

# Tax Incentives and Housing Decisions: Investigating Effects of the Tax Cut and Jobs Act

Raissa Dantas and Erik Hembre\*

February 18, 2021

## **Abstract**

The Tax Cut and Jobs Act (TCJA) altered the tax code, greatly reducing itemization rates. Utilizing American Community Survey data combined with the NBER TAXSIM program, we calculate the TCJA caused the average homeownership subsidy to decline by 56% from \$2,677 in 2017 to \$1,171 in 2018. Comparing similar households that vary in subsidy shock exposure due to state tax rates and house price levels, we find that each percentage point decrease in the TCJA homeownership subsidy lowers homeownership rates by 0.54 percentage points and mortgage utilization by 0.76 percentage points. Using Freddie Mac mortgage origination data, we additionally find that lenders absorbed 5% to 7% of the subsidy incidence through decreasing mortgage interest rates.

JEL Classification Codes: H2, R38, R31.

Keywords: Homeownership, mortgage interest deduction, housing finance.

---

\*Department of Economics, University of Illinois at Chicago.

# 1 Introduction

Do homeownership tax incentives increase homeownership or are they simply transfers to lucky households? This important policy question has received a great deal of attention in prior research, yet often a neutral or negative effect has been found. In 2018, the Tax Cut and Jobs Act (TCJA) changed the tax code considerably by increasing the standard deduction and capping state local tax deductions among other changes, causing a large decline in homeownership subsidies through the mortgage interest deduction (MID) and property tax deduction. This paper measures variation the size of this large homeownership subsidy shock and examines household housing decisions and market responses to these tax incentives.

In 2017, the MID was the third largest deduction claimed at \$290 billion while \$220 billion in property taxes were deducted. Combined these deductions are decrease tax revenue by more than double the annual expenditures on rental assistance programs. Figure 1 displays tax itemization rates, and the fraction of household claiming the mortgage interest deduction (MID) or property taxes between 1993 and 2018.<sup>1</sup> In the 25 years prior to the TCJA at least 28% of tax filers itemized deductions every year and most itemizers claimed MID and property taxes. In 2018, itemization plummeted to 11% and reduced total MID and property tax deductions by 45% to \$175 billion and \$105 billion. Clearly, the TCJA caused the largest decline in federal homeowner subsidy claims in recent history by reducing the likelihood of itemization.

As a cornerstone of the “American Dream” (Gabriel and Painter (2008), Goodman and Mayer (2018)), homeownership has long enjoyed broad political support and plays a prominent role in household financial decisions. Home equity is the largest component of wealth for most families. Homeownership encourages asset accumulation over the life-cycle through forced savings (Wainer and Zabel (2020),

---

<sup>1</sup>IRS tax statistics of income: <https://www.irs.gov/statistics/soi-tax-stats-individual-income-tax-returns-publication-1304-complete-report>

Di et al. (2007), Goodman and Mayer (2018)) and can provide insurance in retirement against rising housing costs and long-term care costs (Davidoff, 2010). Aside from private benefits, evidence of positive homeownership externalities have been found through increased civic engagement (DiPasquale and Glaeser (1999), Engelhardt et al. (2010), Jiang (2018)), increased property values (Coulson and Li, 2013), and improved child outcomes (Aaronson (2000), Green et al. (1997), Haurin et al. (2002)).

Though positive homeownership externalities may exist, economists have widely criticized the MID as a tool to subsidize homeownership. A primary reason is that the MID only benefits households that itemize tax deductions, which are more likely to be higher-income families in higher-cost areas (Gyourko and Sinai (2003), Brady et al. (2003), Glaeser and Shapiro (2003), Poterba and Sinai (2008)). This partially negates the redistributive goals of a progressive tax system. While a majority of homeowners use mortgage debt to finance home purchases, subsidizing mortgage interest also encourages lower-credit-quality households (with higher mortgage costs) to become homeowners and incentivizes larger homes (Hanson, 2012b) and increases mortgage debt (DeFusco and Paciorek (2017), Hanson (2020)).

The large homeownership subsidy shock generated by the TCJA provides an opportunity to study its effects on homeownership and mortgages. We estimate the TCJA effect on homeownership and mortgages by comparing households of similar income levels but differential exposure to the TCJA homeownership subsidy shock based on state variation in tax rates and house price levels.

While some prior work, such as Hembre (2018), has found positive responses to homeownership subsidies few studies have found a direct link between the MID or property taxes and increased homeownership. In fact, several studies such as Hilber and Turner (2014), Sommer and Sullivan (2018), and Chambers et al. (2009) find the counterintuitive result that the MID lowers homeownership. Sommer and Sullivan (2018) and Chambers et al. (2009) attribute this finding to the MID increasing house prices, which reduces homeownership among lower-income

households who benefit less from the MID. Hilber and Turner (2014) find the house price response to the MID is particularly powerful in areas with less elastic housing supply.

One limitation of prior work is the measurement of homeownership tax subsidies. Two approaches have generally been used to measure homeownership subsidies. The first, utilized by Sommer and Sullivan (2018), Floetotto et al. (2016), Chambers et al. (2009), and Gervais (2002) is to treat mortgage interest or property taxes as fully tax deductible, evaluated at marginal tax rates. This can greatly over-estimate homeownership subsidies. Our simulations suggest only 27% of mortgage interest and property taxes are deducted from federal and state income taxes. This deduction rate increases systematically with income, housing demand, and state taxes, complicating analyses that rely on these dimensions for statistical inference.

The second approach is to use a “last-dollar” measurement of mortgage interest or property tax subsidies. For instance, both Hilber and Turner (2014) and Poterba and Sinai (2008) utilize the simulated marginal tax rate for an additional dollar of mortgage interest or property tax among households that itemize deductions. Other work such as Green and Vandell (1999), Martin and Hanson (2016), and Hanson (2012b) use statutory marginal state and federal income tax rates to proxy for available mortgage subsidies. These marginal tax rates provide an appropriate subsidy measure for estimating intensive margin responses of housing decisions, such as housing size or mortgage debt amount. The complicated non-linear interaction between homeownership deductions and itemization means marginal tax rates overstate the average homeownership subsidy a household receives at the extensive margin of housing tenure or mortgage origination.

We expand on this prior work by incorporating tax itemization into the homeownership subsidy calculation for potential homeowners and mortgage holders. Using the National Bureau of Economic Research (NBER) TAXSIM program, we simulate the homeownership subsidy based on the tax burden change

from being a homeowner compared to a renter. Because the TCJA primarily affected the homeownership subsidy through itemization as opposed to marginal tax rates, our homeownership subsidy measure incorporates itemization complexity typically ignore to accurately reflect the homeownership tax benefits.

We estimate the TCJA lowered the average annual homeownership subsidy by \$1,506 from \$2,677 to \$1,171. This change was far greater for higher-income households at \$2,636 relative to lower-income households at \$373. While this subsidy is tiny compared to the home value, when compared to the imputed rental value this subsidy shock is 1.6% and 9.7% respectively. Exploiting cross-state variation in the subsidy shock, we find that the TCJA significantly reduced homeownership and mortgage utilization. For each percentage point decrease in the homeownership subsidy, we find that homeownership rates decreased by 0.54 percentage points and mortgage rates decreased by 0.76 percentage points. These findings suggest a sizable housing and mortgage demand response during the first two years of TCJA implementation.

Given the large expenditures on homeownership subsidies, tracing its incidence is an important policy issue. Early work by Poterba (1984), finds that a significant portion of the MID benefits are capitalized into home values using an asset pricing model framework. More recent work by Sommer and Sullivan (2018) utilizes the progressivity of the tax code to show how the MID endogenously affects house price levels.

Few papers have measured the homeownership subsidy incidence gained by mortgage lenders. Devereux and Lanot (2003) analyze mortgage subsidy incidence in the UK and find that 70%-80% of the subsidy is captured by mortgage lenders. Hanson (2012a) finds a much smaller incidence of the US MID to lenders. Utilizing the MID threshold at \$1,000,000, he finds that 9%-12% of the MID benefit is captured by lenders. In the rental market, both Susin (2002) and Gibbons and Manning (2006) find a significant portion of rental subsidy benefit goes towards landlords through higher rents.

The TCJA provides an excellent opportunity to measure the homeownership subsidy incidence captured by lenders. Using a large, rich dataset of Freddie Mac mortgage originations we measure this incidence by comparing the change in mortgage interest rate following the TCJA in relation to the expected homeownership subsidy of households. We find that for each percentage point decrease in the homeownership subsidy, mortgage interest rates declined by five basis points, suggesting lenders capture between 5% and 7% of homeownership subsidies through interest rates.

## 2 Tax Cut and Jobs Act

The US tax code has a long history of subsidizing homeownership. The two main homeownership subsidies are the deductibility of mortgage interest and property taxes. The mortgage interest deduction was incorporated into the tax code in 1913, as similar treatment was given to other forms of interest on debt, yet there is no indication the mortgage interest deduction was meant to subsidize homeownership (Ventry, 2010). While perhaps an incidental initial inclusion, the MID has consistently remained one of the largest deductions claimed.

Property taxes are a substantial homeownership cost. Homeowners on average pay \$3,340 per year in property taxes.<sup>2</sup> Property tax deductions are treated similarly to other state and local taxation, such as state income and sales taxes. Renters cannot deduct property taxes, but landlords may deduct property taxes and this could lower rental prices. However, the deductibility of property taxes only benefits homeowners who itemize deductions.

The MID and property tax deduction can subsidize a substantial portion of homeownership costs. Consider a household deciding whether to own a \$250,000 home.<sup>3</sup> Suppose the household purchases the home with a 20% down payment at a

---

<sup>2</sup>2018 American Community Survey

<sup>3</sup>This is near the 2017 average US home value.

5% mortgage interest rate and pays \$4,750 in annual property taxes. Assuming the household itemizes deductions regardless of housing tenure status and has a marginal income tax rate of 28%, the homeownership subsidy is \$4,130. Using the Zillow-estimated 2017 national price-to-rent ratio of 12.3, the expected annual rent for this home is \$20,325.<sup>4</sup> This translates into these deductions subsidizing 23% of the rental value of the home.

The TCJA changed numerous aspects of the personal income tax code related to homeownership subsidies. The TCJA directly altered the MID by lowering the maximum mortgage deductibility amount from \$1,000,000 to \$750,000. It also removed the tax deductibility of home equity lines of credit (HELOCs). The TCJA increased the standard deduction from \$6,500 to \$12,000 for single filers (\$13,000 to \$24,000 for joint filers), increasing the threshold required to benefit from itemization. The TCJA also imposed a \$10,000 limit on the combined state and local taxes (SALT), composed of income, sales, and property taxes.<sup>5</sup>

Other important TCJA changes included lowering marginal tax rates and changing tax brackets, eliminating the personal exemption, and raising the alternative minimum tax exemption. The TCJA mostly lowered marginal tax rates, particularly among lower and middle class households, while marginal tax rates on some higher-earning households increased slightly.<sup>6</sup> A comprehensive accounting of the TCJA tax changes is discussed by The Tax Foundation.<sup>7</sup>

When filing taxes, households have the option to either claim the sum of all tax deductions (itemization) or claim the standard deduction. If the sum of all deductions is greater than the standard deduction, households typically itemize. The mortgage interest and property tax deductions do not benefit homeowners unless the household itemizes its deductions. By raising the standard deduction and limiting SALT deductions, the TCJA lowers homeownership subsidies by

---

<sup>4</sup>Average 2017 price-to-rent ratio from Zillow data.

<sup>5</sup>Households can only claim either sales or state income tax deductions, not both.

<sup>6</sup>Refer to Appendix Figure A.1 for the change in tax rates by income and filer status.

<sup>7</sup><https://files.taxfoundation.org/20171220113959/TaxFoundation-SR241-TCJA-3.pdf>

reducing the likelihood a household will have sufficient deductions to itemize.

Quantifying the homeownership subsidy is a complicated non-linear function of marginal tax rates, deductions, and itemization. Consider two example single-filers before and after the TCJA illustrated in Figure 2. Household 1 has \$7,000 in combined mortgage interest and property tax deductions and \$2,000 in other itemizable deductions. In 2017, this household itemizes their deductions and receives a \$2,500 reduction in their taxable income through homeownership subsidies since they deduct \$9,000 from their gross income instead of taking the standard deduction of \$6,500 if they were to rent. The value of the homeownership subsidies is thus the marginal tax rate that only the additional \$2,500 income would have incurred. In 2018, after the TCJA, household 1 receives no homeownership subsidy because they will claim the standard deduction of \$12,000 regardless of their homeownership status.

Household 2 has greater mortgage interest and property tax deductions totaling \$9,000 with \$4,000 in other deductions. In 2017, these deductions are well above the standard deduction and results in a \$6,500 reduction in taxable income. In 2018, Household 2 still itemizes deductions, but the tax benefit declines to \$1,000. Because Household 2 itemizes in both years and has homeownership deductions greater than \$5,500, they have reached the maximum potential subsidy shock. Any further increase to either mortgage interest or property taxes will be included in both the 2017 and 2018 benefits. This illustrates why the TCJA homeownership subsidy shock is non-monotonic: The subsidy initially rises with income as households are more likely to itemize but peaks after deductions are large enough to require itemization in both periods. If other deductions rose above the TCJA standard deduction, the subsidy shock would be confined to SALT or maximum mortgage interest changes.

The ability to deduct both mortgage interest and property deductions greatly increases itemization rates. Half of homeowners itemized their deductions in 2017, while only 10% of renters itemized. Itemization varies by household type: higher



income households itemize more frequently because they have a greater income for deductible expenditures. Similarly, households in states with higher income or sales taxes, such as Maryland and New Jersey are more likely to itemize.

### 3 Methodology

To estimate the TCJA effect on homeownership and mortgage market outcomes, our empirical strategy has three steps:

- (1) Estimate a housing demand and property tax model.
- (2) Create a measure,  $TCJA$ , of the TCJA homeownership subsidy change for each household using estimates from (1) and tax simulations.
- (3) Estimate TCJA effects on homeownership and mortgage utilization using variation in  $TCJA$  by state and income.

#### 3.1 Housing Demand

The homeownership subsidy value varies with home values and property tax rates. Because we cannot observe counterfactual home purchases for renters, we predict housing demand using observable characteristics:

$$\theta_i = \beta_0 + \beta_1 X_i + \epsilon_i \tag{1}$$

where  $\theta_i$  is the home value or property tax rate (annual property taxes divided by home value) for household  $i$  (if an owner), and  $X_i$  is a set of demographic characteristics. We estimate Equation (1) separately for each state and marital status (single or married) to capture state-level variation in housing demand, prices, and property taxes.

To avoid incorporating any TCJA behavioral responses into our homeownership subsidy measure, we estimate Equation (1) using 2017 ACS data. We use estimates from Equation (1) to predict home values and property taxes for every household in our simulation sample if they were to become homeowners in every state.

Estimating Equation (1) on a sample of homeowners may bias estimates if unobserved characteristics of homeowners differ from renters. For example, conditional on observable characteristics, homeowners often have greater financial wealth or credit history than renters. This would result in an upward bias on our home value prediction for renters. Our identification strategy relies on comparing households of similar income levels in different states by exposure to the homeownership subsidy shock. Therefore, this selection bias will be mitigated unless it has a systematic correlation between these unobservables and factors that affect our homeownership subsidy (i.e. if selection on unobservables is greater in higher-tax states).

### 3.2 Measuring the Homeownership Subsidy

To construct our homeownership subsidy shock,  $TCJA$ , we first compute the homeownership subsidy as the tax burden difference of homeowners relative to renters. We then measure the homeownership subsidy shock as the difference between 2017 and 2018. Following Currie and Gruber (1996), we instrument for the actual homeownership subsidy with a subsidy measure that depends only on the state variation in taxes and price levels.

To create this instrument,  $\sigma_{ist}$ , we draw a sample of 250 households from each \$10,000 income bucket and marital status (single or married) in the 2017 American Community Survey (ACS) data. We then predict mortgage interest and property tax deductions for each household if they were to live in each state using estimates from Equation (1):

$$\hat{\theta}_i = \hat{\beta}_0 + \hat{\beta}_1 X_i + \hat{\epsilon}_i$$

Because the realized homeownership subsidy is a non-linear function of tax deductions, we match the observed home value distribution by drawing an  $\hat{\epsilon}_i$  for each observation from the error distribution estimated in Equation 1 within each marital status-state-income bucket. Not including this error draw would downward bias our subsidy estimates since the subsidy is bounded below by zero. For example, consider 100 simulations of a married household with an average home value of \$150,000. If all simulations assumed a home value of \$150,000, the expected mortgage interest would be \$6,000 per year and the household may never itemize. But if instead half the simulations predicted a home value of \$300,000 and the other half predicted a home value of \$0, the homeownership deductions for the higher home value would likely result in itemization and a positive realized homeownership subsidy in 2017 but not in 2018, while the lower home value simulation household would continue not to itemize in either period. Including the error draw helps simulations better capture the complex non-linearities of the effect of the homeownership subsidy measure.

Our combination of 250 households for each marital status-state-income bucket results in 1,275,000 observations. Using the NBER TAXSIM program, we simulate the tax liability for each observation for each of four tax scenarios based on housing tenure (Own/Rent) and tax year (2017/2018).<sup>8</sup> Each observation has its tax liability calculated in the four tenure-year states.<sup>9</sup> For our primary specification, we consider the combined federal and state income tax burden since many state income tax deductions incorporate federal deductions. We additionally use only federal tax burden as a robustness check during our analysis. To translate housing demand into mortgage interest, we assume each potential homeowner would have a mortgage balance at 80% of the expected home value and a 5% mortgage interest rate. By assuming an 80% loan-to-value ratio on the mortgage, our homeownership

---

<sup>8</sup>TAXSIM program, Feenberg and Coutts (1993) is available here: <https://www.nber.org/taxsim/>.

<sup>9</sup>For a limited number of higher-income buckets for singles, the full ACS sample did not include 250 observations. In these cases we randomly duplicated observations to achieve the 250 observations for the simulations.

subsidy measure represents the available subsidy to homeowners, since the option to pay 20% down at origination or to refinance at this level is available to most households and allows our instrument to abstract from mortgage balance behavioral responses to mortgage subsidy rates.

To compute expected property taxes we combine the expected home value with an expected property tax rate estimated in Equation (1). The TAXSIM program estimates state income tax and sales tax deductions. Other potential itemizable tax deductions, including charitable contributions and healthcare expenditures are unobserved in the ACS data. We assume each household spends 5% of their income on potential itemizable goods regardless of year or housing tenure. This assumes that expenditures on these other deductions are not affected by housing tenure status or by the TCJA.

The homeownership subsidy ( $\sigma_{ist}$ ) for each observation and year is the difference in tax liability ( $\tau_{ist}^j$ ) from being a homeowner ( $j = \text{Own}$ ) and a renter ( $j = \text{Rent}$ ) relative to the expected home value ( $\theta_{is}$ ):

$$\sigma_{ist} = \frac{\tau_{ist}^{\text{Own}} - \tau_{ist}^{\text{Rent}}}{\hat{\theta}_{is}}$$

To derive the homeownership subsidy,  $TCJA_{is}$ , we calculate the change in the expected homeownership subsidy between 2018 and 2017:

$$TCJA_{is} = \sigma_{is18} - \sigma_{is17}$$

To integrate our  $TCJA$  variable into the estimation sample, we take the average  $TCJA_{is}$  value with each marital status-state-income group  $g$ ,  $TCJA_g$ , where households are grouped by the nearest \$10,000 in household income.

### 3.3 Estimation

To measure the TCJA effects on housing outcomes we regress  $TCJA_g$  on homeownership, mortgage utilization, and mortgage interest rates using the following equation:

$$y_{ist} = \beta_0 + \beta_1 TCJA_g + \beta_2 Post_t + \beta_3 TCJA_g \times Post_t + \beta_4 X_{ist} + \beta_5 Z_{st} + \gamma_s + \alpha_t + \epsilon_{ist} \quad (2)$$

Where  $TCJA_g$  is our measure of the homeownership subsidy shock,  $Post_t$  is a dummy variable equal to one for years 2018 and later,  $X_{ist}$  is a set of household characteristics include income bin fixed effects,  $Z_{st}$  is a set of state-level macroeconomic variables, and  $\gamma_s$  and  $\alpha_t$  are state and year fixed-effects, respectively. The outcome variable,  $y_{ist}$ , is either a dummy variable equal to 1 for homeowners, a dummy variable equal to 1 for mortgage holders, or the mortgage interest rate. The coefficient of interest,  $\beta_3$ , represents the percentage change in outcome  $y_{ist}$  with respect to a one percentage change in the homeownership subsidy rate. Because homeownership and mortgages become cheaper as the homeownership subsidy increases, we expect  $\beta_3$  to be positive. Similarly, when estimating the TCJA effect on interest rates, we expect  $\beta_3$  to be positive if part of the subsidy is captured by lenders.

## 4 Data and Empirical Implementation

### 4.1 ACS Data

We utilize ACS data to both create our TCJA homeownership subsidy change measure and to estimate the effect of the TCJA on homeownership and mortgage utilization. With a cross-section of 3.5 million households surveyed each year, the ACS provides a large, rich dataset to study homeownership and mortgage

utilization. The ACS includes information on household demographics and consumption such as number of people in the household and their relation, race and ethnicity, marital status, citizenship status, education level, housing tenure, location, and income. Our sample period includes 2014 to 2019, and we restrict our estimation sample to household heads who are US citizens. We exclude extremely low (below \$5,000) and high (above \$500,000) income households. We additionally incorporate several macroeconomic variables into our analysis to control for changes in local economic conditions. These include the state unemployment rate from the US Department of Labor and state median income and population data from the US Census Bureau.

Table 1 displays summary statistics of our sample, split by above- and below-median income households and pre- versus post-TCJA time periods. All dollar values are inflation adjusted to 2017 dollars. Overall, homeownership rates increased by 0.4 percentage points following the TCJA among the below-median income group yet mortgages declined by one percentage point. Among higher-income households, homeownership declined by 0.5 percentage points while mortgage usage declined by 2.5 percentage points. Housing consumption, relative to income, declines with income. Below-median income households purchase homes worth six times their annual income compared to three times annual income for above-median income households.

Aside from reducing homeownership subsidies, other TCJA changes, such as lower marginal tax rates and brackets, generally reduced tax liabilities. To determine the TCJA income effect, independent of the homeownership subsidy shock, we compute the average change in tax liability for each marital status-state-income group,  $g$ , across the two housing tenure states, Own and Rent. We find both lower-income households average paying \$614 less tax, or 1.4%, while higher-income households reduced tax liability by \$2,639, or 1.95%.

Figure 3 displays the change in homeownership and mortgage rates by income level between 2017 and 2019. Relative to the year prior to TCJA enactment,

homeownership and mortgage rates both increased by around one percentage point for below-median income households. However changes in homeownership and particularly mortgage usage declined steadily as household income increased and the corresponding homeownership subsidies decreased. For households with incomes between \$300,000 and \$400,000, homeownership rates declined by one percentage point and mortgage rates declined by 3.5 percentage points.

## 4.2 Freddie Mac Data

To estimate the TCJA effect on mortgage interest rates, we utilize loan-level origination data from Freddie Mac. This dataset includes all fixed-rate mortgages purchased by Freddie Mac and includes borrower and mortgage origination characteristics, such as FICO score, loan-to-value ratio, debt-to-income ratio, number of borrowers, servicer, seller, origination channel, mortgage balance, mortgage interest rate, state, and origination month. Accounting for borrower and mortgage characteristics is important when estimating the TCJA effect on interest rates because variables such as credit quality and down payment amount affect interest rates and could be correlated with income or location over time. To analyze a consistent set of mortgages, we restrict our sample to first-lien, owner-occupied, purchase mortgages originated between 2014 and 2019. This results in a sample of 1,826,272 observations with an average mortgage rate of 4.3 percent.<sup>10</sup>

One important variable missing from the Freddie Mac data is borrower income. Borrower income is needed to pair the homeownership subsidy change,  $TCJA_g$ , to each borrower. To obtain a borrower income estimate, we use Home Mortgage Disclosure Act (HMDA) data on mortgage originations. Mortgage lenders are required to report details of all mortgage applications and originations for the HMDA data. HMDA data include mortgage purchaser (such as Freddie Mac), mortgage balance, state, number of borrowers, and borrower income.<sup>11</sup> After

---

<sup>10</sup>Summary statistics for the Freddie Mac data are available in Appendix Table A.1.

<sup>11</sup>Unfortunately, HMDA only began collecting interest rate data in 2018. This prevents us from

restricting the sample to owner-occupied, purchase mortgage originations sold to Freddie Mac, we calculate the average income within each mortgage balance-state-year cell (in \$10,000 increments). The average income for each group then linked to the Freddie Mac data based on the mortgage balance-state-year of each borrower.

### 4.3 Homeownership Subsidy

We construct a measure representing the expected homeownership subsidy rate for each household by simulating the change in tax liability depending on housing tenure and comparing it to the expected home value. The change in this homeownership subsidy rate from the TCJA incorporates numerous factors including marginal tax rates, home value, property taxes, and other itemizable deductions. To predict home values and property taxes, we estimate home Equation (1) separately by state and marital status while controlling for age, number of children, and a spline in income.<sup>12</sup>

The expected TCJA change to the homeownership subsidy is calculated using the NBER TAXSIM program as the change in difference in the tax liability for each household if they were a homeowner versus a renter. We assign  $TCJA_g$  to ACS observations based on state, marital status, and income group  $g$ . On average, the homeownership subsidy declined by 56% from \$2,677 in 2017 to \$1,171 in 2018. As shown in Table 1, below-median income homeowners only lost \$373 in tax benefits from the TCJA while above-median homeowners lost \$2,636. While these losses are small relative to the home value at 0.13% and 0.79%, respectively, because these benefits can be claimed for each year of homeownership, a comparison to the annual rental value of the home provides a better gauge of the magnitude. Using the national average price-to-rent ratio of 12.3, this suggests that the TCJA

---

using HMDA data to estimate the TCJA effects on interest rates.

<sup>12</sup>Estimates of predicted home value and property taxes by state are available in Appendix Figure A.2. Our income spline has knots at \$33,900, \$64,000, \$110,000, and \$200,000.



reduced the annual homeownership subsidy by a more substantial 1.6% and 9.7% respectively for below- and above-median income households. Incorporating the tax code complexity into our homeownership subsidy vastly changes our subsidy measure relative to alternative methods. For instance, among our simulated sample, only 27% of predicted mortgage interest and property tax payments would reduce tax liability.

Table 2 summarizes the TCJA variable by income levels and marital status. As expected, the TCJA has a minimal effect on the homeownership subsidy for lower-income households. However,  $TCJA_g$  increases sharply among higher-income households, peaking at 0.848% (\$100,000) and 1.220% (\$300,000), respectively, for singles and married couples. The  $TCJA_g$  variable declines slightly among households with incomes greater than \$300,000.

Figure 4 displays state-level  $TCJA_g$  estimates (black line) against the national average (grey line) by household income for married couples.<sup>13</sup> Little cross-state variation exists among lower-income households as 2017 itemization rates are universally low. The lower TCJA homeownership subsidy shock among states with high house price levels and high income tax rates including California, Hawaii, New York, and Washington, D.C., may be surprising, but as discussed earlier could be attributed to higher-income households in these states surpassing the maximum homeownership subsidy shock earlier.

## 5 Results

### 5.1 Homeownership and Mortgages

Table 3 displays the results of estimating the TCJA effect on homeownership using Equation (2). All columns include state and year fixed effects and control for

---

<sup>13</sup>The figure for singles is displayed in Appendix Figure A.3.

income group (\$10,000 increments). Robust standard errors are clustered by state. The simple specification in Column (1) finds that each percentage point decrease in homeownership subsidies from the TCJA reduced homeownership by 0.37 percentage points and is statistically significant at the 95% level. This coefficient declines slightly to 0.33 in Column (2) when macroeconomic controls are added and increases to 0.55 in Column (3) when demographic and household controls are included.

Because the TJCA altered several income tax rates and brackets, Column (4) of Table 3 includes the potential TCJA income effect. Controlling for the TCJA income shock captures any behavioral responses, such as increased homeownership or lowered mortgage demand, than may result from the TCJA broadly reducing tax liability. Incorporating the TCJA income shock does not have a statistically significant effect on homeownership and has only a minor effect on the TCJA homeownership subsidy coefficient at 0.54.

These findings suggest that homeownership decreased more among households more exposed to the TJCA homeownership subsidy shock. Though the negative homeownership subsidy effect on homeownership is modest in magnitude, two points are worth considering. First is that these estimates only reflect a short-term housing response to the TCJA. Given the large transaction costs of buying and selling homes, this subsidy shock is more likely to affect households already moving as opposed to inducing a transition away from homeownership. Further, given the long-term planning involved with homeownership decisions, tax policy expectations may reduce the expected cumulative subsidy benefits. Second, prior work including Hilber and Turner (2014), Hanson (2012b), and Sommer and Sullivan (2018) have rarely documented a positive relationship between homeownership subsidies and increased homeownership. While we are unable to measure the aggregate TCJA effects on homeownership due to the potential general equilibrium effects on house prices, the documenting of a positive and significant relationship between homeownership subsidies and homeownership at the household level is a noteworthy finding.

Estimates of Equation 2 on mortgage utilization are reported in Table 4. Across the four analogous specifications, the TCJA effect on mortgage usage is greater than the homeownership effect with coefficient estimates ranging between 0.67 and 0.87. All coefficients are statistically significant at the 95% confidence level or higher. While we may be concerned about unobserved variable bias in both Table 4 and Table 3 it is noteworthy that as household controls are added between Columns (2) and (3) our coefficient of interest increases. As discussed by Oster (2019), if we assume the relationship between observables and the outcome variable is similar to the relationship between unobservables and the outcome variable, then unobservables are unlikely to be driving our results. The larger TCJA effect on mortgages relative to homeownership could be because the mortgage interest deduction targets mortgages as opposed to homeownership. Mortgages may also be easier to adjust in the short run for households with enough financial resources to pay them off.

To test the robustness of our homeownership subsidy measure, Table 5 presents estimates of the TJCA effect on homeownership and mortgage utilization using two alternative measures of the homeownership subsidy. Column (1) presents the preferred specification estimates, Column (4) from Tables 3 and 4. Other columns use the same specification, including the TCJA income effect along with household macroeconomic controls, but vary the homeownership subsidy shock measure. Column (2) of Table 5 includes only federal income taxes, as opposed to the combined federal and state income tax burden. This change increases the homeownership and mortgage effect sizes slightly to 0.56 and 0.82 respectively. Columns (3) and (4) change the homeownership subsidy to only consider the mortgage interest deduction for combined state and federal and federal only taxes, respectively. That is, this measure calculates the change in the tax liability when a homeowner has a mortgage to when they have no mortgage. Using the MID-only subsidy has only a minor effect on the homeownership effect size while it increases the TCJA effect on mortgages from 0.80 to 0.88.

## 5.2 Mortgage Rates

One reason the TCJA effect on homeownership and mortgages may be muted is if part of the subsidy incidence is passed along to mortgage lenders. Figure 5 displays the monthly relationship between our TCJA effect,  $TCJA_g$ , relative to passage of the TCJA in December 2017 by modifying Equation (2) to allow for quarterly specific TCJA effects. This figure reveals a noticeable jump in the relationship between  $TCJA_g$  and mortgage rates directly following TCJA passage and is sustained through the second quarter of 2019. To formally test this theory, we estimate Equation (2) on mortgage interest rates using Freddie Mac data. Table 6 reports the average change in this effect as estimated by Equation (2). This TCJA effect on mortgage interest rates ranges between 5.6 and 7.4 and is statistically significant at the 99% confidence level. This suggests that for each percentage point decrease in the homeownership subsidy rate, mortgage rates decreased between 5.6 and 7.5 basis points and in turn implies that lenders capture between 5.6% and 7.5% of the homeownership subsidy. This estimate is similar, though smaller, in magnitude to the Hanson (2012a) estimate of 9% to 12% of the mortgage interest deduction captured by lenders.

## 6 Conclusion

The TCJA altered the US tax landscape and resulted in the greatest change to tax itemization and homeownership subsidies since the 1986 Tax Reform Act. Using detailed tax simulations to measure the shock to homeownership subsidies, we find that for each percentage point decline in homeownership subsidies, households significantly reduced their homeownership and mortgage usage by 0.54 and 0.76 percentage points respectively. While we find some of the subsidy incidence was captured by lenders through interest rates, most was borne by homeowners.

These findings have significant policy implications. While not fully repealed, the

TCJA greatly reduced mortgage interest and property tax deduction claims. Several recent congressional proposals have discussed repealing the \$10,000 TCJA state and local tax deduction cap. Removing this TCJA feature was a primary cause of the itemization reduction and removing the cap would increase itemization and homeownership subsidies. These benefits would largely be reaped by higher-income homeowners. Our estimates suggest that the homeownership subsidy reduction resulted in 316,000 fewer homeowners. Because this estimate ignores the equilibrium effect on home values it overstates the homeownership reduction. Even at this upper bound estimate, the tens of billions of increased tax revenue provided by reducing these subsidies greatly outweighs the \$410 million in increased homeownership externalities using the \$1,300 annual homeowner externality estimated by Coulson and Li (2013).

These findings build upon an expansive literature about the effects of homeownership subsidies on housing outcomes. While little prior research has found evidence of a positive homeownership response to homeownership subsidies, we find a moderate reduction in homeownership corresponding to a reduction in homeownership subsidies from the TCJA. We further find a stronger reduction in mortgage utilization, though this effect is partially negated by a lender response to decrease mortgage interest rates.

This does not contradict previous work such as Sommer and Sullivan (2018) or Chambers et al. (2009) since they incorporate an endogenous house price response to homeownership subsidies. While this study does not directly examine the TCJA effects on house price levels, future work exploring this issue is important to understand the aggregate TCJA effects on homeownership. Our study does verify, though, that at an individual level, households are responsive to homeownership tax incentives.

## References

- Aaronson, Daniel**, “A note on the benefits of homeownership,” *Journal of Urban Economics*, 2000, *47* (3), 356–369.
- Brady, Peter, Julie-Anne Cronin, and Scott Houser**, “Regional differences in the utilization of the mortgage interest deduction,” *Public Finance Review*, 2003, *31* (4), 327–366.
- Chambers, Matthew, Carlos Garriga, and Don E Schlagenhauf**, “Housing policy and the progressivity of income taxation,” *Journal of Monetary Economics*, 2009, *56* (8), 1116–1134.
- Coulson, N Edward and Herman Li**, “Measuring the external benefits of homeownership,” *Journal of Urban Economics*, 2013, *77*, 57–67.
- Currie, Janet and Jonathan Gruber**, “Saving babies: The efficacy and cost of recent changes in the Medicaid eligibility of pregnant women,” *Journal of political Economy*, 1996, *104* (6), 1263–1296.
- Davidoff, Thomas**, “Home equity commitment and long-term care insurance demand,” *Journal of Public Economics*, 2010, *94* (1-2), 44–49.
- DeFusco, Anthony A and Andrew Paciorek**, “The interest rate elasticity of mortgage demand: Evidence from bunching at the conforming loan limit,” *American Economic Journal: Economic Policy*, 2017, *9* (1), 210–40.
- Devereux, Michael P and Gauthier Lanot**, “Measuring tax incidence: an application to mortgage provision in the UK,” *Journal of Public Economics*, 2003, *87* (7-8), 1747–1778.
- Di, Zhu Xiao, Eric Belsky, and Xiaodong Liu**, “Do homeowners achieve more household wealth in the long run?,” *Journal of Housing Economics*, 2007, *16* (3-4), 274–290.

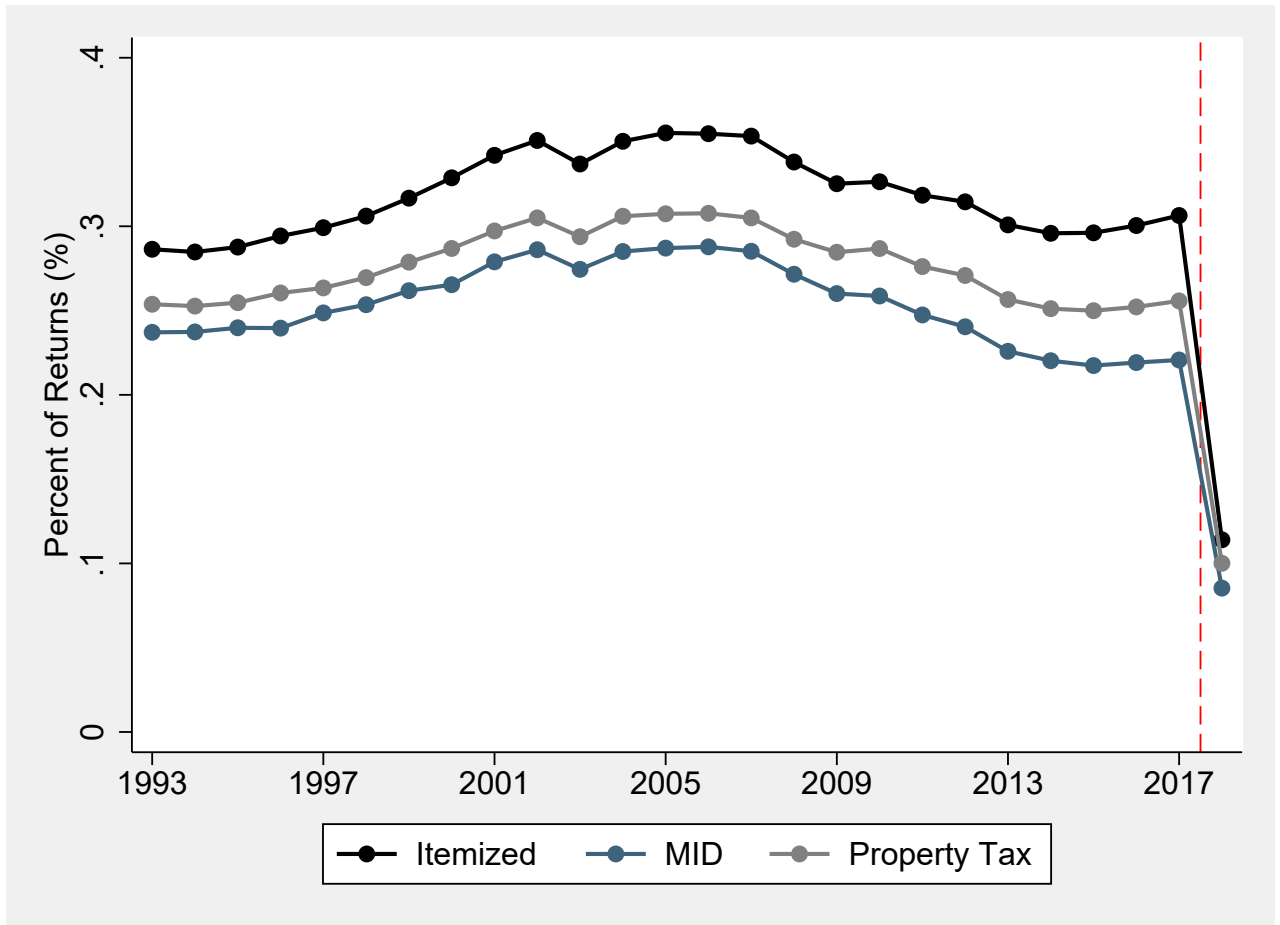
- DiPasquale, Denise and Edward L Glaeser**, “Incentives and social capital: Are homeowners better citizens?,” *Journal of urban Economics*, 1999, 45 (2), 354–384.
- Engelhardt, Gary V, Michael D Eriksen, William G Gale, and Gregory B Mills**, “What are the social benefits of homeownership? Experimental evidence for low-income households,” *Journal of urban Economics*, 2010, 67 (3), 249–258.
- Feenberg, Daniel Richard and Elizabeth Coutts**, “An Introduction to the TAXSIM Model,” *Journal of Policy Analysis and Management*, 1993, 12 (1), 189–194.
- Floetotto, Max, Michael Kirker, and Johannes Stroebe**, “Government intervention in the housing market: Who wins, who loses?,” *Journal of Monetary Economics*, 2016, 80, 106–123.
- Gabriel, Stuart A and Gary Painter**, “Mobility, residential location and the American dream: The intrametropolitan geography of minority homeownership,” *Real Estate Economics*, 2008, 36 (3), 499–531.
- Gervais, Martin**, “Housing taxation and capital accumulation,” *Journal of Monetary Economics*, 2002, 49 (7), 1461–1489.
- Gibbons, Stephen and Alan Manning**, “The incidence of UK housing benefit: Evidence from the 1990s reforms,” *Journal of Public Economics*, 2006, 90 (4-5), 799–822.
- Glaeser, Edward L and Jesse M Shapiro**, “The benefits of the home mortgage interest deduction,” *Tax policy and the economy*, 2003, 17, 37–82.
- Goodman, Laurie S and Christopher Mayer**, “Homeownership and the American dream,” *Journal of Economic Perspectives*, 2018, 32 (1), 31–58.
- Green, Richard K and Kerry D Vandell**, “Giving households credit: How changes in the US tax code could promote homeownership,” *Regional Science and Urban Economics*, 1999, 29 (4), 419–444.

- , **Michelle J White et al.**, “Measuring the benefits of homeownership: Effects on children,” *Journal of urban economics*, 1997, *41* (3), 441–461.
- Gyourko, Joseph and T. Sinai**, “The Spatial Distribution of Housing Related Ordinary Income Tax Benefits,” *Real Estate Economics*, 2003, *31*, 527–575.
- Hanson, Andrew**, “The incidence of the mortgage interest deduction: Evidence from the market for home purchase loans,” *Public Finance Review*, 2012, *40* (3), 339–359.
- , “Size of home, homeownership, and the mortgage interest deduction,” *Journal of Housing Economics*, 2012, *21* (3), 195–210.
- , “Taxes and Borrower Behavior: Evidence from the Mortgage Interest Deductibility Limit,” *Journal of Urban Economics*, 2020, p. 103256.
- Haurin, Donald R, Toby L Parcel, and R Jean Haurin**, “Does homeownership affect child outcomes?,” *Real Estate Economics*, 2002, *30* (4), 635–666.
- Hembre, Erik**, “An examination of the first-time homebuyer tax credit,” *Regional Science and Urban Economics*, 2018, *73*, 196–216.
- Hilber, Christian AL and Tracy M Turner**, “The mortgage interest deduction and its impact on homeownership decisions,” *Review of Economics and Statistics*, 2014, *96* (4), 618–637.
- Jiang, Boqian**, “Homeownership and voter turnout in us local elections,” *Journal of Housing Economics*, 2018, *41*, 168–183.
- Martin, Hal and Andrew Hanson**, “Metropolitan area home prices and the mortgage interest deduction: Estimates and simulations from policy change,” *Regional Science and Urban Economics*, 2016, *59*, 12–23.
- Oster, Emily**, “Unobservable selection and coefficient stability: Theory and evidence,” *Journal of Business & Economic Statistics*, 2019, *37* (2), 187–204.



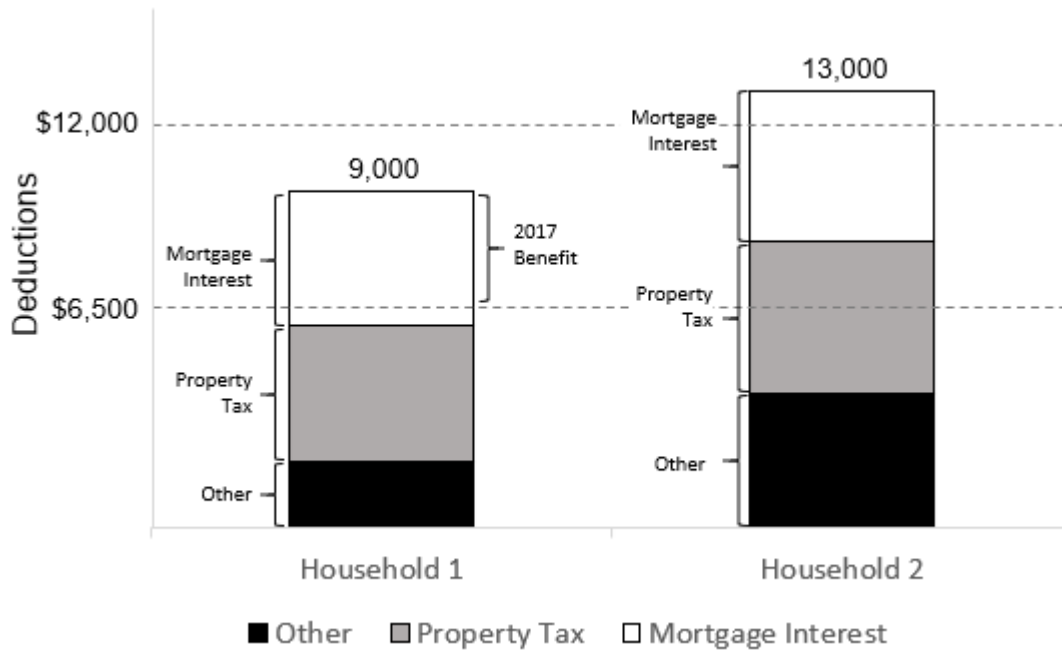
- Poterba, James and Todd Sinai**, “Tax expenditures for owner-occupied housing: Deductions for property taxes and mortgage interest and the exclusion of imputed rental income,” *American Economic Review*, 2008, *98* (2), 84–89.
- Poterba, James M**, “Tax subsidies to owner-occupied housing: an asset-market approach,” *The quarterly journal of economics*, 1984, *99* (4), 729–752.
- Sommer, Kamila and Paul Sullivan**, “Implications of US tax policy for house prices, rents, and homeownership,” *American Economic Review*, 2018, *108* (2), 241–74.
- Susin, Scott**, “Rent vouchers and the price of low-income housing,” *Journal of Public Economics*, 2002, *83* (1), 109–152.
- Ventry, Dennis J**, “The accidental deduction: A history and critique of the tax subsidy for mortgage interest,” *Law and Contemporary Problems*, 2010, *73* (1), 233–284.
- Wainer, Allison and Jeffrey Zabel**, “Homeownership and wealth accumulation for low-income households,” *Journal of Housing Economics*, 2020, *47*, 101624.

Figure 1: Itemization and Homeownership Subsidy Claiming Rates



**Source:** IRS Statistics of Income. This figure plots the percent of returns that itemize deductions (black), claim a mortgage interest deduction (grey) and claim a property tax deduction (blue).

Figure 2: Tax Deductions and Homeownership Subsidies Example



**Notes:** This figure displays two example single households and their tax deductions under the 2017 and 2018 tax regimes. The portion of the bar above \$6,500 reveals deductions above of the 2017 standard deduction and the portion of the bar above \$12,000 reveals deductions above the 2018 standard deduction.

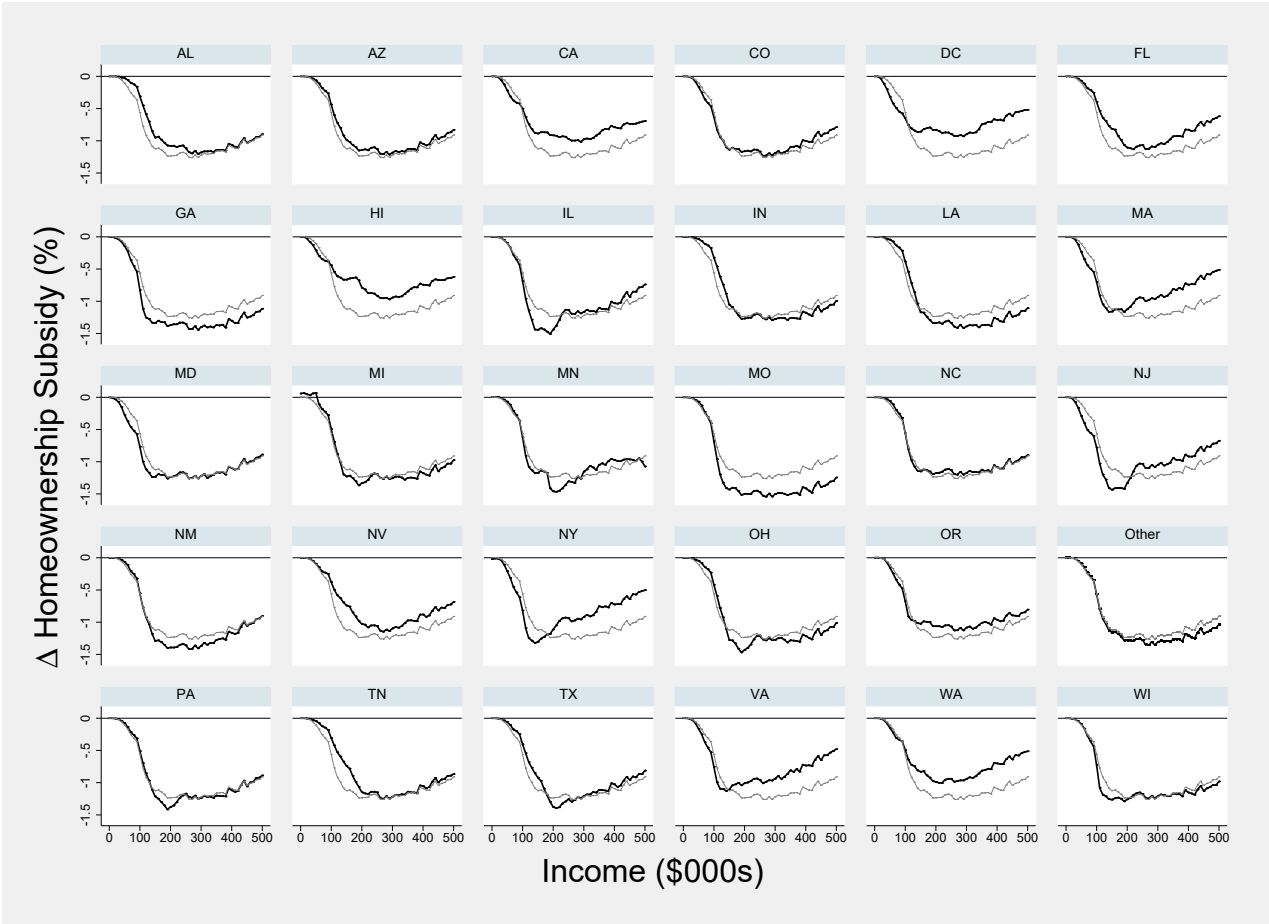
Figure 3: Change in Homeownership and Mortgages by Income, 2019-2017



**Source:** American Community Survey.

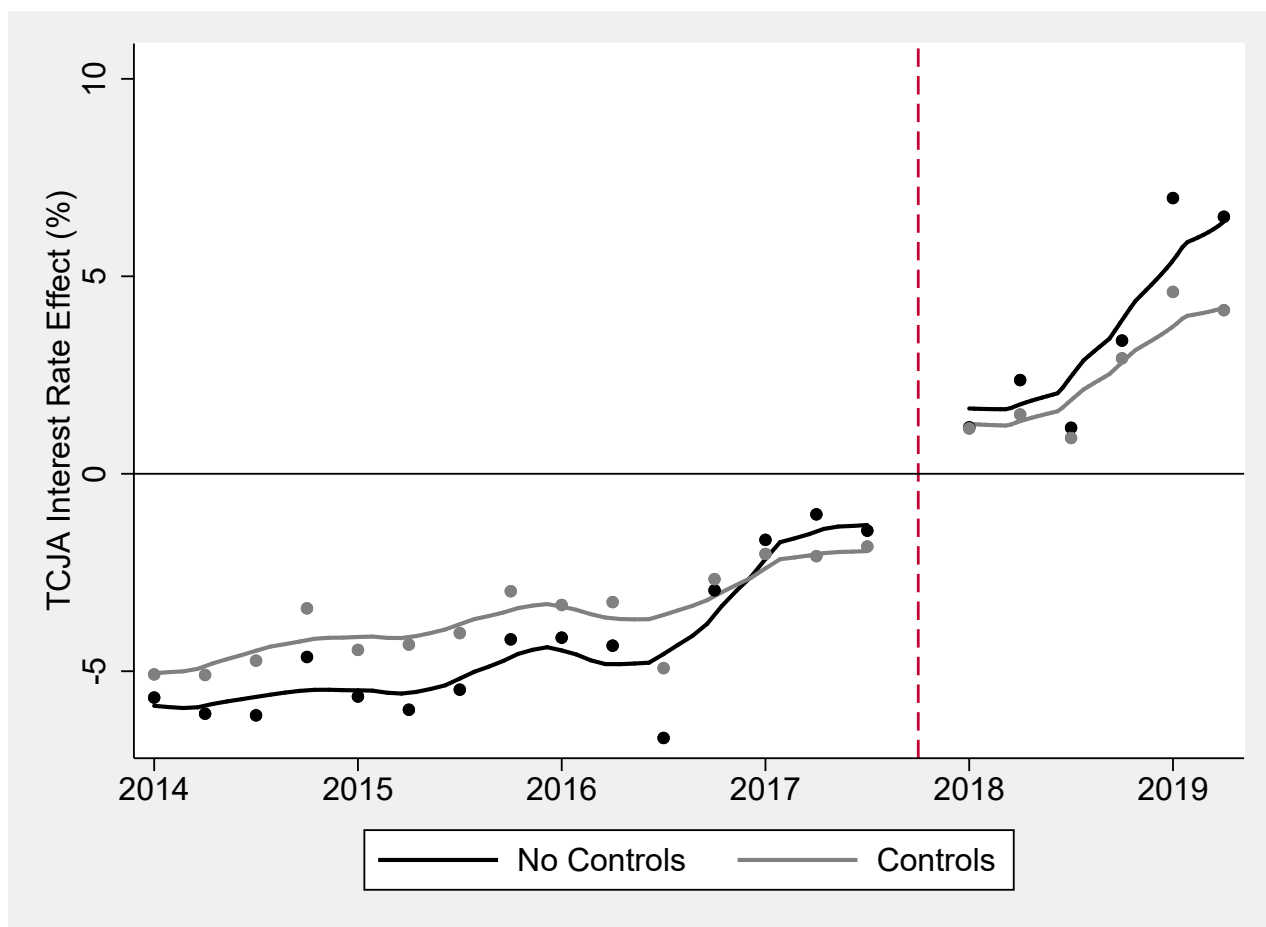
**Notes:** This figure displays the percentage change in homeownership and mortgages between 2019 and 2017 by household income.

Figure 4: TCJA Change in Homeownership Subsidy for Married Couples



**Source:** American Community Survey and NBER TAXSIM simulations.  
**Notes:** This figure shows the change in the homeownership subsidy between 2017 and 2018 by state and income for married couples. The grey line displays the national average and the black line displays the state homeownership subsidy changes. The homeownership subsidy in each year is calculated as the difference in tax liability for a household if they were to be a homeowner compared to a renter. Mortgage interest is based on 80% of predicted home value at a 5% interest rate. For simplicity, the least populous twenty-two states are averaged into the “Other” state.

Figure 5: TCJA Interest Rate Effect



**Source:** Freddie Mac loan-level origination data, 2014-2019.

**Notes:** This figure displays quarterly estimates of the TCJA homeownership subsidy shock on mortgage interest rates. All specifications include state and quarter fixed effects. Control variables include loan-to-value ratio, debt-to-income ratio, first-time homebuyer indicator, second lien indicator, number of borrowers, income, home value-to-income ratio, origination channel, and servicer and seller fixed effects.

Table 1: ACS Summary Statistics

	Below-Median		Above-Median	
	Pre-TCJA	Post-TCJA	Pre-TCJA	Post-TCJA
Homeowner	58.4 (49.3)	58.8 (49.2)	75 (43.3)	74.5 (43.6)
Mortgage	30.4 (46)	29.4 (45.6)	55.8 (49.7)	53.4 (49.9)
TCJA Homeowner Subsidy Shock (%)	-.11 (.115)	-.13 (.129)	-.732 (.33)	-.786 (.312)
TCJA Homeowner Subsidy Shock (\$)	-319 (384)	-373 (426)	-2,413 (1,794)	-2,636 (1,839)
TCJA Income Shock (%)	-1.33 (.487)	-1.4 (.504)	-1.95 (.673)	-1.95 (.721)
TCJA Income Shock (\$)	-543 (434)	-614 (491)	-2,444 (2,828)	-2,639 (2,992)
Home Value (predicted)	211,813 (94,792)	214,762 (95,349)	342,292 (196,107)	357,384 (205,329)
Income	35,368 (20,971)	38,163 (22,874)	119,968 (77,088)	129,965 (80,442)
Number of Children	.476 (.977)	.442 (.957)	.522 (.944)	.503 (.937)
Number of People	2.28 (1.37)	2.23 (1.35)	2.63 (1.44)	2.65 (1.46)
Hispanic	1.43 (2.39)	1.5 (2.58)	1.38 (2.3)	1.46 (2.51)
White	.771 (.42)	.758 (.429)	.819 (.385)	.803 (.397)
Black	.147 (.354)	.152 (.359)	.0975 (.297)	.0995 (.299)
Other Race	.0816 (.274)	.0905 (.287)	.0837 (.277)	.0972 (.296)
Married	.508 (.5)	.499 (.5)	.507 (.5)	.503 (.5)
< High School	.15 (.357)	.124 (.33)	.0388 (.193)	.0347 (.183)
High School	.332 (.471)	.321 (.467)	.18 (.384)	.166 (.372)
> High School	.518 (.5)	.555 (.497)	.781 (.413)	.8 (.4)
Observations	4,447,889	1,163,694	4,456,637	1,159,138

**Source:** American Community Survey.

**Notes:** TCJA homeowner subsidy shock is the simulated tax liability difference between 2018 and 2017 divided by predicted home value. TCJA income effect is the average simulated tax liability difference between 2018 and 2017 by housing tenure status (owner and renter). Pre-TCJA period is 2014-2017. Post-TCJA period is 2018 and 2019.

Table 2: TCJA Homeownership Subsidy Shock by Income and Marital Status

Income (\$)	Single			Married		
	Min	Mean	Max	Min	Mean	Max
0	-0.008	0.003	0.116	-0.020	0.003	0.103
10,000	-0.033	-0.010	0.106	-0.011	0.003	0.096
20,000	-0.132	-0.064	0.004	-0.034	-0.005	0.078
30,000	-0.279	-0.171	-0.082	-0.113	-0.022	0.031
40,000	-0.417	-0.283	-0.134	-0.199	-0.058	0.061
50,000	-0.650	-0.446	-0.238	-0.315	-0.105	0.065
60,000	-0.928	-0.623	-0.347	-0.421	-0.170	-0.054
70,000	-1.070	-0.717	-0.343	-0.508	-0.255	-0.099
80,000	-1.187	-0.792	-0.334	-0.555	-0.308	-0.122
90,000	-1.198	-0.794	-0.353	-0.611	-0.363	-0.154
100,000	-1.407	-0.848	-0.312	-1.351	-0.750	-0.286
150,000	-1.373	-0.820	-0.340	-1.649	-1.092	-0.501
200,000	-1.065	-0.583	-0.129	-1.712	-1.221	-0.630
250,000	-1.186	-0.611	-0.144	-1.634	-1.216	-0.870
300,000	-1.353	-0.725	-0.186	-1.625	-1.220	-0.871
350,000	-1.453	-0.825	-0.191	-1.609	-1.174	-0.706
400,000	-1.389	-0.676	0.011	-1.631	-1.114	-0.665
450,000	-2.182	-0.680	0.095	-1.545	-1.013	-0.548
500,000	-2.404	-0.645	0.172	-1.476	-0.938	-0.479

**Notes:** This table displays the distribution of the TCJA homeowner subsidy shock by income level and marital status. For incomes above \$100,000 averages are shown in \$50,000 increments. The homeownership subsidy each year is calculated as the difference in tax liability for a household if they were to be a homeowner compared to a renter divided by the expected home value. Mortgage interest is assumed to be as 80% of home value at a 5% interest rate.



Table 3: TCJA Effect on Homeownership

	(1)	(2)	(3)	(4)
TCJA Homeowner Subsidy Shock $\times$ Post	0.3695** (0.1544)	0.3310** (0.1390)	0.5536*** (0.1602)	0.5407** (0.2411)
TCJA Homeowner Subsidy Shock (%)	16.6582*** (3.8944)	16.6724*** (3.8906)	-2.0152* (1.1708)	-2.2181* (1.2033)
Unemployment Rate		0.0566 (0.1391)	-0.0127 (0.1250)	-0.0126 (0.1227)
Ln(Population)		8.0166 (4.9144)	9.4105** (4.5791)	9.5027** (4.4867)
Number of Children			-3.9685*** (0.3579)	-3.9641*** (0.3608)
Number of People			-0.5538** (0.2451)	-0.5556** (0.2462)
Hispanic			-0.5662*** (0.1162)	-0.5666*** (0.1163)
Black			-18.6193*** (0.6532)	-18.6156*** (0.6522)
Other Race			-8.5628*** (1.5147)	-8.5610*** (1.5137)
High School			1.6542** (0.7181)	1.6568** (0.7171)
> High School			-0.0558 (0.6980)	-0.0506 (0.6951)
TCJA Income Shock				.2356 (.3658)
TCJA Income Shock $\times$ Post				.0187 (.1468)
Constant	48.2882*** (3.2017)	-74.7978 (74.7411)	-89.6125 (69.6180)	-96.4358 (68.6492)
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Controls	No	No	Yes	Yes
N	6,815,633	6,815,633	6,815,633	6,815,633
r2	0.13	0.13	0.19	0.19

\* p<0.10, \*\* p<0.05, \*\*\* p<0.010

Source: American Community Survey.

Table 4: TCJA Effect on Mortgages

	(1)	(2)	(3)	(4)
TCJA Homeowner Subsidy Shock $\times$ Post	0.6875*** (0.1830)	0.6736*** (0.1772)	0.8746*** (0.1971)	0.7606** (0.2999)
TCJA Homeowner Subsidy Shock (%)	5.6159** (2.7412)	5.6220** (2.7386)	-6.0238*** (1.1545)	-4.0373*** (1.1286)
Unemployment Rate		0.2170* (0.1264)	0.1238 (0.1061)	0.1287 (0.1062)
Ln(Population)		4.9784 (4.1383)	5.8786* (3.4401)	5.9134* (3.4279)
Number of Children			2.7847*** (0.4478)	2.7463*** (0.4474)
Number of People			0.9271*** (0.1814)	0.9456*** (0.1818)
Hispanic			-0.0612 (0.0505)	-0.0595 (0.0505)
Black			-5.3108*** (0.6149)	-5.3428*** (0.6171)
Other Race			-3.7910*** (0.8643)	-3.7992*** (0.8674)
High School			3.8400*** (0.3259)	3.7943*** (0.3301)
> High School			7.8226*** (0.3880)	7.7468*** (0.3885)
TCJA Income Shock				-2.3241*** (.2929)
TCJA Income Shock $\times$ Post				.1385 (.1645)
Constant	21.8046*** (1.8832)	-56.5469 (63.4714)	-77.8668 (52.6772)	-84.9338 (52.6979)
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Controls	No	No	Yes	Yes
N	6,815,633	6,815,633	6,815,633	6,815,633
r2	0.14	0.14	0.17	0.17

\* p<0.10, \*\* p<0.05, \*\*\* p<0.010

Source: American Community Survey.

Table 5: TCJA Robustness

	MID+Prop Tax		MID Only	
	(1)	(2)	(3)	(4)
	Fed+St	Fed	Fed+St	Fed
Homeownership	0.5407** (0.2411)	0.5641** (0.2302)	0.5243* (0.3124)	0.5615* (0.3082)
Mortgage	0.7606** (0.2999)	0.8204*** (0.3038)	0.7966* (0.4175)	0.8843** (0.4398)
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
obs	6,815,633	6,815,633	6,815,633	6,815,633

\* p<0.10, \*\* p<0.05, \*\*\* p<0.010

**Source:** American Community Survey.

Table 6: TJCA Interest Rate Effect

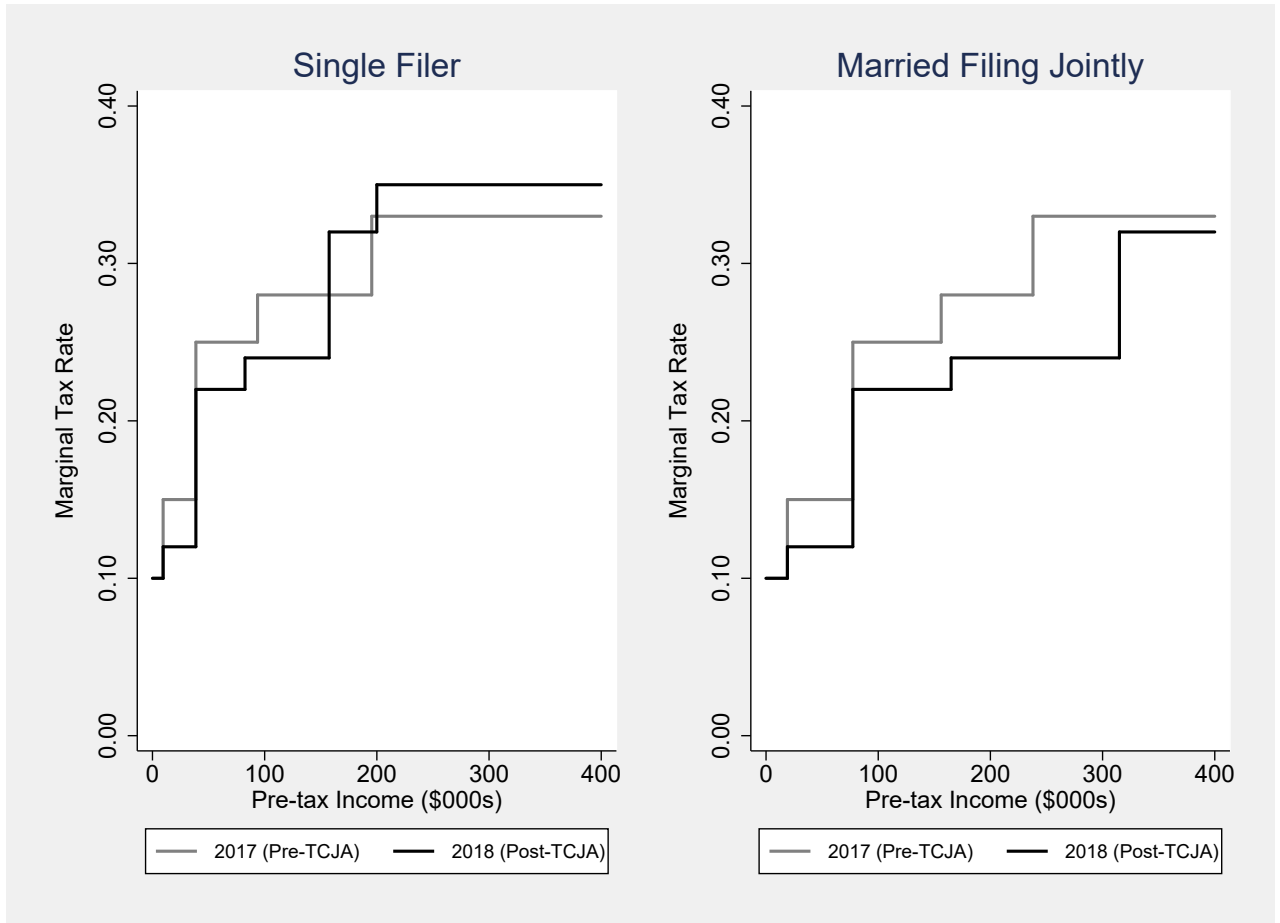
	(1)	(2)	(3)	(4)
TCJA Homeowner Subsidy Shock $\times$ Post	7.4176*** (0.8694)	5.7627*** (0.7868)	5.7627*** (0.7868)	5.6135*** (0.7093)
TCJA Homeowner Subsidy Shock	6.3343*** (0.6333)	1.9172*** (0.6864)	1.9172*** (0.6864)	1.9249** (0.7377)
Unemployment Rate		-0.0004 (0.0051)	-0.0004 (0.0051)	-0.0015 (0.0060)
Ln(Population)		0.1769 (0.1882)	0.1769 (0.1882)	0.1233 (0.1818)
Median Income		-0.0000 (0.0000)	-0.0000 (0.0000)	-0.0000 (0.0000)
LTV		0.0050*** (0.0014)	0.0050*** (0.0014)	0.0050*** (0.0014)
Combined LTV		-0.0039*** (0.0013)	-0.0039*** (0.0013)	-0.0039*** (0.0013)
FICO		-0.0025*** (0.0000)	-0.0025*** (0.0000)	-0.0025*** (0.0000)
Debt-to-Income Ratio		0.0013*** (0.0001)	0.0013*** (0.0001)	0.0013*** (0.0001)
First-time Homebuyer		-0.0072*** (0.0023)	-0.0072*** (0.0023)	-0.0072*** (0.0023)
LTV $\geq$ 90		-0.0091* (0.0053)	-0.0091* (0.0053)	-0.0091* (0.0054)
LTV $\geq$ 95		0.0285*** (0.0033)	0.0285*** (0.0033)	0.0286*** (0.0033)
LTV $\geq$ 97		0.0527*** (0.0147)	0.0527*** (0.0147)	0.0518*** (0.0144)
Has 2nd Lien		0.1997*** (0.0332)	0.1997*** (0.0332)	0.1995*** (0.0331)
Number Borrowers		-0.0188*** (0.0023)	-0.0188*** (0.0023)	-0.0186*** (0.0024)
Income		-0.0003*** (0.0001)	-0.0003*** (0.0001)	-0.0003*** (0.0001)
TCJA Income Shock $\times$ Post				-1.7474*** (0.5632)
TCJA Income Shock				0.6683 (0.4389)
Constant	4.5847*** (0.95048)	4.2062* (2.5011)	4.2062* (2.5011)	4.9293** (2.4045)
Date FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
obs	1,826,272	1,826,272	1,826,272	1,826,272
r2	0.6099	0.7136	0.7136	0.7137

\* p&lt;0.10, \*\* p&lt;0.05, \*\*\* p&lt;0.010

**Note:** Freddie Mac mortgage origination data, 2014-2019.

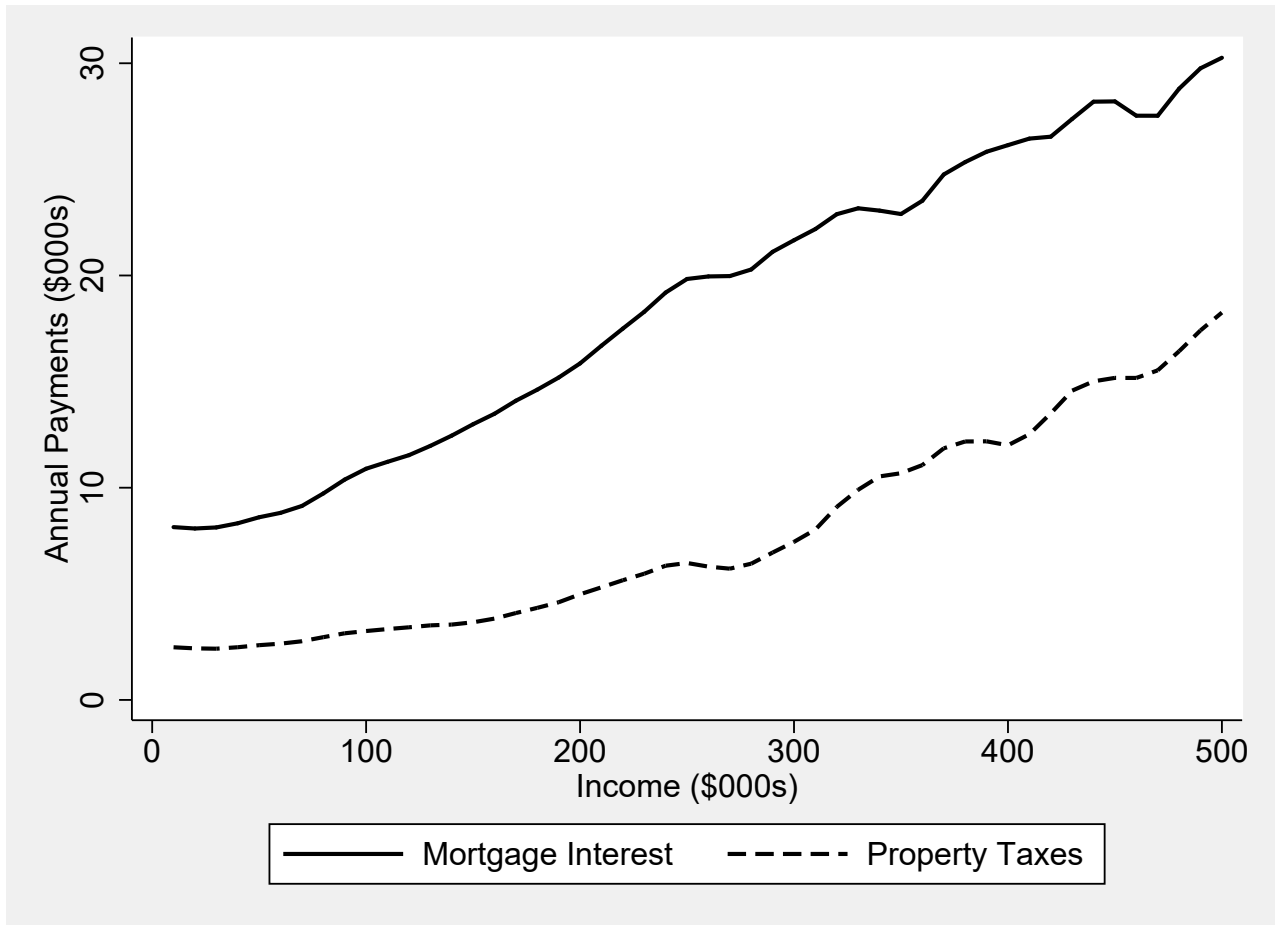
# Appendix

Figure A.1: Marginal Income Tax Rates, 2017 and 2018



**Notes:** This figure displays income tax liability as a function of taxable income, marital status, and filing year.

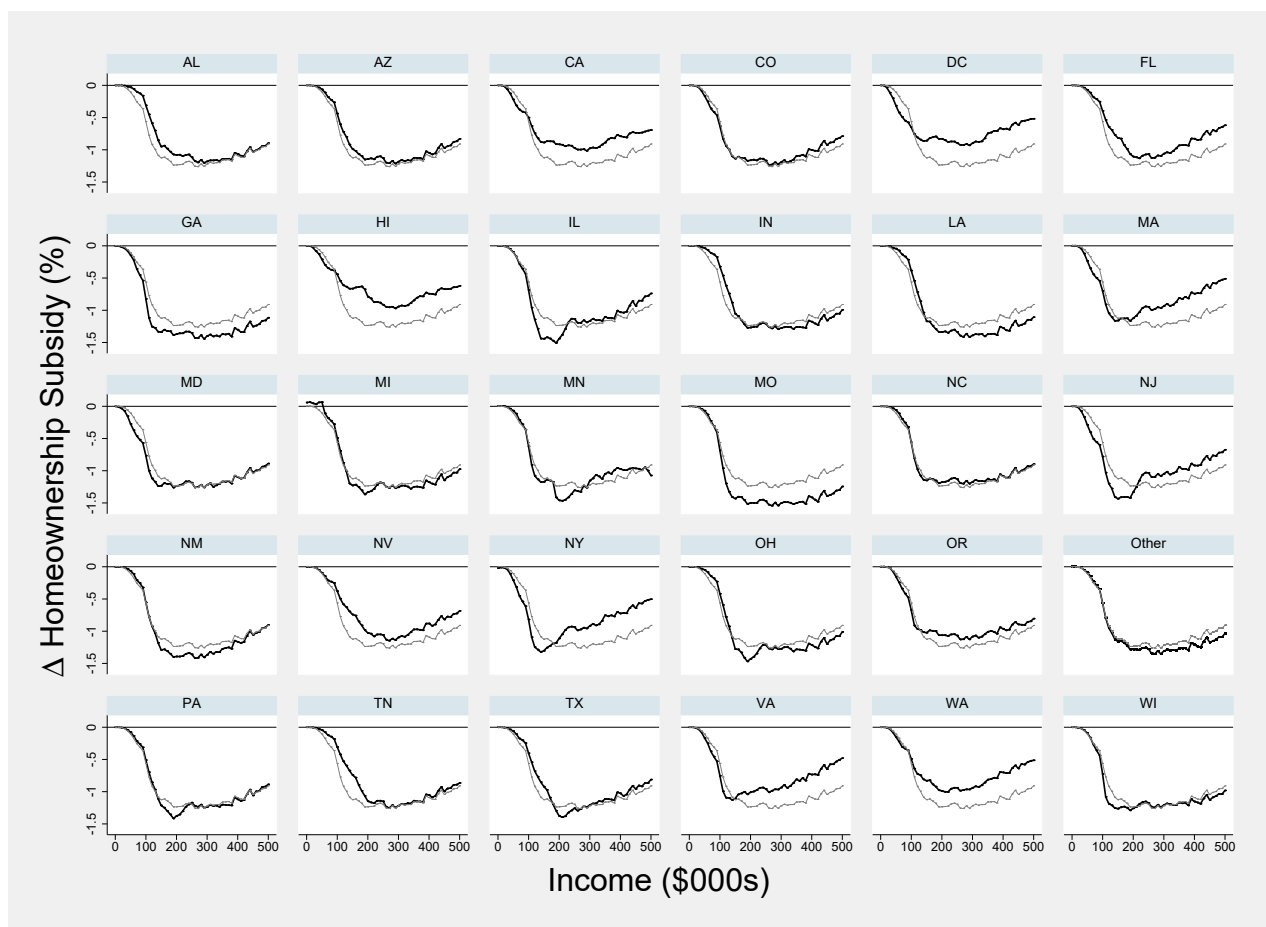
Figure A.2: Predicted Mortgage Interest and Property Taxes by Income



**Source:** American Community Survey.

**Notes:** This figure displays estimates of mortgage interest and property taxes based on Equation (1). Mortgage interest assumes a mortgage balance of 80% of predicted home value and an interest rate of 5%.

Figure A.3: TCJA Change in Homeownership Subsidy for Singles



**Source:** Based on American Community Survey data and NBER TAXSIM simulations.

**Notes:** This figure shows the change in the homeownership subsidy between 2017 and 2018 by state and income level for singles. The grey line displays the national average and the black line displays the state homeownership subsidy changes. The homeownership subsidy in each year is calculated as the difference in tax liability for a household if they were to be a homeowner compared to a renter. Mortgage interest is based on 80% of predicted home value in state for income level at 5% interest. For simplicity, the least populous twenty-two states are averaged into the “Other” state.

Table A.1: Freddie Mac Summary Statistics

	Below Median		Above Median	
	Pre-TCJA	Post-TCJA	Pre-TCJA	Post-TCJA
Interest Rate	4.15 (.36)	4.75 (.4)	4.13 (.351)	4.66 (.396)
TCJA Homeowner Subsidy Shock	-.0182 (.00287)	-.0185 (.00289)	-.0183 (.0049)	-.0186 (.00519)
Income	69.4 (10.7)	70.9 (13.3)	112 (40.7)	109 (45.6)
FICO score	738 (47.1)	736 (46.9)	749 (42.9)	748 (42.9)
Debt-to-Income Ratio	32.3 (9.63)	33.9 (9.63)	35 (8.78)	36.6 (8.87)
First-time Homebuyer	.428 (.495)	.488 (.5)	.428 (.495)	.498 (.5)
LTV	81.6 (15.7)	82.2 (16.2)	84.5 (11.9)	85.3 (12.4)
CLTV	81.8 (15.6)	82.3 (16.2)	84.9 (11.6)	85.5 (12.3)
LTV <sub><math>\hat{c}</math>=90</sub>	.439 (.496)	.473 (.499)	.487 (.5)	.528 (.499)
LTV <sub><math>\hat{c}</math>=95</sub>	.327 (.469)	.36 (.48)	.339 (.473)	.384 (.486)
LTV <sub><math>\hat{c}</math>=97</sub>	.0261 (.159)	.0965 (.295)	.0288 (.167)	.113 (.317)
Has Second Lien	.00934 (.0962)	.0141 (.118)	.0291 (.168)	.0204 (.141)
Number Borrowers	1.99 (.0993)	1.97 (.182)	1.42 (.494)	1.34 (.475)
Broker	.0689 (.253)	.0768 (.266)	.103 (.304)	.125 (.33)
Retail	.579 (.494)	.57 (.495)	.513 (.5)	.492 (.5)
Correspondent	.352 (.477)	.354 (.478)	.384 (.486)	.384 (.486)
Home Value to Income Ratio	2,554 (985)	2,814 (1,142)	2,815 (873)	2,923 (987)
Observations	163,486	105,886	1,077,842	479,058

**Source:** Freddie Mac mortgage origination data, 2014-2019.