Under a SALT Cap: The Effect of Limiting the SALT Deduction on Local Housing Markets

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Abstract

We estimated to which extent state and local taxes (SALT) are capitalized into home value using Zillow's ZTRAX data set. To identify capitalization rates, we use the implementation of SALT caps through the passage of the TCJA to see how a national change in the price of local residence impacted housing markets. Using IRS Statistics of Information data on ZIP code level tax filings, We estimate that about 76 percent of the SALT is capitalized into the sales price. To control for local amenities and housing characteristics, we leverage a repeat sales model, identified through event study and difference-in-difference estimates. Overall, we find evidence that sales prices decline in areas with the greatest exposure to the SALT deduction, and strong evidence of partial capitalization.

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1 Introduction

State and local governments face unique challenges in raising revenue due to the mobility of residents and the ability to "vote with their feet". In particular, high income residents constitute a large share of tax revenue and are highly mobile in regards to their residence decisions with respect to state and local tax tax differentials (Moretti and Wilson, 2019; Rauh and Shyu, 2019). One way in which governments have limited the effective tax differential between subnational jurisdictions is through the state and local tax (SALT) deduction in the US federal income tax. This reduces the cost of state and local tax changes by a taxpayers marginal tax rate for those who itemize, thus the cost of each additional dollar in tax revenue raised by state and local governments is considerably less than one, especially for higher income earners who both have higher tax rates and are more likely to itemize. This potentially allows for state and local governments to engage in progressive redistribution, which otherwise might be limited by tax mobility. However, the extent to which the SALT deduction reduces tax induced mobility is an open question, as variation has previously only come from small changes in marginal tax rates which are insufficient in magnitude to determine any effects.

In order to better understand effects of SALT on interjurisdictional mobility, we utilize a 2017 tax reform that placed limits on the deductibility of state and local taxes. The Tax Cuts and Jobs Act of 2017 (TCJA) represented the largest change in the federal tax system since 1986. While primarily focused around reducing the corporate tax rate from 35% to 21% several important changes were made to the individual income tax code. Besides reducing tax rates and creating new brackets, the standard deduction increased and several tax deductions were eliminated or reduced in scope. The largest and most notable change in deductions comes from limiting the SALT deduction to no more than 10,000 dollars. This limit increases the negative vertical fiscal externality between federal and state governments in two ways: first as the price of state and local taxes increases by the value of the federal income tax deduction, and secondly due to the increase in the standard deduction where individuals are pushed from itemizing to taking the standard deduction. Unlike previous changes, the TCJA provides a large change in price of subnational taxation on a national scale, only varying with preexisting dependence upon the SALT deduction.

In this paper, we seek to analyze the impact of setting a ceiling on the SALT deductions on local housing markets. For high income individuals, limiting the SALT deduction increases the expected tax liability of home-ownership, and to a lesser extent residency, in a high tax area, which would therefore be reflected in property sales prices. This paper examines the effect of eliminating the SALT cap on housing sales in areas with a high dependence on state and local tax deductions. Once we identify to what extent SALT impacts home values, we leverage our point estimates to tackle the capitalization hypothesis. That is, whether or not the present value of future taxes impact home price.

This paper analyzes this question using a sample of housing sales between 2013 to 2021 from Zillow's ZTRAX database.[1] In this unique dataset, we view a large subset of the universe of home sales during this period. Most importantly, we view over 8 million repeat sales. This data is then combined with data on ZIP code level filings from the Internal Revenue Service (IRS) Statistics of Income (SoI) program, which provides aggregate statistics on 1040 filings, which we use to construct measures of SALT dependency.

This paper provides a novel contribution to the literature by estimating one of the first estimates of the implementation of a SALT cap on housing markets. Recent work by Bruce and Kessler (2022) examines the impact of the TCJA on housing price indecies for counties and finds that housing prices in counties in high tax states grow slower after the passage of the TCJA relative to low tax counties. Similarly Lomonosov (2020) finds evidence that home buyers at certain income levels alter their purchasing decisions in New Jersey after passage of the TCJA. This paper examines a different question using a more localized level of geography in ZIP codes and how high levels of SALT deductions pre-TCJA impact housing prices within geographically small areas, where there can be substantial variation even within county.

This question is increasingly important, as due to the digitization of the labor market and increasing ability to work from home makes individuals less attached to the physical location of employers. This allows individuals to be more sensitive to tax burdens in their residency decisions (Agrawal and Brueckner, 2022). Even on a local level, such as within a metropolitan area, eliminating (full telework) or reducing commuting (hybrid) costs increase the importance of tax burdens in models of location decisions. The importance of better understanding mobility responses of state and local tax differentials is increasingly important as individuals have more ability to choose where to live, and subsequently where to work.

Recent work has highlighted the importance of taxes for various subsets of high income or "super star" earners and finds that these populations have large migration tax elasticties (Kleven et al., 2013; Moretti and Wilson, 2017; Akcigit et al., 2016; Kleven et al., 2014; Agrawal and Tester, 2020). Other studies that have focused on more general populations have found sizeable effects of taxation on the location decisions of less affluent households (Agrawal and Foremny, 2019; Schmidheiny and Slotwinski, 2018).[2] Given that

[1] Data provided by Zillow through the Zillow Transaction and Assessment Dataset (ZTRAX). More information on accessing the data can be found at http://www.zillow.com/ztrax. The results and opinions are those of the author(s) and do not reflect the position of Zillow Group.

[2] Less affluent is more of a relative term here, both papers here emphasize the location decisions of

the desirability of an area can be reflected by the price of housing and the SALT deduction disproportionately benefits high income individuals, any change in housing prices due to limiting the SALT deduction should capture the mobility response of relatively high income earners.

We also contribute to the long standing question of capitalization. The seminal Tiebout (1956) model depicts a model where home values reflect both the homes characteristic as well as the set of local amenities, such as education and local services. Importantly, local taxes are viewed as service payments for these amenities, as a result these taxes should be fully capitalized into property values. A large literature has yielded no clear answer to this theory. While some work finds support for full capitalization (Oates (1969), Reinhard (1981), and Gallagher et al. (2013)), others find no evidence at all (Pollakowski (1973) and Wales and Wiens (1974). Recent empirical work finds a more nuanced answer.by Gierletz (2021) show in the case of Dallas County, property taxes are partially capitalized. We contribute additional evidence to the theory of partial capitalization in the context of SALT.

In this paper, we find that a $1000 decrease in the ability to deduct SALT in a given ZIP code is associated with a reduction home sale prices in the ZIP code by 0.6-1.2%, depending upon the specification. We find the SALT cap reduced home sale prices in the ZIP code by 9 percent. Assuming a 3 percent discount rate, a tax rate of 24 percent, with a sales price of 550,000, this gives a capitalization rate of 76 percent. Granted, because this is a measure of SALT per filer, this may underestimate the actual SALT burden for those who itemize and given they may have a disproportionate impact on housing prices, these capitalization rates are likely downward biased, but should remain nontrivial. Better understanding the impact that federal tax policy has on the ability for state and local governments to raise tax revenue is important for policymakers, as state and local policy makers increasingly look for novel ways to increase tax revenue.

The paper is structured as follows: Section 2 discusses the institutional details of SALT, section 3 provides a brief theoretical framework of capitalization. Section 4 discusses the data sources and measure of SALT. Section 6 presents our baseline results, and explores heterogeneity of supply and mobility effects, and other challenges to identification. Finally, we present our implied capitalization rates in Section 7 and Section 8 concludes.

high income households, just not top earners.

2 Institutional Details

A unique aspect of the federal income tax in the United States is that it allows individuals who choose to itemize their taxes to deduct tax payments to state and local governments on their federal income tax returns. This deduction for state and local taxes has existed since the creation of the federal income tax, although the extent and types of taxes included has changed significantly over time. As various other deductions have been changed and disallowed overtime, the SALT deduction has managed to survive and represents an important tax expenditure for US the government. The Joint Committee on Taxation estimated that SALT deductions would cost the federal government almost 370 billion dollars on the 5 year period between 2016-2020, which is roughly the same as the Earned Income Tax Credit for low income working families (JCT, 2017).

The idea behind why the SALT deduction might be beneficial is that it reduces the vertical negative fiscal externality between the federal and state income tax system, where increases in the federal rate limit the ability of state governments to increase revenue due to the overlapping tax base, by allowing state tax payments to be deductible on federal tax returns, thus reducing the effective burden of state and local taxes by their marginal federal rate. If this externality is sufficiently large, and states and localities are unable to set their optimal tax rates to maximize welfare, it makes sense for some sort of policy to help reduce this externality. The SALT deduction can also serve as a way to allow for progressive redistribution at the state and local level. This is important for several reasons, in particular, the federal tax and transfer system has an unequal geographic burden due to cost of living differences (Albouy, 2009). A SALT cap can help mitigate this burden by subsidizing transfers from high income households to lower income households at the state level, where the federal government is unable to adjust for these cost of living differences. Unsurprisingly, both currently and before the passage of the TCJA, SALT deductions overwhelmingly benefited high income households who are more likely to itemize and who generally face the highest level of state and local taxes. Additionally, states with higher state and local tax burdens also are more likely to benefit from the SALT deduction which may encourage larger tax and spending policy than optimal.

Figure 1 highlights how the importance of SALT for high income and high tax communities by looking at county level shares of SALT deductions to total deductions. Tennessee (bottom left) is a state with no income tax and very low property taxes, even in wealthy suburban areas surrounding Nashville, the SALT deduction represents a relatively small share of deductions across the state. However in Virginia (top right) which has an average income tax rate and slightly above average property tax rates , the

SALT deduction is much more important, especially in high income areas like the DC and Richmond suburbs. However even in relatively rural areas, SALT represents a much larger share of deductions than in similar areas in Tennessee, highlighting how important state and local tax systems explain the importance of SALT deductions in the federal tax system.

3 Conceptual Framework

The question of tax capitalization goes back to the the seminal paper Tiebout (1956). The Tiebout model predicts that with multiple jurisdictions with tax and spending instruments, there will be a market outcome for the provision of local public goods where individuals "vote with their feet". Communities sort based on their preferences for local public goods under assumptions typical of a perfectly competitive model[3]. From this perspective, households remit taxes as a user fee for local public goods. As a result, low-end home prices are higher in a community with more public services. The local taxes capitalize in the property value.

If Tiebout model implications hold, an increase in local tax rates puts downward pressure on home value. Oates (1969) tests this hypothesis using a cross-sectional data on local property taxes, local expenditure programs, and property values. He finds local property values are negatively related to tax rates but positively correlated to school expenditures.

The SALT deduction essentially lowers the implicit tax rate of a given locality by allowing households who itemize to reduce their local tax liability by the value of their marginal tax rate times their SALT payments. Consider the simple example from Oates (1969), property value for a finite time T can be written as:

$$V = \sum_{i=1}^{T} \frac{Y - \tau V}{1 + r^i} \tag{1}$$

where V is the market value of the home, τ is the (local) tax rate, Y is the gross annual rental income and r is the discount rate. Solving for V, equation 1 becomes:

$$V = \frac{\sum_{i=1}^{T} \frac{1}{1+r^i}}{1 + \tau(\sum_{i=1}^{T} \frac{1}{1+r^i})} \tag{2}$$

Taxpayers who claim the SALT deduction are able to lower τ. Since V is decreasing in τ, we would expect a cap on this deduction to put downward pressure of home prices in areas with a high number of households who claim the SALT deduction. Firstly, we

[3]Including perfect mobility of individuals, large number of suppliers and perfect information

will be able to test if a SALT reductions leads to a decrease in sales price.

Empirical studies since Oates (1969) have yet to conclude to what extent these taxes capitalize in housing value. While a subset in the literature supports full capitalization (a one to one pass through of taxes to evaluation)[4], Pollakowski (1973) and Wales and Wiens (1974) find little to no capitalization in the case of property taxes. Others find a more nuanced result; taxes are only partially capitalized (King, 1977; Palmon and Smith, 1998). More recently, Giertz et al. (2021) leverage boundary discontinuities in Dallas County, finding more evidence of partial capitalization.

Taxes may fail to fully capitalize due to many factors such as expectation about future tax changes, information asymmetries. To better uncover to what degree SALT capitalizes in housing value, we follow Giertz et al. (2021) in altering 1 to allow for partial capitalization in our framework:

$$V = \sum_{i=1}^{T} \frac{Y}{1 + r^i} - \sum_{i=1}^{T} \frac{Y - \delta\tau V}{1 + r^i} \tag{3}$$

where $\delta \in [0, 1]$ represents the capitalization rate, where $\delta = 1$ implies full capitalization and $\delta = 0$ no capitalization. We can then generalize this result to express capitalization rate can be expressed as the change in sales prices divided by the present value of the tax change.

By considering the characteristics of a typical tax payer who claims SALT, we can leverage our point estimates to uncover an implied capitalization rate. Then we can write capitalization rate δ as

$$\delta = \frac{\Delta P}{\Delta T} \tag{4}$$

where ΔP is the change in sales price divided present value of the tax change ΔT, or taxpayers discounted top marginal tax rate τ times the amount of SALT deducted or

$$\delta = \frac{P_1(1 - \beta) - P_1}{\sum \Delta(\tau * SALT)/(1 + r)^n} \tag{5}$$

where P represents the observed sales price sale, $SALT$ represents the total amount of SALT, and r the future discount rate. The parameter β is the principle result from our regression. This represents the change in sales prices due to implementing the SALT cap. In order to construct capitalization measures, we select the following parameters to match the average taxpayer in our sample. We use the mean SALT of 18,000 dollars for the treated in the pre-period, a discount rate of three percent, and median sales price of the treated is 550,000 dollars. The rate τ is set to the marginal tax rate for 165-315 thousand

[4]See Reinhard (1981) and Gallagher et al. (2013) amongst others

dollar income married filling jointly. By leveraging equation 5, we assess to what extent does SALT capitalize in housing value. estimating how the SALT cap impacts sales price.

4 Data Sources

In this section we present the data sources we used to observe home sales since 2013. Then, we discuss our measurement of the SALT deduction.

4.1 Home Sales Data

We obtained the Zillow Transaction and Assessment Dataset (ZTRAX) to collect property-level real estate assessor and transaction data. ZTRAX data provides a rich set of housing, geographical, and loan characteristics for more than 400 million records for 2,750 counties across the United States. This includes annual property assessments, detailed information of buyer's and seller's location, and home sale prices. The ZTRAX has records going back to April 1996; however, many counties do not have sufficient coverage until the mid-2000s. We begin our analysis in 2013 to allow for the largest amount of geographic coverage in the ZTRAX data.

The ZTRAX dataset also contains information on a wide set of assessor information such as the square footage, number of rooms, and build year, in addition to the type of property. The dataset provides the exact coordinates of the properties allowing us to utilize small geographical units.

Our ZTRAX sample contains 35,434,730 home sales since 2013. Unfortunately property assessment record data availability varies across geographies, leading us to direct our focus to homes solely with sales price information. The availability of assessment information would although us to control for covariants often seen in the canonical hedonic price models. However, by leveraging assessment data we lose important variation of state and local tax rates need for our question at hand. For this reason, we turn instead to a repeat sales model, further discussed in Section 5, allowing us to control for unobserved covariates. As such we choose to only use the 8,815,902 repeat home sales in our main specifications.

The ZTRAX data allows us to identify the longitude and latitude of each home sale. We are limited to leverage this variation at a zipcode level due to the availability of our measure of SALT explore. The next section discuesses this measure.

4.2 IRS Statistics of Income

The Statistics of Income (SoI) data provided by the Internal Revenue Service (IRS) contains aggregated administrative data on individual income tax returns, specifically 1040s. The data is aggregated up to the ZIP code or county level from individual income tax returns. The report contains data on sources of income, adjusted gross income, exemptions, taxable income, income tax, number of filers, and most notably itemized deductions. We use SOI from the years 2013 and 2019 to represent the amount of SALT deductions prior and post the TCJA SALT cap respectively. These reports directly come from the IRS and should represent the true amount of remitted taxes and declared deductions.

In the following section, we then describe how we construct the measure of SALT exposure from the SOI. Table 1 reports the summary statistics for variables in the baseline model across both samples.

4.3 Measure of SALT Exposure

The aim of our exposure measure is to identify in which areas had the largest change in the effective price of state and local taxes induced by the federal tax reform. Ideally, if we had linked state and local tax filings for the income tax, property tax, and the retail sales tax[5] we could directly observe areas that had high rates of state and local taxes, however no such administrative data exists. In order to identify the impact of the TCJA SALT cap on housing prices, we need to identify the exposure of local areas to state and local tax deductions. We do so in two steps. First, using the data from SOI, we calculate the change in the amount of SALT deductions per filer between 2013 and 2019. Secondly, we average the amount of SALT deductions per filer in the years prior to the policy change in order to identify which areas the cap would be binding. SOI reports the total number of tax returns in each ZIP code, number of personal exemptions, along with the total remitted and deducted amounts for state and local taxes and other deductions at the ZIP code level. Because these reports are directly from the tax authority, the data represent true amounts reported to the IRS, they should accurately measure the amount of *claimed* state and local taxes in the ZIP code.

We define our SALT exposure measure as the following:

$$Exp_j = \frac{\sum_{i=1}^{N} SALT_{i,j}^{2013}}{N_j^{2013}} - \frac{\sum_{i=1}^{N} \min\{SALT_{i,j}^{2019}, 10000\}}{N_j^{2019}} \tag{6}$$

$SALT_{i,j}$ represents the amount of state and local taxes claimed on individual i's

[5] US Federal Income Tax allows for deduction of either income or sales tax, likely due to the presence of zero tax states, like Florida and Texas.

tax return filing in ZIP code j , while N_j represents the number of filers. The *min* function represents the effective formula for an individual in determining their SALT payments eligible to be deducted from the federal income tax. The interpretation is the change in the SALT amount *deducted* per filer between 2013 and 2019.[6]

4.4 Defining the SALT Cap

In the previous section, we discuss how we first explore the relationship of SALT and sales prices. Once we have established the impact of a change in SALT exposure on housing prices as suggested by equation 2, our goal is to identify the causal impact of the SALT cap on housing prices. Namely, to what extent SALT capitalize in home sale prices. To identify which areas are treated, we average the SALT per filer for years 2013 to 2017 using the SOI data. We define the treated group as ZIP codes where the average SALT per filer in the pre-period is greater than the imposed cap of 10,000 dollars. Because the value of SALT deduction for a given ZIP code before the passage of the TCJA is predetermined, using the policy cap provides a natural threshold for defining treatment. Homes that were previously claiming above the threshold will now be limited to how much they can deduct, whereas homes below the cap will not. Comparing to homes below the threshold allows us to remove variation from other tax changes implemented as part of the TCJA unrelated to SALT. Additionally, this allows us to better control for other national and local economic conditions.

However, because changes outside of the SALT cap, such as tax decreases or worsening local labor market conditions, may be correlated with both the change in the SALT amount and housing prices, we need some way of isolating the specific effect of the SALT cap. We perform a number of robustness checks to ensure our results are not driven by external factors.

5 Estimating the Impact of the SALT Cap

Typically, hedonic models are use to estimate the value of amenities or property taxes on housing which take the following form:

$$P_i = \beta_0 + \sum_k \beta_k Z_{ki} + \beta_\tau \tau_i \tag{7}$$

[6]Intuitively, one would think to subtract the 2019 from 2013 to create a change measure, but given that change is negative, it leads to a confusing interpretation of our results. Thus we simply change the order for ease of interpretation

where P represents the value of property i, Z represents various amenity/disamenity levels, and τ represents the property tax rate. Because sales prices should generally reflect the value of the property, sales data is often used to estimate these models along with different natural experiments to create exogenous variation in amenities Z and tax rates τ (Palmon and Smith, 1998; Downes and Zabel, 2002). In our case, because we are estimating the impact of changes in state and local taxes on housing prices, we could estimate the following equation:

$$ln(P_{ijy}) = \alpha + \beta_1(Exp_j) + \gamma X_i + \theta Z_{ay} + \delta_j + \delta_{sy} + \varepsilon_{ijy} \tag{8}$$

where P_{ijy} represents the sales price of housing unit i, in ZIP code j, in year y, Exp_j represents our exposure measure to the SALT cap as the change in the amount of SALT claimed per filer between 2013 and 2019 in thousands of dollars, X_i represents controls for housing, and the vector Z_{ay} would represent some proxy for amenities, in area a for year y, while δ_j and δ_{sy} would be ZIP code and state by year fixed effects respectively. Here the coefficient of interest β_1 represents the impact of a \$1000 decrease in the SALT deduction per filer. However, given that the variation stems from year changes in SALT deductibility at the ZIP code level, there could be changes in market composition, for example having more sales from smaller homes or condominiums with lower property taxes, that could bias the results. Due to the extensive scope of our data, we can take advantage of repeated sales of homes before the passage of the TCJA and after the passage of the TCJA, where the variation comes from within housing units. Under this model the change in log sales price of a home sold in year y and an earlier time s is:

$$ln(P_{ijy}) - ln(P_{ijs}) = \beta_0 Exp_{y,s} + (\gamma_t X_i - \gamma_s X_i) + (\theta_t Z_a - \theta_s Z_a) + (\varepsilon_{ijy} - \varepsilon_{ijs}) \tag{9}$$

where $Exp_{y,s}$ is defined as the change in SALT claimed per filer from year s to y. Given observable individual home characteristics and their coefficients are generally constant over time, then equation 9 can be rewritten as:

$$ln(P_{ijy}) - ln(P_{ijs}) = \beta_0 Exp_{y,s} + (\varepsilon_{ijy} - \varepsilon_{ijs}) \tag{10}$$

The repeat sales specification enables us to control for the individual housing characteristics and local amenities that are constant over the sample period, such as highly sought after school districts or other unobserved housing features. Controlling for this variation allows us to better isolate the impact of implementing a SALT cap. We cluster standard errors at the state level to account for any state wide shocks in the housing market.

To estimate the causal impact of the SALT cap on housing price, we leverage a difference in difference specifcation where we define treated as areas with average SALT was above the cap prior to the policy. We estimate the following equation

$$ln(P_{ijy}) - ln(P_{ijs}) = \beta_0 Treat_j \times Post + (\varepsilon_{ijy} - \varepsilon_{ijs}) \tag{11}$$

where β_0 can be interpreted as causal effect of the SALT cap under the assumption that all the change in the SALT amount per filer can be directly contributed to the implementation of the SALT cap and not economic conditions or other subsequent changes.

Following (Garrett et al., 2020) we expand our specification into an event study framework, where we interact $Treat_j$ with year fixed effects to directly examine the impact of the SALT cap by year and to insure that the parallel trends assumption in the pre-period appears valid. We estimate the following equation:

$$\Delta ln(P_{ijy}) = \sum_{k=2013}^{2016} \pi_k 1(y = k) \times Treat_j + \sum_{k=2018}^{2020} \rho_k 1(y = k) \times Treat_j + \Delta\varepsilon_{ijy} \tag{12}$$

The π_k coefficients represent the difference in the impact of exposure in year k relative to 2017 before the passage of the TCJA while ρ_k represents the difference in the impact of exposure in year k relative to 2017 following the implementation of the SALT cap. ρ_y can be interpreted as the impact of a 100 $*\rho_y$ percent change in the sales prices induced by the TCJA while π_y has a similar interpretation, but should not directly impact housing prices in this period, thus providing suggestive evidence if the parallel trend assumption is likely to hold.

6 Impact of SALT Removal

We begin by estimating the relationship between the change in deducted SALT and home sales prices from equation 10. Table 2 presents the results of this exercise, in column (1) we see a decrease in the amount of SALT per filer by 1000 dollars is associated with a 1.2 percent decline in sales prices. Column (2) and (3) which add various fixed effects show a similar decline.

Given that we have established the relationship between SALT and home prices, we estimate the causal impact of implementing the SALT cap using equation 12. Examining Figure 2, we see no evidence of any pre-trends and see a sharp decline in 2018. This result generalizes to Last Sale Year by Year Fixed Effects, State Fixed Effects and Last Sale Year by Year by State fixed effect. Using our preferred specification in panel (c), we estimate that the the implementation of the SALT cap decreases the price of homes in areas with high state and local tax burdens by approximately 9 percent. Table 4 provides difference and difference estimates of the event studies in Figure 2 which are broadly similar, it also presents capitalization calculations based upon these estimates. We ultimately calculate capitalization rates between 76 to 129 percent depending upon the specification[7]. This suggests that SALT capitalizes into housing prices, but not fully, which is largely consistent with the previous literature. However, we do not find much evidence for full capitalization.

To better understand the story of capitalization we must understand the sides of both supply and demand. Specifically, to ensure we are estimating a demand response, we need to know how supply and mobility effects contribute to our results. Furthermore we must address other challenges to identification. Since we use a proxy to measure SALT, we must show other covariates of sales price and our measure of SALT do not drive results. For instance, our treatment is determined at the ZIP code level, it is possible some high income taxpayers may have high values of SALT would not be able to claim it due to claiming the alternative minimum tax (AMT). Changes in housing market supply could represent another important possibility for capitalization. Home price changes could be driven by changes in composition of the homes for sales. Consider the scenario where an increase in new constructions at the time of TCJA passage drives price changes. Then we would expect to see areas with more lax land use regulations to see more changes in sales prices than those who have more restrictive regulations. We later split our sample by land use to show this does not confound our results.

Mobility from high to low tax locations could explain part of the story for capitalization. For a first order concern, taxpayers could relocate from high to low tax burden states. To address this possibility, we split the sample into high vs low tax states. Samples without low tax states would see differential impact by the SALT cap if mobility is a first order concern. Likewise, we would expect to see little or no effect on low tax states. Later, we show this is not the case

Local amenities represent a large, often unobserved factor for home price in traditional hedonic models. Referring back to the Tiebot model, taxes are viewed as service payments for these amenities. It is possible that due to the change in SALT, localities either change their local tax rates or the amount of amenities offered. A classical exam-

[7]See Section 7 for a discussion of how these numbers are constructed

ple is education spending; a house in neighborhood with a better schools cost more than the same house in a worse neighborhood. To address the possibility of our result being caused by a change in local amenities, we split our sample based off how much education spending changes from before and after the passage of TCJA.

Given that our measure of SALT is at the ZIP code level, a potential concern is that treated units are wrongly marked treated because they would not be able to claim SALT. Notably, those who claim the alternative minimum tax are forbidden from claiming SALT. We also show our results are robust when excluding ZIP codes that claim a large fraction of AMT.

6.1 Supply Side Effects

Because capitalization is uniquely demand driven effect, and the TCJA contained incentives that may have lead to an increase housing supply, we need to ensure that implied capitalization rates are not being driven by supply side effects. In order to rule out the possibility of increase in supply we utilize the Wharton Land Index Gyourko et al. (2008) to examine how the SALT cap differred between areas with high land use restrictions versus less restricted areas. We define high (low) land-use as an area being in the top (bottom) 25th percentile of the index.

Figures 3a and 3b present event studies for impact of the SALT cap on areas with high and low land-use restriction. In Figure 3b, we provide evidence that the impact is not exclusively driven by areas with restrictive land-use, as those in the top 25th percentile have a similar, but slightly smaller, magnitude effect as the baseline repeat sales estimate. Figure 3a shows there is no observed impact in sales price in areas with more lax land-use restrictions. Given the null effect in low land-use restriction areas, it is unlikely changes in sales price due to the SALT cap are caused by an increase in the housing supply, at least not in easy to build areas. Interestingly, both results lend to the theory of partial capitalization. Looking at Table 5, we see that less restrictive areas yield a lower capitalization rate of approximately 55 percent; however given that that the interaction term of the difference in difference is not different than zero, one cannot not reject that this number is different than the baseline. Similarly, restrictive areas have a similar rate as the baseline. These estimates suggest that our results are not being driven by changes in housing supply, but likely reflect changes in local tax prices.

6.2 High vs Low Tax States

Previous work has shown that high income individuals are highly sensitive to state tax rates with respect to their residence decisions. With the removal of SALT, the question remains whether states with high tax burdens have more sensitive housing prices as a result. We divide sales into those from high vs low tax states to examine how much of our result is driven by a state's tax burden. We rank states by their tax burden according to the Tax Foundation in order to determine high vs low tax states.[8] Figures 4a and 4b report similar magnitudes as the baseline for both high and low tax states. We find no evidence of heterogeneous responses, besides during the first year after the reform, due to state tax burden. The limited evidence of a mobility response alongside no evidence for a change in housing supply gives strong evidence of sorting being the primary driver behind our results.

6.3 Robustness and Alternative Specifications

The alternative minimum tax (AMT) represents an important aspect of income taxes amongst high income earners in the US. Notably, the AMT disallows one to claim the SALT deduction. To ensure our result is robust to excluding individuals who would claim the AMT, we show the impact of SALT removal on ZIP codes with an average AMT per filer below one thousand dollars versus those in the top 25th percentile of AMT dollar amount per filer. Similar to our measure of SALT, we take the average AMT dollar amount per filer in the year prior to TCJA. Figures 5a and 5b reveal no differences between the two groups. The impact of SALT on housing price is the same whether or not there are high levels of AMT per filer. This suggest it is highly unlikely that the AMT confounds our main results.

One possible response is that jurisdictions may alter local tax rates or change the amount of local amenities offered to adjust for SALT removal. Education represents one of the largest expenditures in local public spending. Changes in the value of education spending would similarly alter the impact of home sales price. To account for possible changes by localities, we we split our sample into those who experienced large increase in education spending since the passage of TCJA versus those with declines in spending. To investigate this possible mechanism, we collect education expenditure data from the National Center for Education Statistics' (NESC) Local Education Agency Finance Survey. This survey reports the per pupil expenditure for each school district in the United States. In order to relate school distinct level data to each respective ZIP code, we weight school district level spending as their percentage of the total land mass at the zip code level Figures 7a and 7b reveal no noticeable difference between ZIP codes who saw large increases in per pupil expenditure versus those who saw a decline. This suggests that declines in sales price after the passage of TCJA are not driven by changes

[8]We use the states with the highest ten tax burdens to represent those who are high tax, and those in the bottom ten plus states with no income tax as low tax states.

in local amenities.

Additionally, because the repeat sales model involves comparing housing sales with potentially different tenures, we fix our previous sale year to be 2013, therefore each observation in every year is identical with respect to tenure. Figure 6 shows the result of this exercise and while the effect is large and noisy in 2018, it shows no clear pre-trend in the pre-period and estimates in 2019 and 2020 are broadly similar to the baseline estimates in Figure 2c. This suggests that the results are robust to fixing the tenure period across treated and control groups, giving more evidence of the reliability of our results.

7 Implications for Capitalization of SALT

The Tiebout model predicts full capitalization of taxes into home values. Previously we discussed how empirical work shows an unclear answer. There is no consensus of full, partial and no capitalization of these taxes. We attempt to shed light on this contested question by applying equation 5 to the impact of the SALT cap. Table 5 reports the implied capitalization rates. These results have one clear implication. All specifications support the partial capitalization hypothesis. That is, changes in SALT lead to changes in sales price; however, the relationship is less than the value of the tax change.

To provide confidence intervals on our estimates, we construct upper and lower bounds using the 95 percent confidence intervals for the point estimate of the difference in difference. Note that the majority of the intervals imply partial capitalization, but there is not sufficient evidence to reject full capitalization. Restrictive land use regimes and high state taxes show higher levels, with some cases of over-capitalization. In the case of lax land-use areas, the bounds are less informative, as they go from no capitalization to over. This conclusion falls in line with the results of Giertz et al. (2021). Like in the case of property taxes in Dallas County, we show strong evidence of SALT partially impacting marginal sales prices, while failing to reject a one to one pass-thru.

8 Conclusion

We document one of the first analysis of the impact of the SALT cap on local housing markets. We find that the SALT cap reduced the prices of homes in areas that saw large changes in the deductibility of state and local taxes. While currently we do not investigate how the composition of homes available for sale systematically changes with the introduction of the SALT cap, this represents another margin in which markets adjust. While these results suggest evidence for the capitalization of local taxes into home prices, further research is need to understand how local communities change in response to the increased cost of raising tax revenue, such as reducing tax burdens or limiting public services. Better understanding how federal tax policy can impact state in local finance is important for policy makers, and this paper helps better understand one mechanism for adjustment.

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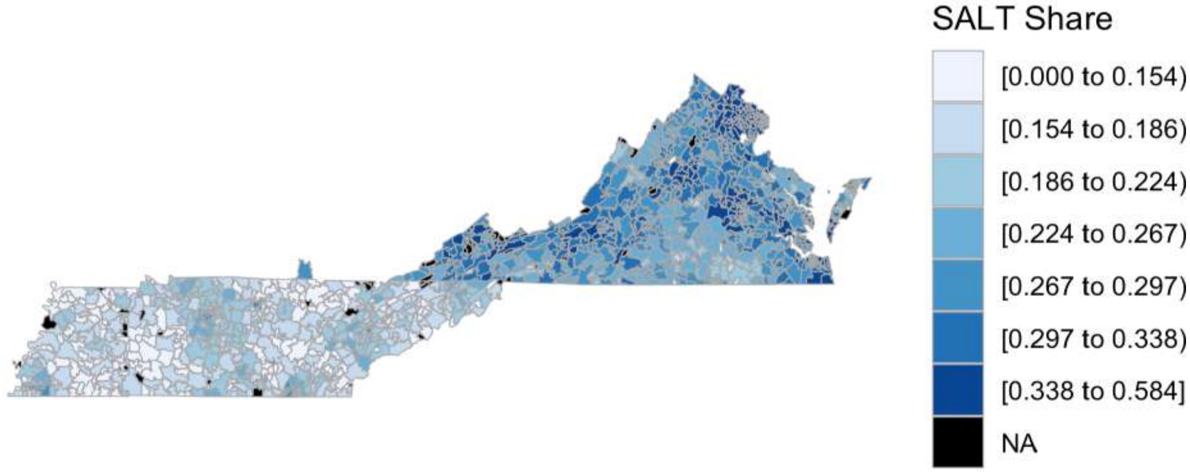
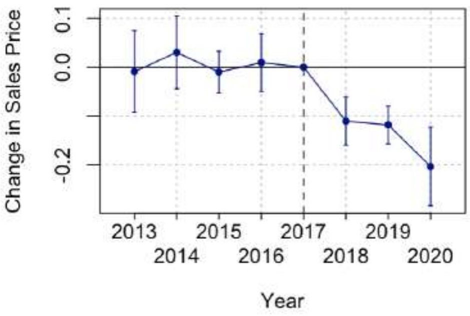
Figure 1: Geographic Variation in SALT Share



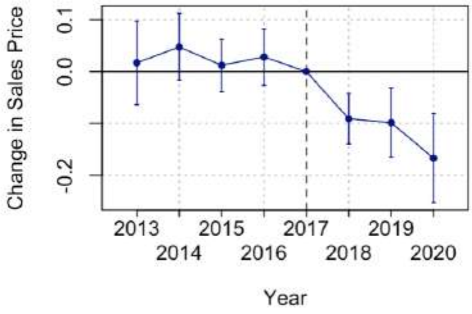
Authors' calculations of SALT share of itemized deductions from the SOI in 2013 defined as from total amount of state and local sales and income tax plus real estate tax divided by total deduction amount for each ZIP code. The above figure shows the SALT deduction share across ZIP codes in Tennessee and Virginia.

Figure 2: Causal Effects of Implementing the SALT Cap

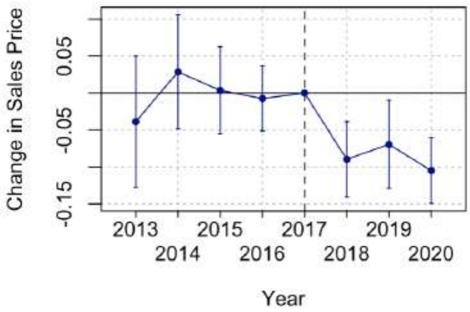
(a) LastSaleYear-by-Year



(b) State Fixed Effects



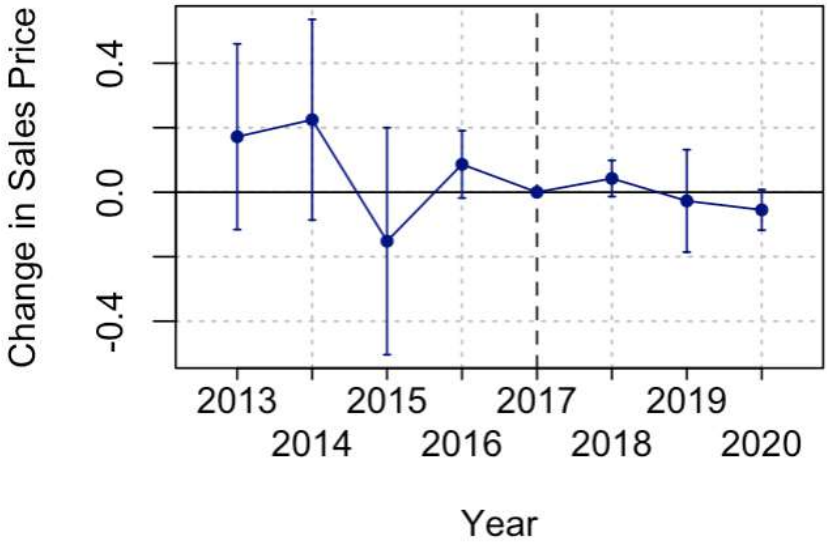
(c) LastSaleYear-by-Year-by-State



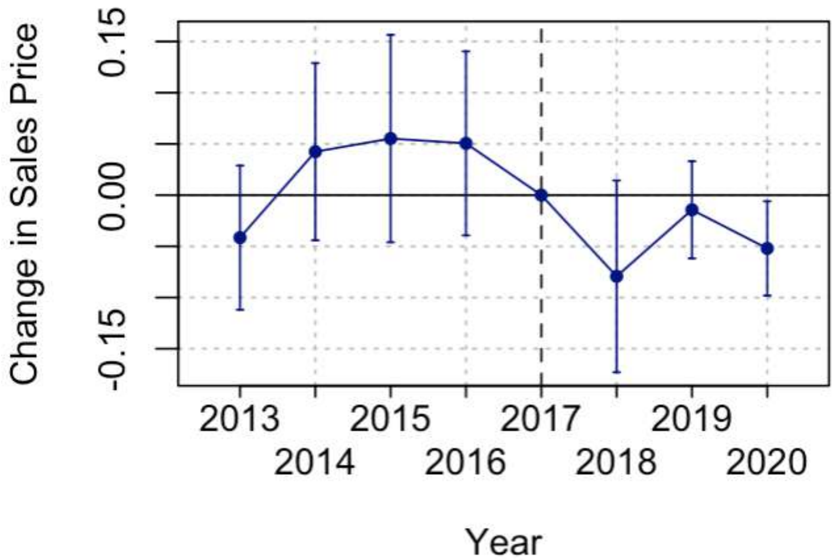
This figure shows the annual coefficients from a repeat sales event study of TCJA-17's impact on the SALT deduction on the change in log of sales prices (equation 12). The above figures homes sold more than once over the time period. Each figure represents a different set of fixed effects. See Section 6 for a discussion regarding the interpretation of the event studies. Standard errors are clustered at the state level.

Figure 3: Effect of SALT Cap on Housing Prices: Land-Use Restrictions

(a) Lax



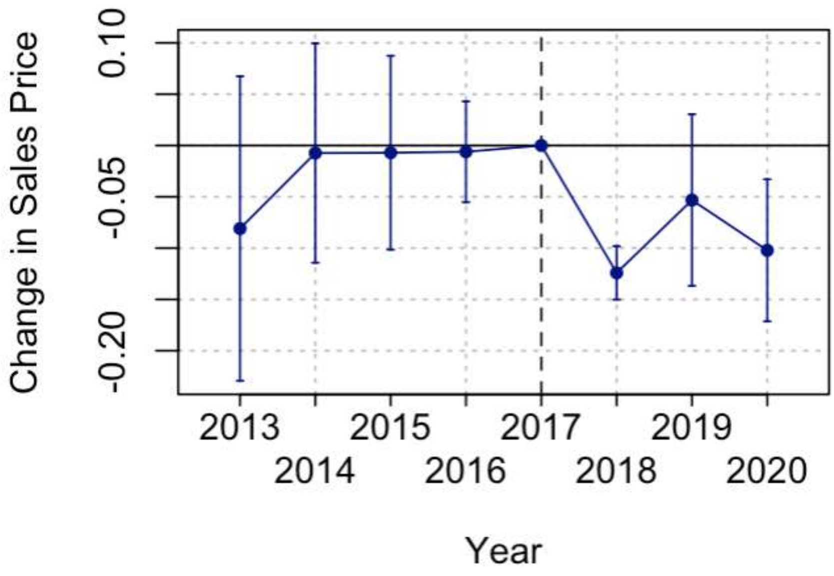
(b) Restrictive



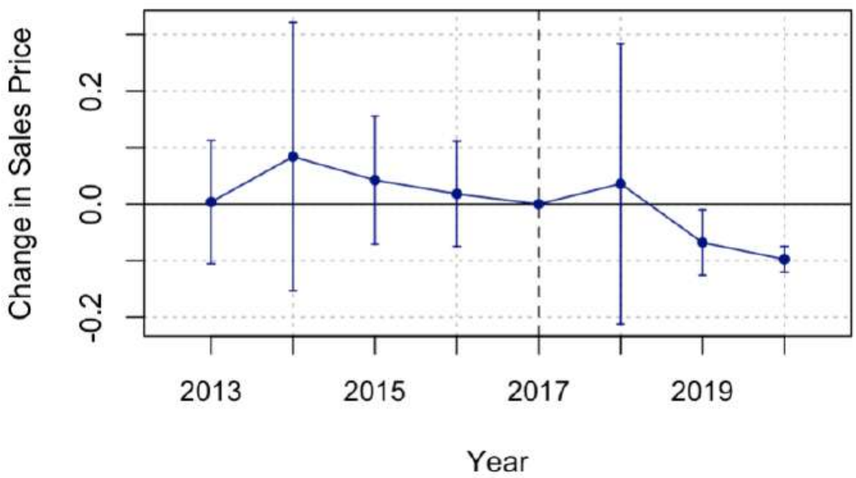
This figure shows the annual coefficients from a balanced panel event study of TCJA-17's impact on the SALT deduction on the change in log of sales prices (equation 12). Figure 3a reports areas with more lax land-use restriction versus 3b reflects those who are more restrictive as defined by the Wharton Land Use Index. See Section 6 for a discussion regarding the interpretation of the event studies. Standard errors are clustered at the state level.

Figure 4: Effect of SALT Cap on Housing Prices:State Tax Burden

(a) High State Tax



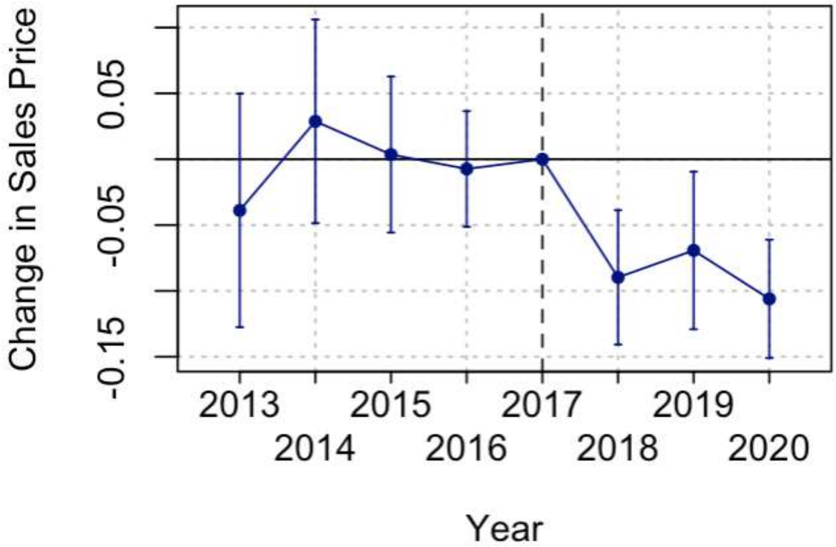
(b) Low State Tax



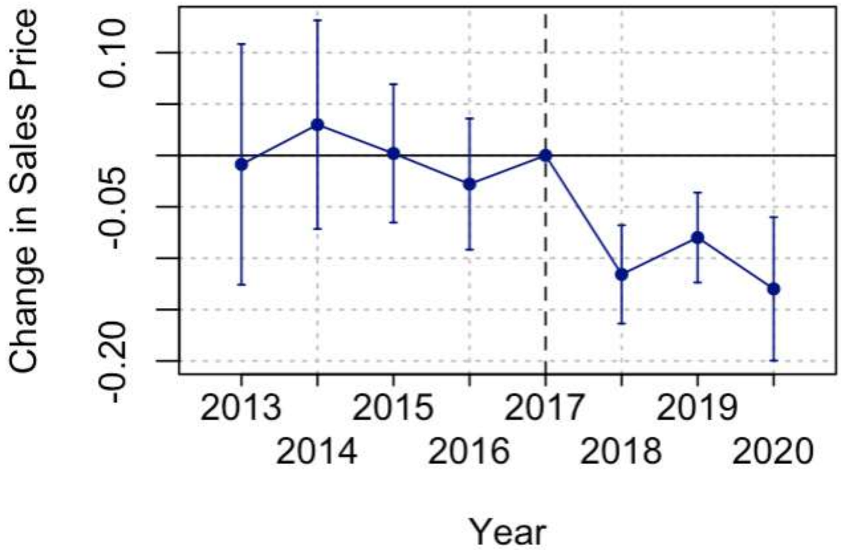
This figure shows the annual coefficients from a balanced panel event study of TCJA-17's impact on the SALT deduction on the change in log of sales prices (equation 12). Figure 4b presents results for low tax states, while 4a reflects those with the largest tax burden. See Section 6 for a discussion regarding the interpretation of the event studies. Standard errors are clustered at the state level.

Figure 5: Effect of SALT Cap on Housing Prices:AMT

(a) High AMT

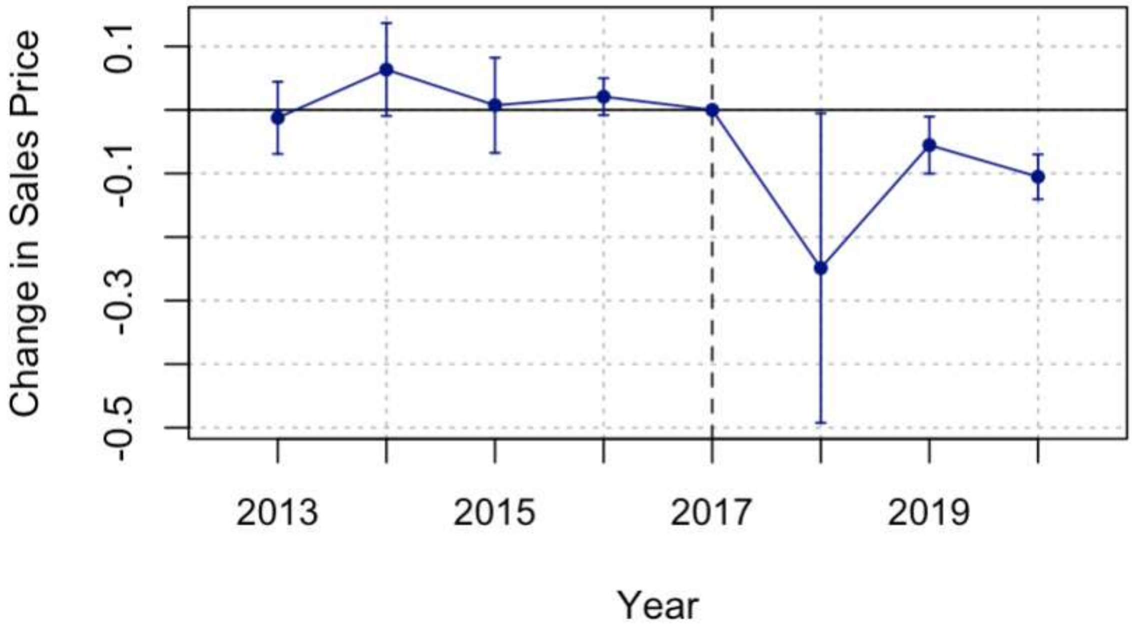


(b) Below Mean AMT



This figure shows the annual coefficients from a balanced panel event study of TCJA-17's impact on the SALT deduction on the log of sales prices (equation 12). See Section 6 for a discussion regarding the interpretation of the event studies. Standard errors are clustered at the state level.

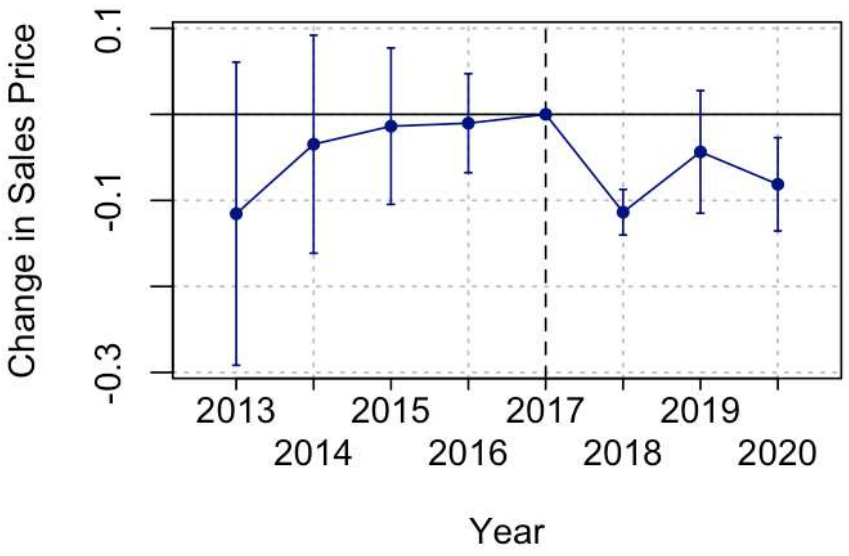
Figure 6: Effect of SALT Cap on Housing Prices: First Sold in 2013



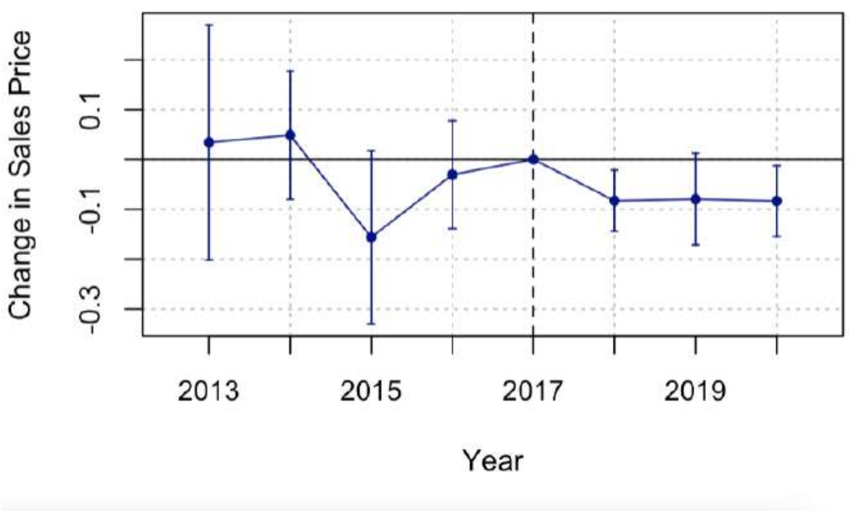
This figure shows the annual coefficients from a balanced panel vent study of TCJA-17's impact on the SALT deduction on the log of sales prices (equation 12). See Section 6 for a discussion regarding the interpretation of the event studies. Standard errors are clustered at the state level.

Figure 7: Effect of SALT Cap on Housing Prices: Change in Per Pupil Expenditure

(a) Large Increase



(b) Decrease



This figure shows the annual coefficients from a balanced panel event study of TCJA-17's impact on the SALT deduction on the change in log of sales prices (equation 12). Figure 7a reflects the impact on ZIP codes who saw top 75th percentile changes in per pupil expenditure, where as 7b reflects ZIP codes who saw a decrease. See Section 6 for a discussion regarding the interpretation of the event studies. Standard errors are clustered at the state level.

Table 1: Zillow Transaction and Assessments Data

	Mean	Std Dev.	Min	Max	(N)
Full Sample					
Sales Price	\$402,720	\$4,268,286	\$10,001	\$20,700,000	35,434,730
EXP_j	-2.433	2.933	-29.68	0.279	35,434,730
EXP_j^{CF}	-1.30	1.23	-17.14	17.3	35,434,730
Property Assessment					
Sales Price	\$305,306	\$4,040,557	\$10,001	\$20,400,000	12,701,973
EXP_j	-2.75	4.04	-29.33	0.04	12,701,973
EXP_j^{CF}	-1.49	1.49	-17.139	7.163	12,701,973
Building Area (Sq Ft)	1951.06	10371.36	1	8549588	12,701,973
Total Rooms	6.40	2.27	1	768	12,701,973
Total bedrooms	3.16	1.06	1	780	12,701,973
Age	44.09	34.37	0	527	12,701,973
Percent Minority	30.38	26.14	0	100	12,701,973
Number of Households with Income > \$200k	114.02	160.06	0	2286	12,701,973
Pool Flag	0.06	0.23	0	1	12,701,973
Fireplace Flag	0.30	0.46	0	1	12,701,973
Median MSA Income	\$56,649	\$11,509	\$31,879	\$95,405	12,701,973

This Table shows summary statistics for ZTRAX and SOI data. The bottom section of the table presents additional housing characteristics that come from the assessment data.

Table 2: Effects of Changes in SALT Deductibility

	(1)	(2)	(3)
Exp_j	-0.012*	-0.010	-0.006**
	(0.005)	(0.005)	(0.002)
δ	0.83	0.68	0.47
LastSaleYear-by-Year FE	X	X	
State FE		X	
State-by-LastSaleYear-by-Year			X
N	8,829,363	8,829,363	8,829,363

This table shows the results estimating equation on unit level outcomes. Standard errors are clustered at the state level. Column (1) shows results for the baseline regression on change in log of sales price. Column (2) includes the addition of state fixed effects. Columns (3) present the results of the inclusion of state by last sale year by year fixed effect. $p < 0.10$, $^{*}p < 0.05$, $^{***}p < 0.01$

Table 3: Impact of SALT Cap on Housing Prices

	(1)	(2)	(3)
$Treat_j \times Post$	-0.15 ***	-0.13***	-0.09 **
	(0.023)	(0.031)	(0.02)
δ	1.29	1.1	0.76
LastSaleYear-by-Year FE	X	X	
State FE		X	
State-by-LastSaleYear-by-Year			X
N	8,829,363	8,829,363	8,829,363

This table shows the results estimating equation on unit level outcomes. Standard errors are clustered at the state level. Column (1) shows results for the baseline regression on change in log of sales price. Column (2) includes the addition of state fixed effects. Columns (3) present the results of the inclusion of state by last sale year by year fixed effect. $p < 0.10$, $^{*}p < 0.05$, $^{***}p < 0.01$

Table 4: Impact of SALT Cap on Housing Prices

	Restrictive Land-Use	Lax Land-Use	Edu Decrease	Edu Increase	High Tax	Low Tax
PostXTreat	−0.0739***	−0.0785***	−0.0763***	−0.0614***	−0.0703**	−0.0815***
	(0.0172)	(0.0154)	(−0.0123)	(0.0168)	(0.0248)	(0.0144))
PostXTreatXGroup	−0.0138	0.0145	0.0217	0.0084	−0.0106	0.0305
	(0.0311)	(0.0729)	(0.0320))	(0.0359)	(0.0278)	(0.0298)
β	−0.0877	−0.064	−0.0546	−0.053	−0.0809	−0.051
δ	0.75	0.55	0.47	0.46	0.70	0.44
LastSaleYear-by-Year FE	X	X	X	X	X	X
Group-by-Year	X	X	X	X	X	X
N	6,788,530	6,788,530	8,672,937	8,672,937	8,829,363	8,829,363

Note: This table presents the variable results. Standard errors are shown in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 5: Capitalization Rates of SALT

	Baseline	Restrictive Land-Use	Lax Land-Use	Edu Decrease	Edu Increase	High Tax	Low Tax
δ	0.76	0.75	0.55	0.47	0.46	0.70	0.44
δ_{ub}	0.95	1.17	1.31	0.85	0.91	1.15	0.82
δ_{lb}	0.60	0.34	-0.21	0.09	0.01	0.24	0.06
r	0.03	0.03	0.03	0.03	0.03	0.03	0.03
τ	0.24	0.24	0.24	0.24	0.24	0.24	0.24
$\Delta\ SALT$	\$8000	\$8000	\$8000	\$8000	\$8000	\$8000	\$8000

Note: This table presents capitalization rates across different specifications. Lower and upper bounds are calculated using the standard error of the estimated parameter from 11. See Section 7 for a discussion of these results