, and between 55 and 64. Regressions are weighted by average state population between 2011 and 2019 and standard errors are clustered at the state level. The treatment group consists of the top 5 (Panel A), 10 (Panel B), and 15 (Panel C) states with the highest SALT exposure index values. The control group is always the 13 states in the bottom quartile of the index's distribution.

Figure 10: Average Growth in Per Capita Total State Tax Collections Over Time Among States with High Exposure to the SALT Deduction Cap (Treatment Group) Versus Counties with Low Exposure (Control Group)

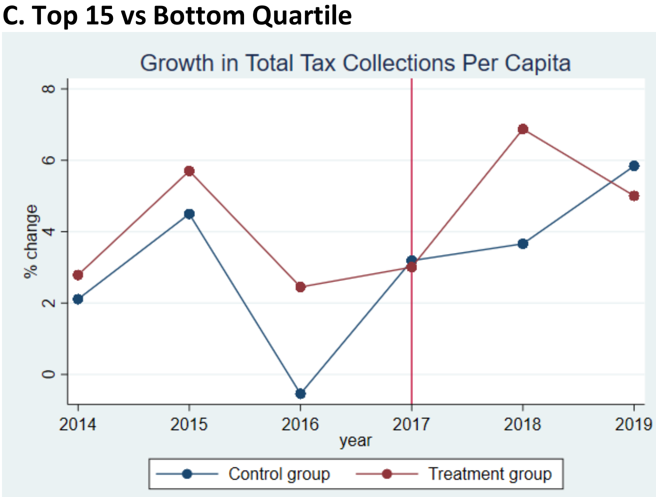
A. Top 5 vs Bottom Quartile



B. Top 10 vs Bottom Quartile



C. Top 15 vs Bottom Quartile



Note: Plots are formed by calculating the average migration rate at time t among sates in the treatment group (red) and states in the control group (blue). The treatment group consists of the top 5 (Panel A), 10 (Panel B), and 15 (Panel C) states with the highest SALT exposure index values. The control group is always the 13 states in the bottom quartile of the index's distribution.

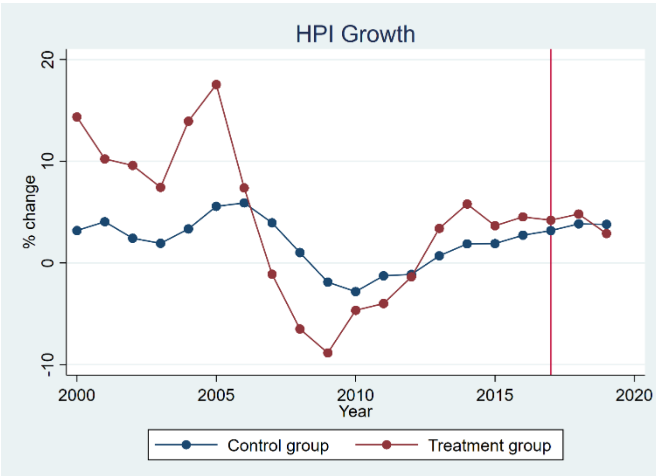
Table 7: Descriptive Statistics. State-Level, Total Tax Collections Per Capita

	Top-5 (treatment group)		Bottom quartile (control group)	
	Pre	Post	Pre	Post
Total Tax Collections Per Capita	6,937.68	8,056.50	3,621.49	4029.77
	(1,758.17)	(1,969.37)	(295.69)	(362.16)
Growth in Total Tax Collections Per Capita	3.52	6.27	2.31	4.75
	(2.40)	(1.99)	(3.03)	(4.71)
N	5 States		13 States	

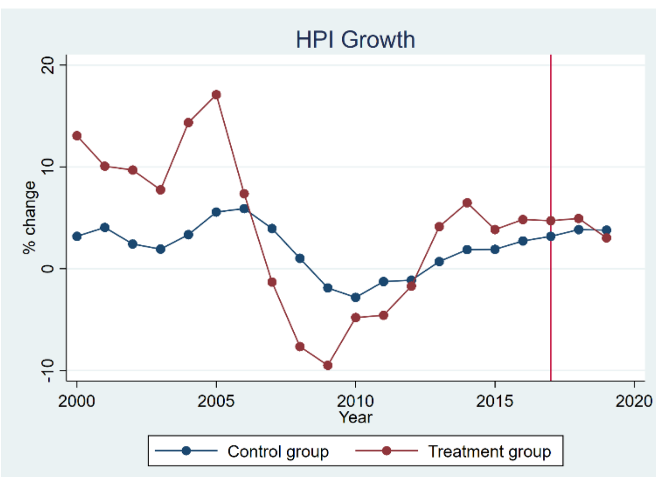
Appendix

Figure A1: Average HPI Growth Over A Longer Time Horizon (2000-2019) Among Counties with High Exposure to the SALT Deduction Cap (Treatment Group) Versus Counties with Low Exposure (Control Group)

Panel A: Top 51 versus Bottom Quartile



Panel B: Top 100 versus Bottom Quartile



Note: Plots are formed by calculating the average HPI growth rate at time t among counties in the treatment group (red) and counties in the control group (blue). The treatment group consists of the top 51 (Panel A) and 100 (Panel B) counties with the highest SALT exposure index values. The control group is always the 589 counties in the bottom quartile of the index's distribution.