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Department of Economics

Working Paper

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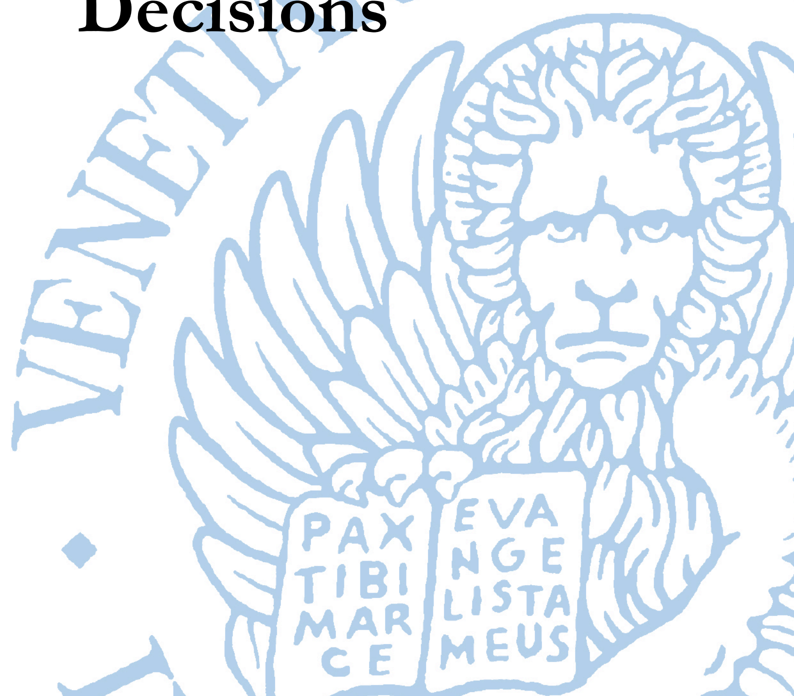
Implications of Fiscal Policy for Housing Tenure Decisions

ISSN: 1827-3580
No. 11/WP/2016



Electronic copy available at: http://ssrn.com/abstract=2763174

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Keywords
fiscal policy, tenure choice, mortgage interest deduction, income tax, homeownership

JEL Codes
E62, G11, H24, H31, K34

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Implications of Fiscal Policy for Housing Tenure Decisions [*]

Anastasia Girshina [†]

April 11, 2016

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[*]I am infinitely grateful to my supervisors Mario Padula and Giacomo Pasini for their constant guidance and timely advice. I thank Christos Koulovatianos for making my stay at the University of Luxembourg possible and for his insightful comments. For their discussions I am grateful to Stefano Fiorin, Katherine Hunt, Jian Li, Marina Pavan, Lavinia Piemontese, Eva Sierminska, Valentina Tonei. I also thank Sumit Agarwal, Rob Alessie, Mariela Dal Borgo, Hector Calvo Pardo, Gordon B. Dahl, Benjamin R. Everett, Daniel Feenberg, Will Fischer, Michael Haliassos, Mark P. Keightley, Donald Morris, Nathanael Vellekoop, Alan Viard and participants of RES and ARES meetings for their advice. I am grateful to all the department CREA of the University of Luxembourg for their hospitality. I thank the Department of Economics of the Ca' Foscari University of Venice for financial support.

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Introduction

Many of the world's wealthy countries provide fiscal incentives to homeowners. However, the impact of such tax breaks on housing tenure decision is unclear. Many existing policies, aimed at promoting house purchases and widely used among taxpayers, have proved to be both expensive[1] and not targeted, thus creating controversy about their overall effect. This paper aims to shed light on the effectiveness of such fiscal incentives by providing empirical evidences on their impact on housing tenure decisions. Specifically, this work focuses on the effect of mortgage interest deduction (MID) on home-ownership in the United States.

To build understanding on how housing tenure decision is affected by fiscal policy is important for several reasons. Firstly, housing wealth is arguably one of the most basic needs for many families in developed countries. It is the main asset, while the associated mortgage is the main liability for many households. Housing determines families' economic well being by affecting their consumption (Sierminska and Takhtamanova, 2012; Li and Yao, 2007; Bostic et al., 2009), and serving as a mean of saving (Yao and H.H.Zhang, 2005) and a collateral (Cooper, 2013). It has also been shown that owning a house contributes to the psychological well being by providing families with a sense of security (McCarthy et al., 2001) and enhancing life satisfaction (Rohe et al., 2013). Despite the importance of the investment in housing wealth, there is no consensus on how homeownership should be supported. Both design and intensity of fiscal incentives available to homeowners vary substantially among countries. Moreover, existing empirical evidences and theoretical predictions of whether housing related tax breaks have any effect on homeownership, and if yes, what is their impact, are mixed. The aim of the proposed study, thus, is to address this issue by identifying the effect of the MID on the decision to own a house.

To answer this question, the panel survey data from PSID for the period 2001 to 2011 is used. To identify the effect of MID on the home ownership, this paper analyses two channels through which MID affects user cost of housing: first, changes in personal state income tax rates; second, changes in the standard deduction allowed at the state level. Variation in these fiscal policy parameters allows for the identification of the causal effect of MID on home ownership for several reasons. Firstly, in presence of MID, higher marginal tax rates lead to higher tax savings from housing, other things been equal. Thus, since mortgage interest payments are deducted from taxable income, the higher is the marginal tax rate household faces, the higher are its tax savings and the lower is the user cost of housing. Secondly, lower standard deduction increases a fraction of households that qualify for this program. This is because MID is an itemized deduction and, thus, can be filed for only in case overall amount of itemised deductions exceeds the standard deduction. Therefore, increase in the amount of standard deduction at the state level implies that less homeowners could qualify for mortgage interest deduction, and vice versa, the lower is the standard deduction, the higher is the proportion of itemisers. Finally, each state is free to decide whether to impose state income tax and allow for mortgage interest deduction. Both state-level standard deductions and personal income tax rates are set independently by each state and were revised several times during the analysed period. Although the time of announcement varies from state to state, Internal Revenue Service announces tax rates, tax brackets and standard deduction in the provision normally published in the end of the year preceding the fiscal year in question. Given very short announcement period, this fact creates a quasi-experimental set up allowing for difference-in-differences estimation strategy. Therefore this study identifies the effect of

[1] According to *The Economist*, in 2013 tax revenues forfeited because of mortgage interest deductibility amounted 0.6% of GDP (The Economist, 2015).

MID on housing tenure decision by exploiting variation in state marginal tax rates and standard deduction.

The identification of the effect of MID on home-ownership proposed in this paper relies on large changes in fiscal policy. The largest of these changes led to an increase in income tax rate by as much as 23,9% and to a decrease in the standard deduction by 7,2% between 2002 and 2004.

The estimates suggest that increases in income tax rates in a state that allows mortgage interest deduction is associated to a 3 percentage point increase in home-ownership relative to states that didn't change their fiscal policy. Furthermore, in states where more households were able to qualify for MID because of the lower standard deduction, home-ownership increased by 4 percentage points relative to control states.

Thus, this study suggests that MID has a positive effect on home-ownership decisions and that increase in fiscal incentives to homeowners resulting in greater tax savings related to housing have positive impact on housing ownership decision. The results are robust to a range of alternative specifications and have wide ranging policy implications.

This paper proceeds as follows. Section 1 reviews the US law related to mortgage interest deduction and summarises main previous research findings. Section 2 discusses theoretical framework and strategy for estimating the effect of mortgage interest deduction on homeownership decision. Section 3 discusses data and sample selection. Results are discussed in the Section 4 and robustness analysis in Section 5. Section 6 concludes.

1 U.S. Fiscal Policy and Homeownership Incentives

Currently, when a household decides to finance the purchase of its first or second residence with the mortgage, it can benefit from fiscal incentives by reducing its taxable income by the amount of paid interests. This deduction applies to the interests paid on the first and/or second mortgages used for buying, building or improving the house and to any other home equity debt. The interest payments that can be deducted are those paid on the first $1 million of a total mortgage debt and the first $100,000 of home equity debt (or $500,000 and $50,000 respectively if married and filed separately). [2] Any household can file for mortgage interest deduction within the set limits as long as its total amount of itemised deductions exceeds the level set by the standard deduction. [3]

The use of mortgage interest deduction is widespread among the US taxpayers, although the amount claimed vary from state to state. For example, in California mortgage interest payments claimed per filer are the highest among the US states [4]. In the year 2000 this amount was $ 13, 247 and grew up to $ 15,756 over the decade. It peaked around 2006-2008 reaching $ 19k of mortgage interests paid per claimant, which translates into $ 4,750 of tax savings for an individual in a 25% tax bracket. Although in the state with the lowest mortgage interests claimed per filer, namely in Oklahoma, its amount is roughly half of that in California, it was still ranging around as high as $7,000 between 2000 and 2010. The general tendency across all the states was that mortgage interests paid per filer reached maximum levels between 2006 and 2008 and decreased afterwards possibly due to the fact that some household moved to the rental dwelling. Proportion of filers who claimed mortgage interest deduction, however, remained quite constant overtime, ranging from around 37% in the state with the highest incidence, namely Maryland, to 15% in West Virginia and North Dakota as of the year 2010.

[2] Federal limits are set by IRS Publication 936.
[3] Otherwise household can file for the standard deduction.
[4] Further details can be found in Appendix.

According to the US tax law, households can potentially benefit from mortgage interest deduction (MID) filing for both federal and state tax purposes. Although federal rules apply to all the of taxpayers in the US, states have a great degree of autonomy when deciding on their fiscal policy and not all of them allow MID for state income taxation purposes. In particular, households can deduct mortgage interest payments in 32 states out of 51 (including District of Columbia). Out of remaining 19 states which do not allow MID, 12 states impose income tax while 7 states have no income tax levied. The intensity of taxation also varies greatly among the US states. District of Columbia and Rhode Island, for example, are the states that were charging the highest average tax rates, of more than 7%, in the beginning of 2000's while in Pennsylvania the flat rate was as low as 2,8% during the same period. Next, not only income tax rates vary greatly across states and within state across time, but also standard deduction allowed at state level is different for many states. Some of the states closely follow federal rules in setting standard deduction, which means indexing its level by inflation. Others, however, follow their own policy track in setting this amount. The highest level of standard deduction, for example, is allowed by the state of New York where it didn't change for single or separately filing individuals during the 2000's. Finally, most of the states adjust their fiscal policy frequently and, thus, many of them modified at least some of the parameters associated to income taxation during the observed period by varying tax rates, or tax brackets, or both.
Hence, the US tax code in part that is related to individual income taxation is a complex system which changes frequently over time and varies largely across states. This fact creates an insightful set up for analysing effects of fiscal policy, and in particular, of mortgage interest deduction, on housing tenure decisions.

1.1 Controversy about mortgage interest deduction

The original aim of mortgage interest deduction (MID) is to promote homeownership and to support housing demand but there is no agreement on the effectiveness of its design to reach this goal. On the one hand, this policy is widely accessible and used, and provides generous tax deductions. In the US, more than 25% of tax filers and more than 48% of homeowners claimed MID in 2011 with the average refund of $1,906 per claimant (see Keightley, 2014). The fact that not all of the homeowners can benefit from the mortgage interest deduction is because of the eligibility criteria: to benefit from MID total amount of itemised deduction must exceed standard deduction level. On the other hand, MID is frequently blamed for targeting families who are less in need of a support. The controversy about the implementation of the policy that supports housing demand in the form of tax deduction is twofold. First, as documented in Morris and Wang (2012), MID has an undesired redistributive effect due to the progressivity of tax system. In particular, since the refund obtained increases with income, because of the fact that taxation is progressive, wealthier households are those who benefit the most from the policy. Secondly, the refund increases with the mortgage taken out and, thus, with the value of the house purchased. The consequence of these two features of the fiscal incentive design is illustrated in Poterba and Sinai (2008): the average tax savings from mortgage interest deduction were almost $ 5,500 for the wealthiest taxpayers, while less the $100 for those in the bottom of the income distribution as of the year 2004. Hence, given the fact that tax refund increases with income and with the value of the house, that income profile, in its turn, increases with age, and that MID does not address the down payment requirement, this policy does not provide a substantial support to young families planning to become first time home-owners, while offers significant benefits to the families that would purchase a house without any subsidy. These facts create ambiguity about the

overall effect of such a policy.

1.2 Previous Research

The relation between the US tax code and homeownership rates is a vivid argument of both popular and academic discussions. Most non-academic literature emphasises ineffectiveness of preferential taxation of homeowners to reach its original goal to support homeownership due to the fact that it does not address downpayment and favours mostly the wealthiest households (e.g., Keightley, 2014). However, there is no such a consensus among scholars.

Indeed, conclusions of the academic literature that studies the impact of taxation on the evolution of homeownership rates are mixed. Moreover, there are only few attempts to analyse empirical evidences, despite the existence of extensive and well developed theoretical works. A body of research that establishes the link between mortgage-related tax breaks and housing tenure decisions was originated in seminal works of Rosen (1979) and Rosen and Rosen (1980). They find that differences in the relative prices of renting and owning the residence determines the choice between the two and that higher net price of housing services generated by an owner-occupied dwelling may discourage homeownership. Federal tax system, according to these works, drives this difference by subsidizing owner-occupied housing and, therefore, have important impacts on the percentage of home owning households. Rosen and Rosen (1980) further investigate the effect of the provisions of the federal personal income tax and explain nearly a quarter of the growth in the proportion of homeowners in the post-World War II period by the tax system's favourable treatment of owner-occupied housing.

Researchers have examined several channels through which preferential housing taxation affects tenure choice. Dìaz and Luengo-Prado (2008) analysed the life cycle model of housing demand and showed that both the fact that owner-occupied housing services are not taxed and that mortgage interest payments are deductible have a substantial effect on the difference between user cost of housing and its rental price. They further noticed that the effect of the former is greater and that the main determinant of this spread is income tax rate. Study by Poterba (1984) investigates the effect of favourable taxation on the user cost of homeownership in presence of rising inflation. Author finds that persistent high inflation rates along with tax deductibility of mortgage interest payments make homeownership more attractive and may, therefore, explain housing investment. The reason for this is that inflation both increases the homeowner's interest charges, by pushing up nominal interest rates, and leads to larger nominal capital gains on houses. However, nominal mortgage interest payments are tax deductible and the capital gains from house appreciation are untaxed. Therefore, increase in the rate of expected inflation along with such a taxation raises tax subsidy to owner occupation and, thus, reduces user cost of housing and favours ownership. Gervais (2002) studies wedge between return on housing capital and that on business capital by employing dynamic general equilibrium life-cycle model. He finds that this spread is generated by the failure to tax imputed rents and is amplified by mortgage interest deductibility. He finds two effects of the elimination of the latter: first, it would increase the user cost, and therefore, if house prices were to remain unchanged, would depress homeownership; second, individuals would delay decision to buy a house which, in its turn, would increase the rental housing stock at the expense of owner-occupied housing.

The benefits from tax savings related to housing are not equally distributed among taxpayers, however. Poterba (1992) finds that more than half of tax savings from mortgage interest deduction were concentrated among less than 10 percent of the wealthiest tax payers after tax reforms in the 1980's. He

also argues, that these reforms made rental real estate investment less attractive by effectively reducing housing-related tax incentives for all income groups. In fact, provisions of the reforms decreased marginal tax rates and increased standard deductions. Reductions in marginal tax rates lowered the value of tax-exempt imputed income for homeowners, which mostly affected high-income individuals. The result of the latter was ceasing by a large portion of tax payers, mostly low- and middle-income one's, itemising prior to the reform to itemize after. Finally, Poterba and Sinai (2008) find that distribution of tax savings from mortgage interest deduction varies not only with income, but also with age and that they are the highest among young, high-income individuals that own expensive houses and have high marginal tax rates. They also find that removing mortgage interest deduction or taxing imputed rental income on owner-occupied housing will raise the average user cost, if no changes in loan-to-value ratios occur. This strand of literature concludes, therefore, that one part of the rapid development of homeownership rates in the second half of 1900's can be attributed to tax breaks home owners enjoy in the US.

However, there is a rich body of research that presents evidences in favour of the opposite view. In particular, this literature emphasises the distortionary or no effect of existing tax system on homeownership. On the one hand, Sommer and Sullivan (2014) find negative effect of fiscal incentives on homeownership rates. Specifically, they use dynamic model of housing tenure choice to analyse the effect of the tax subsidies related to housing on equilibrium house prices and homeownership. Authors find that evoking existing tax breaks, including mortgage interest deduction, would lead house prices to decline and would, therefore increase homeownership.

On the other hand, there are several studies, that find no link between tax incentives and the tenure decision. Among such is Glaeser and Shapiro (2002) who claim that home mortgage interest deduction is a poor instrument for encouraging homeownership because it is targeted at the wealthy, who are most always homeowners. To support their argument, authors use variation in inflation and standard deduction. Using time series tests, they show that, despite the fact that ownership subsidies changed significantly between 1956 and 2002 due to fluctuations in inflation rates, homeownership rate has stayed essentially constant over the second half of 1900's. They also find no evidence of effectiveness of mortgage interest deduction as a policy promoting homeownership by testing whether changes in the degree of itemisation, that varies with the level of standard deduction, affected levels of homeownership. Next, Chambers et al. (2009b) study effects of the progressivity of income taxation on homeownership in the framework of an overlapping generations model. They find that its reduction may mitigate asymmetries created by the preferential tax treatment of homeowners by decreasing equilibrium interest rate and rental price and, therefore, increasing homeownership. More progressive income taxation, instead, makes the mortgage interest deduction more valuable and, thus, introduces an incentive to purchase larger homes, but leads to a decrease in the total number of homeowners. Elimination of mortgage deduction, however, has small overall effect on homeownership. Finally, Gervais and Pandey (2008) claim that eliminating mortgage interest deduction would have little impact on the user cost because households would modify their loan-to-value ratios in response. They conclude that preferential taxation of owner-occupied housing creates only distortions in the housing market and benefits households that most probably are already owners.

Several works provide explanations of the recent growth of the homeownership alternative to tax system favouring ownership. Chambers et al. (2009a), for example, examine the role of such factors as mortgage innovations and demographic characteristics in the boom of homeownership in the late 90's-early 2000's. They find that mortgage innovation largely contributed to this increase whereas demographics is found to be less important. Further, they attribute at least half of the increase in home-

ownership after 1940 to the introduction of the conventional fixed rate mortgage. In their other study Chambers et al. (2009c) explore another channel of the housing tenure decision making. In particular, they study the impact of alternative mortgage structure on the housing finance decision and find it to have important implications for both tenure choice and the size of the home consumed. They further show that preferred mortgage structure depends on age and income and that loan products with low initial payments maybe an alternative to mortgages with no downpayment. They also emphasise the role of inflation which reduces the real value of the mortgage payments and the outstanding loan.
Thus, this strand of literature concludes, that housing tax provision, if anything, generates asymmetries on housing markets and does not improve homeownership rates. This view contradicts to the findings of the research which explains recent increase of homeownership rates by preferential tax treatment of owner-occupied housing. Therefore, given the controversy of the conclusions and the fact that the literature addressing this question is mostly represented by theoretical research while very few studies attempted empirical analysis, more work is needed in order to establish the effect of tax savings available to homeowners, and in particular that of the mortgage interest deduction, on housing tenure decision. [5]

2 Methodology

2.1 Theoretical Framework

The focus of this study is the analysis of the effects of the fiscal policy on housing tenure decision. This decision potentially depends on a range of socio-demographic and economic household characteristics, as well as on the relative cost of buying the house as opposed to renting it. Broadly speaking, household will decide to switch from renting the house to owning it once rental payments exceed the user cost of ownership.
There are several mechanisms through which the user cost of owner-occupied housing might be altered. The most influential works that present formal analysis of such channels are Glaeser and Shapiro (2002) and Poterba (1992). Following their definition, the user cost of owner-occupied dwelling, UC, is given by the ratio of imputed rental value to house price, RH/P_hH, where R is an imputed rental price for a unit of housing, P_h is a capital price per unit of housing and H is the quantity of housing. [6]

[5] Among other studies that analyse relation between taxation and homeownership are James R. Hines (2013), Aaron (1970) and Dougherty and Order (1982). There are also several other studies that analyse the demand for housing. However, they do not emphasise the role of taxation in a tenure decision. Among these works are Bajari et al. (2013) that estimate a dynamic model of demand for housing, introducing down-payment constraints and non convex costs of adjustment to housing shock as key frictions. They find that because of this frictions households don't adjust housing stock frequently. Negative home price shocks allow renting households to upgrade earlier in the life-cycle. But if these shocks occur along with negative income shocks, then housing demand becomes lower for young and middle aged households. Further, these kinds of shocks do not lead to a change in housing stock for older households, as they have already reached their optimal home size. Attanasio et al. (2012) model individual demand for housing over the life cycle and show that higher house prices lead households to downsize rather than to stop being owners and that individuals delay purchasing their first home when incomes are low or uncertain.

[6] The user cost of homeowner is defined differently in Dìaz and Luengo-Prado (2008). They describe ex post user cost is a present value of the sum of maintenance costs and property taxes (net of deductions), current and appropriately discounted future transaction costs, the forgone return to home equity, and the cost of the mortgage (net of possible deductions) minus capital gains. The main difference between the rental price and user cost is that rental income from housing is taxable while services from owner-occupied housing are not. This fact is reflected in the rental price. Further, user cost may vary with mortgage loan-to-value ratios because of the tax deductibility of mortgage interest payments. In particular, under assumptions that house prices are constant and there are no buying costs, the user cost of homeowner i is given by $uc^i = (1-\tau_y)r^f + \frac{(1-\tau_y)(M^i(\hat{r}^m - \hat{r}^d)+\Gamma^i)}{\hat{r}^d+\delta^h+\hat{\tau}_h} r^f$. M^i is the mortgage loan-to-value ratio for household i. Γ^i are selling costs, $\hat{r}^m$ the

If homeownership were taxed for its real economic profits, then net-of-tax income from owning a home worth P_hH with imputed rental value RH for an owner with a marginal tax rate τ, would be

$$(1-\tau)[RH-(i+\tau_p+d-\pi)P_hH] \tag{1}$$

In this expression, i denotes nominal interest rate which measures the owner's interest payments and/or forgone equity cost. π is inflation rate or, in other words, owner's nominal capital gain. For the sake of simplicity of the exposition, it is assumed that house prices appreciate at the overall inflation rate.[7] τ is marginal income tax rate and τ_p is deductible property tax rate. d is the total maintenance and depreciation cost which is assumed to be the same for renters and owners (differently from Glaeser and Shapiro (2002), who assume it to be different in order to emphasise agency costs involved in renting).

In equilibrium, the net income from homeownership is zero (by zero profit condition), therefore, the free-market user cost of housing equals to a sum of the costs associated to ownership (cost of the outstanding mortgage, opportunity cost, property taxes, depreciation and maintenance costs) minus expected capital gain:

$$UC*P_h=(i+\tau_p+d-\pi)P_h=R \tag{2}$$

However, the preferential taxation of homeowners permitted by the US tax code, introduces a distortion in the user cost. Under the US taw law, the cost of homeownership depends on whether the owner itemises its deductions, marginal tax rate he faces and the nominal interest rate he pays.

If a household itemises its deductions independently of a housing tenure status, then it has enough allowable expenditures (e.g., medical expenses or charitable contributions) to exceed the threshold set by the standard deduction . If such a household were a homeowner, then its per unit cost of housing would be :

$$UC'*P_h=[\theta i(1-\tau)+(1-\theta)i(1-\tau)+\tau_p(1-\tau)+d-\pi]P_h=R-\tau(i+\tau_p)P_h \tag{3}$$

where θ is the fraction of the house that is financed with the owners' capital and $1-\theta$ can be viewed as a loan-to-value ratio.

When, on the contrary, a homeowner never has enough expenditures to itemise, his per unit cost of housing is:

$$UC''*P_h=[\theta i(1-\tau)+(1-\theta)i+\tau_p+d-\pi]P_h=R-\tau\theta iP_h \tag{4}$$

Nonitemizers cannot claim mortgage-interest deductions and their after-tax cost of borrowing is simply i. However, the equity they invest in the house could have earned $(1-\tau)i$ had it been invested elsewhere. As further noted by Glaeser and Shapiro (2002), per unit cost of housing for nonitemizers is increasing with debt-financing. Therefore, nonitemizers as opposed to itemisers face tax-created incentives to put everything ($\theta=1$) into their home because the capital gains in that asset are not taxed. Furthermore, if $\theta=0$, meaning that homeowner uses all-debt financing, such a nonitemizer receives no subsidy. Therefore, home mortgage provides an incentive for owners who don't itemize

after tax mortgage interest rate ($\hat{r}^m=(1-\tau_m\tau_y)r^m$) , $\hat{r}^d$ after tax return on deposits ($\hat{r}^d=(1-\tau_y)r^d$), r^f is the after-tax rental price of one unit of housing stock which structure is assumed using asset pricing theory and which is equal to $r^f=\frac{q-\frac{1}{1+\hat{r}^d}q(1-\delta^h-\hat{\tau}_h)}{1-\tau_y}$, where q is the constant house prices. Houses depreciate at the rate δ^h. Income tax is denoted by τ_y, deduction percentage by τ_m, proportional effective local property tax on housing is $\hat{\tau_h}=(1-\tau_y)\tau_h$ and it is fully deductible from income taxes. Imputed housing rents for homeowners are tax free.

[7] This assumption can be relaxed and does not affect the conclusions of the theoretical specification presented in this section.

to invest more in housing.

Finally, if a household claims standard deduction, D, in the absence of privately-owned residence, but its mortgage interest payments would have been high enough to allow it to itemise deductions were it a house owner, then this household would file for itemised deduction only if owned a residence and standard deduction would become an opportunity cost. In his case the user cost of housing is:

$$UC''' * P_h = [\theta i(1-\tau) + (1-\theta)i(1-\tau) + \tau_p(1-\tau) + d - \pi]P_h + \tau\frac{D}{H} = R - \tau(i+\tau_p)P_h + \tau\frac{D}{H} \quad (5)$$

Given this form of the unit cost of housing, the benefit from owning (as opposed to renting) can be derived. It is given by the difference between the free market cost of renting and the cost of owning. If individual itemizes when he is both an owner and a renter, his benefits from owning a house of fixed size per dollar spent on housing are (see Appendix B.1 for the derivation of the user cost of housing in terms of real interest rate)

$$\tau(\bar{i} + \pi + \tau_p) \quad (6)$$

where $\bar{i}$ is the real interest rate.

If individual does not itemize in either case, then the incentive to own relative to the cost of housing is

$$\tau\theta(\bar{i} + \pi) \quad (7)$$

Finally, if individual itemises only when he owns and claims the standard deduction in the other case, then his cost total cost of renting is $RH - \tau D$, while his user cost of housing is affected only by the amount he itemises. [8] Therefore, his incentive to own per dollar spent on housing equals to:

$$\tau(\bar{i} + \pi + \tau_p) - \tau\frac{D}{P_h H} \quad (8)$$

To summarise, tax code creates subsidies to homeowners by allowing them to deduct their mortgage interest payments from the taxable income. These incentives increase with marginal tax rate[9], interest payments and are higher for households who itemize their deductions. Among nonitemizers, the incentive to own increases only for those buyers who pay for a significant fraction of their own homes. For households who itemise only when they own the residence, the higher is the level of standard deduction, the lower is the benefit of owning relative to renting. Thus, increase in standard deduction increases the user cost of owning, and thus, may reduce homeownership. Hence, it can be concluded,

[8] To see why standard deduction affects user cost only in the case when individual claims itemised deduction if he is an owner and standard deduction otherwise, consider all three cases. First, if individual claims itemised deduction if he is both owner and renter, then he has enough deductible expenses not related to housing. These other deductions, therefore, do not depend on the price of the house and costs and gains associated to it. Thus, the amount of itemised deduction which is not related to housing and will stay the same independently of ownership status will not affect expression for benefits of owning relative to renting (it is deductible in both cases, and, thus, appears both on the left hand side and the right hand side of the expression in the same quantity) and, hence, can be omitted. Second, if individual does not itemize in neither case, then he claims standard deduction independently of tenure choice. Therefore, both his potential rent (right hand side) and user cost of housing (left hand side) are decreased by the amount of standard deduction, which does not depend on ownership, and, can be omitted as well. If, however, individual claims standard deduction only when he is a renter but itemises when he is an owner, then the only expenses he can itemize are those related to housing. Therefore such an individual faces the tradeoff: in case he stays a renter, his rent is decreased by standard deduction; if, however, he owns, then he can claim itemised deduction, loosing his right to claim standard deduction. Thus, standard deduction affects renting cost, and, therefore, changes the user cost and enters in the final expression for the benefits of owning relative to renting.

[9] This is the case for all the individuals. For households who itemize only when owns, benefits of owning relative to renting increases in τ only if $\bar{i}+\pi+\tau_p > \frac{D}{P_h H}$, meaning that itemised expenses exceed standard deduction. Note that it will always be the case, since we assumed that individual itemises when he owns. Therefore, his benefits are always positive and increase with marginal tax rate.

that incentives provided by the tax system reduce the user cost of ownership and induce both to own homes and to consume more housing. These incentives are higher for those who itemize and for individuals who face higher tax rates. These clear theoretical predictions can be tested empirically, and, thus, will guide our identification strategy.

2.2 Empirical Framework

2.2.1 Identification Strategy

As follows from the previous discussion, the difference between the imputed rent and the user cost of owner-occupied housing is generated by fiscal incentives available to homeowners and depends not only on market's and owner's characteristics, but also on a range of fiscal policy parameters. The baseline rule to understand the dollar amount of the tax savings due to mortgage interest deduction depends on whether individual is eligible for such deductions, the tax bracket he is in, and on the amount of interests paid on the mortgage. Broadly speaking, if a household is in 25% tax bracket, can itemise and mortgage interest payments are fully deductible, then it can save 250 US$ for every 1,000 US$ of mortgage interest.
In order to identify the effect of mortgage interest deduction on homeownership, several sources of exogenous policy variation could potentially be used. The main channels through which fiscal policy may alter dollar amount of tax incentives to own a house, thus, affecting the housing tenure decision are the following:

- **Change in the total limit of the mortgage and home equity eligible for the deduction.** In the theoretical framework adopted in this study, it is implicitly assumed that mortgage interest payments are fully deductible (see Appendix B.2 for an extension of the definition of the user cost). Dìaz and Luengo-Prado (2008) modify this assumption and study how the extent to which mortgage interests can be deducted may alter the gap between rental payments and user cost of owning. Authors show that despite the fact that when mortgage interest payments are not fully deductible or cannot be deducted at all, mortgages become more expensive, this channel does not lead to major changes in the relative price of owning the house . The reason for this is that households respond to the changes in the limits up to which they can deduct by revising their debt holdings. Hence, when the mortgage interest payments deductibility limits decrease, the debt holdings decrease as well while rental price remains unchanged. Thus, the user cost rises only slightly. From the empirical point of view, in the US, there are large across state differences in the overall adoption of mortgage interest deduction: some states allow deductibility, whereas others do not; but there has been no time variation in this policy over the last few decades. The amount of the mortgage and home equity on which interest payments can be deducted applies to all the taxpayers and were changed last time in the 1980's.

- **Change in marginal tax rate**. This channel naturally follows from the theoretical framework in spirit of Glaeser and Shapiro (2002) and Poterba (1992) proposed in this study. As can be seen from Equations 6 and 7, the benefit from owning the house, rather than renting it, is increasing in income tax rate. One study that points out the importance of the marginal tax rate to the relative cost of owning the house is presented in Feldstein (1995). He summarised the important role of income tax rates in driving the difference between relative prices of deductible and non-deductible consumption in general. He noticed that decrease in marginal tax rates causes a

reduction in deductible expenditures by decreasing the relative price of ordinary consumption relative to the price of tax-favored consumption. One example of such a consumption, considered by Feldstein (1995), is mortgage payments. Furthermore, according to Dìaz and Luengo-Prado (2008), this channel is the main driver of the wedge between user cost and rental payments. According to their model, when income tax decreases, the rental price decreases while the user cost increases. Thus, the difference between the two is reduced. However, the opposite occurs when the tax rate increases: the higher is the tax rate, the lower is the user cost and, therefore, the higher is the difference between user cost and rental price. Therefore, their study confirms that the difference between the two increases with marginal tax rate. To illustrate this point, consider the example made in the beginning of this section. If marginal tax rate increased from 25% to 30%, then dollar amount of tax savings would increase by 50 US$ for every 1,000 US$ of mortgage interest (the decrease in tax rate would work in a similar fashion).

- **Change in the standard deduction**. Mortgage interest deduction is an itemised deduction. Therefore, only those households whose total amount of itemised deductions exceeds the limit set by the standard deduction will benefit from this incentive. Coming back to the previous example, if the total amount of the itemised deduction is 1,000 US$, while the limit set by the standard deduction is 900 US$, then the household will file for the mortgage interest deduction. However, if the standard deduction were raised up to 1,100 US$, the household would not claim mortgage interest deduction. Therefore, as noticed in Poterba (1992) and Glaeser and Shapiro (2002), the use of homeowner deduction would increase if standard deduction were decreased because homeowners would be more likely to itemise their tax deductions. Poterba (1992) further develops this point by noticing that the Tax Reform Act of 1986 raised the standard deduction in the US which resulted in a decline of the number of taxpayers itemising their tax deductions. He further shows, that for low- and middle-income taxpayers, for whom marginal tax rates were not changed significantly by the tax reforms of 1980's, the switch from being an itemiser to claiming the standard deduction was the largest effect of the tax reform on homeownership costs. He shows that the discrepancy between the actual and true economic user cost of homeownership is smaller if a given household does not itemize than if it does. This can be seen from Equation 8, which shows that the benefit of owning the house rather than renting it decreases with the level set by the standard deduction, and from Equations 6 and 7, which demonstrate the tax savings are higher for owners that itemize than for those that don't. Finally, Glaeser and Shapiro (2002) state that, if the tax subsidy is at all important, then homeownership would fall when standard deduction were increased. Therefore, changes in the standard deduction cause changes in the degree of itemisation, thus potentially leading to changes in the homeownership.

To summarise, there are three main channels through which fiscal policy may affect tax savings related to housing, thus, affecting the incentive to become a homeowner. These channels are the degree of mortgage interest payments deductibility, marginal tax rate and standard deduction.
The straightforward way to study the causal relation between MID and homeownership would be to exploit the variation in the amount of mortgage interests eligible for the deduction which would provide an immediate insight into the effects of this policy. This approach faces several challenges for an identification, however. Firstly, major changes in the regulation of mortgage interest deduction that revised limits of the eligible interest payments, such as, for example, those introduced by the Tax Reform Act of 1986, affected all the population. This variation, although potentially represents an interesting research design, cannot help in the identification of the causal effect of MID on homeown-

ership. This is because such a massive reform affected all the tax payers and there is no counterfactual group in order to identify the effect of this policy reform. Moreover, using only time variation on the federal level, as has been done in the previous studies, may confound the results since there is no proper control group. On the other hand, thanks to the autonomy granted to the states in managing their own fiscal policy, there is a large across-state variation in the adoption of the policy: there is a number of states that allow for the mortgage interest deduction while others do not. However, during the observed period for which data is available, there were no states, to the best of our knowledge, that implemented or eliminated the policy to allow for a within state variation[10] and simple across-state comparison of outcomes will provide biased estimates of the results if fiscal policy in general and MID in particular are correlated with unobservable states characteristics. Finally, following theoretical contributions, the degree of mortgage interest payments deductibility is found to have no significant effects on housing tenure choice because households tend mitigate it by changing their loan-to-value ratios.

In order to overcome these challenges in the identification, this study proposes a unique empirical strategy. In particular, I exploit both across and within state variation in the intensity of fiscal incentives to homeownership in a difference-in-differences framework. The sources of this variation are changes in state marginal income tax rates and in state standard deduction.

Such an identification strategy is possible for several reasons. Firstly, different states changed income tax rates and standard deduction at different times, while other states didn't have any changes in fiscal policy related to housing market during the analysed period Secondly, not only the timing of the reforms was different among the states, but also marginal tax rates were changed by different amounts for various income groups Next, there were no changes in the total limits of the mortgage and home equity eligible for MID on neither the federal nor the state level between 2000 and 2011. Finally, both marginal tax rates and the level of standard deduction are found, in the theoretical literature, to have potentially major effects on the wedge between the user cost and rental payments if tax subsidies have any effect on the tenure decision - a finding that can be tested with the proposed research design. Therefore, to identify the effect of mortgage interest deduction on the decision to own the residence this study will use exogenous policy variations in marginal tax rates and standard deduction.

2.2.2 Modelling housing tenure decision

Housing tenure choice depends on the user cost of housing and on a range of household inputs (e.g., income, employment, number of children, marital status) and general economic conditions (e.g., inflation, unemployment rate, GDP per capita). In this section, individual housing tenure decision is modelled, accounting for the possibility of the effect of the changes in the user cost of housing occurred in states that experienced changes in fiscal policy through channels described in the previous section (these states are later referred to as *treated states*).

Let Y_{ist} being an indicator for a household that owns its residence as opposed to renting it. Then, the

[10]The exception is Rhode Island which abolished itemised deductions in the fiscal year 2011. However, this study uses PSID waves up to 2011, which contains data on income regarding year 2010, and, therefore, cannot be used to estimate the effect of the changes in fiscal policy implemented in 2011. The 2013 PSID release has become available in June 2015 and, therefore, can be used in the future studies, provided enough observations residing in Rhode Island, to ensure the power of the experiment.

housing tenure choice equation can be written as follows [11]:

$$Y_{ist} = \beta_0 + \beta_t + \alpha_i + \beta_1' X_{is} + \beta_2' W_{ist} + \sum_g \tau_g FiscalPolicy_{ist} + \beta_3' S_{st} + \epsilon_{ist} \tag{9}$$

In this equation, X_{is} is a vector of observable time invariant characteristics (e.g., gender and college degree) and α_i reflect unobserved permanent attributes for households i (i.e., a household fixed effect). W_{ist} is a vector of socio-economic and demographic variables that change over time and includes an inverse hyperbolic sine transformation of income[12], age of the household head, number of family members and number of children. In the empirical analysis, there are also included dummies for whether household head is married, self-employed, unemployed and retired. Next, β_0 is a constant and β_t is a time dummy which captures time variation common across individuals. S_{st} is a vector of state-specific controls, among which are house price index, log transformations of real GDP and real GDP per capita, and unemployment rates. ϵ_{ist} denote any time-varying unobserved shocks to the household. Finally, $FiscalPolicy_{ist}$ is identity if household i was a resident in a state that changed fiscal incentives for homeowners at time t by varying either marginal income tax rate or standard deduction :

$$FiscalPolicy_{ist} = \begin{cases} 1 \text{ if individual i receives treatment in period t,} \\ 0 \text{ otherwise} \end{cases}$$

τ_g is, therefore, the coefficient of interest that identifies the effect of tax subsidies for homeownership on the tenure decision and is estimated by using fixed-effects estimator.[13] Subscript g accounts for expected heterogeneous effects between states that have similar changes in fiscal policy but differ in the adoption of allowed deductions. In particular, there are two groups of states, from this point of view: those that allow to deduct interest payments and those that do not. Since in states that experienced increase in income tax rates and that allow for such a deduction, this policy change will increase tax savings for homeowners but in states that do not allow for the deduction - it will not, these two groups of states are included in the regression separately.

During the observed period, states didn't change income tax rates by the same amount. On the contrary, they changed tax rates by different amounts for different income groups at different times. This fact creates additional variation in fiscal policy and, therefore, provides an opportunity to gain a deeper insight into the effect of taxation on ownership choice. In order to estimate this effect, the following model of tenure choice is specified:

$$Y_{ist} = \beta_0 + \beta_t + \alpha_i + \beta_1' X_{is} + \beta_2' W_{ist} + \gamma MarginalTaxRate_{ist} + \beta_3' S_{st} + \epsilon_{ist} \tag{10}$$

Taking first differences of Equation 10, to eliminate the unobserved individual fixed effect α_i, yields:

$$\Delta Y_{ist} = d_t + \beta_2' \Delta W_{ist} + \gamma \Delta MarginalTaxRate_{ist} + \beta_3' \Delta S_{st} + \Delta\epsilon_{ist} \tag{11}$$

[11] Even though the dependent variable is limited, only OLS model is estimated. This is because the specification includes the full set of fixed-effects and interaction terms which involves computational difficulties in clustering the standard errors and computing marginal effects for the logit fixed-effect model.

[12] This transformation of income is used in order to adjust for skewness but to cover also zero amounts, which are approximately 19% of all observations.

[13] In the empirical analysis, the following specification without individual fixed effects is also estimated by pooled cross-section: $Y_{ist} = \beta_0 + \beta_t + \beta_s Treated_{gs} + \sum_g \delta_g (Treated_{gs} \text{ x } Post_t) + \beta_1 X_{is} + \beta_2 W_{ist} + \beta_3 S_{st} + \epsilon_{ist}$. In this specification, $Treated_{gs}$ is a dummy for treated states and the effect of interest is given by the interaction term $Treated_{gs}$ x $Post_t$, which defines treated states in the post-treatment period.

In this specification, d_t reflects the fact that model allows for time dummies and time-invariant characteristics X_{is} does not appear in the equation since they affect only the level of homeownership but not its growth.
Following Card and Krueger (1994), variable ΔMarginal Tax Rate$_{ist}$ is defined to be a difference in tax rates individual is subject to if resides in the treated state and zero otherwise.

$$\Delta\text{Marginal Tax Rate}_{ist} = \begin{cases} \Delta\text{Marginal Tax Rate}_{ist}, \text{ if individual lives in treated state } s \text{ at time } t \\ 0 \text{ otherwise} \end{cases} \quad (12)$$

Given this specification, coefficient γ captures effect of any change in the marginal tax rate experienced by household i in a given period t on the change of its tenure. This change, however, may reflect not only variation induced by policy changes, but also that individual might have changed states or could have had dramatic changes in his income and, therefore, changed the tax bracket he was in. To disentangle the effect of the policy induced variation from these other reasons, I explicitly control for both by keeping sample of individuals who didn't move across states and who didn't have big changes in their income, and thus did not change the tax bracket. [14]
Models given by Equations 9 and 10 serve as baseline specifications. Estimation of these models allows to obtain estimates for the effect of changes in income tax rates and in standard deduction, which affect tax savings from housing, on the housing tenure choice in difference-in-differences framework.

2.2.3 Defining the time frame

The analysis concentrates on the years 2000 to 2010. Almost every year one of the states implemented some changes in standard deduction or in the income tax rates. However, in order to assess the impact of the changes in fiscal policy on the house tenure decision, the best period to analyse is the window between the year 2002 and the year 2004. There are several reasons for this choice. Firstly, it is safely far away from the crisis occurred in the year 2008 which was directly related to the housing and mortgage markets. Secondly, there are observations available two periods before year 2004, and thus, the behaviour of homeownership rates can be observed before the treatment year which is essential to analyse the common pre-trend assumption. Finally, PSID data is biennial and, thus, it is only possible to compare two non-consecutive years. Hence, changes in fiscal policy occurred in the year 2004 relative to the year 2002 are the most suitable in order to identify the effect of MID and constitute the core of the empirical analysis. However, in the robustness analysis, the effects of fiscal policy is estimated using different time windows (e.g., covering all years from 2000 to 2010). The results show to be robust to such specifications.

2.2.4 The choice of the control group to identify the effect of MID

This study aims to identify the effect of the mortgage interest deduction on housing tenure decision using difference-in-differences strategy. In order to do so, changes in homeownership rates in the

[14] I also estimate a model where I keep individuals who changed tax bracket and I control for this by introducing an interaction term. Specifically, I estimate the following model in first differences: $\Delta Y_{ist} = d_t + \gamma_0 * \Delta MarginalTaxRate_{ist} + \gamma_1 \Delta MarginalTaxRate_{ist} * ChangedBracket_{ist} + \gamma_2 ChangedBracket_{ist} + d_1' \Delta W_{ist} + d_2' \Delta S_{st} + \Delta\epsilon_{ist}$. In this model, $ChangedBracket_{ist}$ is unity if individual i changed the tax bracket at time t, and it is zero otherwise. The results are robust to this specification.

treated states before and after tax reform are compared to those in the control group. This section discusses how states composing the control group were chosen.
In order to build a control group, only those states where there were no changes in fiscal policy are considered. Among such states, there are both states that allow to deduct mortgage interest payments from taxable income for state income tax purposes (Alabama, Georgia, Mississippi, Virginia,) and those that don't (Alaska, Illinois, Indiana, Florida, Nevada, New Hampshire, South Dakota, Tennessee, Texas, Washington, West Virginia and Wyoming). Furthermore, we also include separately in the regression states that had only minor and, thus insignificant for housing tenure decisions, changes in fiscal policy. If changes in homeownership are indeed driven by fiscal policy, there should be not changes in homeownership rates in these states relative to the control group.

2.2.5 Using changes in state income tax rates to estimate the effect of mortgage interest deduction on homeownership

In order to identify the effect of fiscal incentives on the housing tenure decision, the first channel of exogenous policy variation used in this study is variation in income tax rates. As discussed in Section 2.1 and Section 2.2.1, if tax savings generated by the possibility to deduct mortgage interest payments from taxable income have any effect on homeownership, then comparable increase in marginal income tax rates should lead to higher ownership rates in states that allow for such deductions than in the states that do not.
Indeed, any change in marginal income tax leads to a dollar change in the amount of tax savings if mortgage interest deduction is permitted. Given the chosen year of treatment, namely 2004, there are several states that changed their income tax rates at least for some income brackets. However, this research focuses on the changes occurred in New York and Pennsylvania. There are several reasons for why these two states are the best cases in order to analyze the effect of MID. Firstly, both New York and Pennsylvania increased their income tax rates (as opposed to decreasing them), which is the most revealing direction of the change in this fiscal policy parameter for the purpose of this study. The reason for this is the fact that decrease in income tax rates for a given level of income is not always the result of the changes of the rates *per se*. Indeed, this change is oftentimes generated by the increase in the dollar value of the tax bracket due to the indexation by the inflation and thus, is a gradual year-to-year change. Most of the time it occurs in the states that closely follow federal scheme in designing their state fiscal policies. On the contrary, increase in income tax rates is always the result of either a rise in tax rates or a decrease in tax brackets' thresholds and, therefore, goes in the opposite direction to the general tendency of the states to decrease income tax rates for a given level of income. Thus, this study will focus on implications of the increase of income tax rates, leaving their decrease aside as it does not represent an interesting case to examine. Such states as Hawaii, New Mexico, Maryland, Massachusetts, Michigan and New Jersey are, therefore, excluded from the analysis. [15]
Other five states that changed income tax rates in the year 2004 comparing to the year 2002 are New York, Nebraska, Oklahoma, Connecticut and Pennsylvania. Although all of them increased their income tax rates, the largest changes took place in New York, Pennsylvania and Connecticut. Furthermore, only in New York and Pennsylvania this reform touched all the tax payers, while in Connecticut there were no changes in income taxation for the households whose income was under 10,000 US$.

[15] Changes in income tax rates over time by income group are summarised in Appendix.

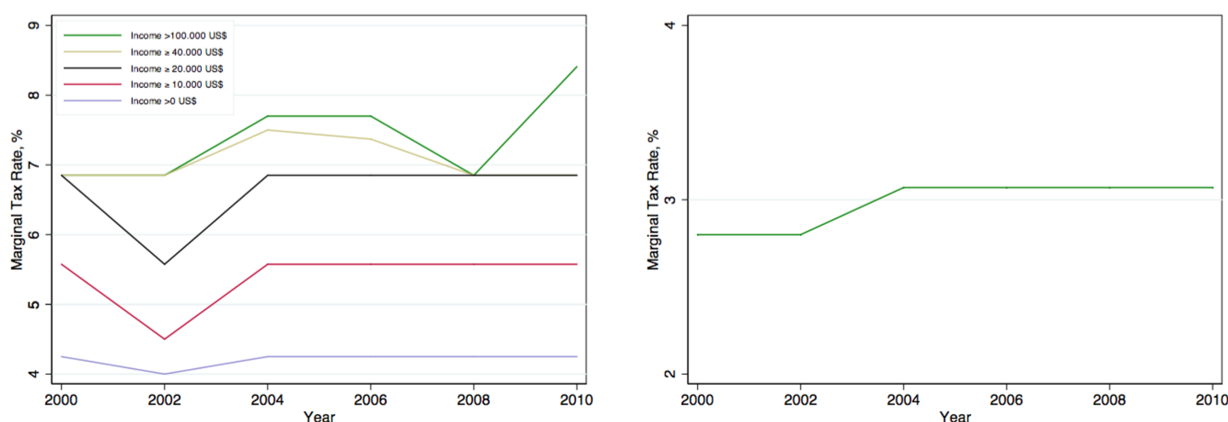
Next, only in New York and Pennsylvania there is a sufficient number of respondents in every PSID release, while number of observations for Connecticut never exceeded 50 heads of the households in any given year.

Finally, but importantly, neither New York nor Pennsylvania, to the best of our knowledge, changed any other policy parameter regarding housing market over the observed period, including standard deduction for single or separately filing couples (see Appendix for more details)[16]. For these reasons, in order to evaluate the effect of income taxation on the decision to purchase a house, this study will consider changes in marginal tax rates in states New York and Pennsylvania.

In order to study the effect of MID on housing tenure decision through the variation of income tax rates the following strategy is adopted. Firstly, the difference in the effects of increase in income tax rates in New York and Pennsylvania will be tested. The main difference between these two states is the fact that New York allows to deduct mortgage interest payments from taxable income for state income taxation purposes while Pennsylvania does not. Therefore, if MID has any implications for homeownership, then negative effect of increase in income taxes should be bigger in Pennsylvania than in New York, where it would be at least partly mitigated by increased tax savings. Although negative effect of increased tax rates on the decision to own, if there is no possibility to deduct interest payments, follows from the fact that higher taxes decrease disposable income, the degree to which this negative effect can be diminished by the presence of MID remains ambiguous. Indeed, the estimated effect of this tax reform in New York maybe be positive (if positive effect of MID is stronger than negative effect of increased income tax rates), zero (if two effects are nearly the same and, therefore, cancel out), or even negative (if effect of MID is smaller than direct effect of income taxation). In any of these cases, however, if MID has any effect on homeownership, it should be observed that in Pennsylvania drop in homeownership is bigger than in New York. In principle, this prediction could be tested directly by comparing Pennsylvania and New York. However, to make the evidence sharper and to secure the power of the test, it is chosen to compare both New York and Pennsylvania to a group of control states which didn't change any policy parameter in the observed period. Such a comparison would allow to disentangle the effects in Pennsylvania and in New York, thus, permitting to make more robust conclusions.

Next, variation of income tax rates in New York allows to estimate their effect directly. This is because in New York income tax rates were increased by different amounts across income groups. As can been seen Figure 1 Panel A , marginal tax rates changed from varying between 4% and 6,9% in 2002 to being between 4,3% and 7,7% in 2004. The biggest changes occurred for low and middle-income households. For those who earn between $10.000 and $ 20.000 income tax rate were increased from 4,5 % to 5,6% by 24%, and for those who earn between $20.000 and $ 40.000 - from 5,6 % to 6,9% by 23%. Given this variation, it is possible to estimate the exact effect of changes in marginal income tax rates on changes in homeownership by comparing outcomes in New York and in a group of control states. Note that, although income tax rates in Pennsylvania increased by as much as 9,6%, it changed equally for all the taxpayers, who are subject to flat tax schedule, as can be seen on Figure 1 Panel B. Moreover, Pennsylvania changed its income tax rates only once during the observed period. This fact makes it an attractive case to be studied in a difference-in-differences framework, but given the absence of the sufficient variation, complicates estimation of the effect of fiscal incentives using marginal tax rates instead of the policy dummy.

[16]There are no data available on property taxes, however, which is one of the major limitations of this study.



Panel A. New York | Panel B. Pennsylvania

FIGURE 1: Individual State Marginal Income Tax Rates

Source: Author's calculations based on Taxfoundation data

Thus, this study analyses changes in homeownership rates in New York and Pennsylvania relative to the control states which did not change fiscal policy between 2000 and 2010. It will further use variation in income tax rates in New York to estimate effect of taxation on tenure choice.

2.2.6 Using changes in Standard Deduction to Estimate the Effect of Mortgage Interest Deduction on Homeownership

Another source of variation that potentially affects housing tenure decision is standard deduction. As has been shown in Section 2.1 and Section 2.2.1, decrease in standard deduction both allows more households to benefit from MID and reduces user cost of owner-occupied housing, which should lead to the increase in homeownership if fiscal incentives play any role in supporting it. In order to identify the effect of the mortgage interest deduction through the change in the level of standard deduction allowed at the state level, this study will focus on the case of Oregon. The reason for such a choice is threefold. Firstly, this state experienced the decrease in the amount of standard deduction between 2004 and 2002. Although, there are 17 states that changed standard deduction in this period, only two of them for which data is available, namely District of Columbia and Oregon, decreased it. It is more revealing to study the decrease in the standard deduction than its increase because most of the states that raised its level simply followed the federal model and indexed it by inflation. Furthermore, even if the increase in standard deduction was an unexpected policy change, higher standard deduction would mean not only that less taxpayers would file for the mortgage interest deduction, but also that nonitemizing taxpayers would receive a higher amount of the dollar refund, benefiting from the higher standard deduction allowance. This fact may potentially confound the results. Therefore, this analysis will focus on the states in which there was a decrease in the level of the standard deduction, which potentially leads to more interpretable conclusions.
Secondly, among the two states which decreased standard deduction in 2004, Oregon is the most suitable case to study for the purpose of this analysis because of the proportion of the urban population in this state. Indeed, in the District of Columbia, every resident (100% - see more details in the Appendix)

is defined as belonging to the urban population and this is a unique composition among 51 US states. Therefore, there is no possible control group for this state. Instead, urban population in Oregon varied from 79% to 81% between 2000 and 2010, which is in line with the average composition among other states.

Finally, in the period of interest, there were no other changes related to the housing market in Oregon, which, therefore, allows to identify the effect of MID relying on changes in standard deduction. In the District of Columbia, instead, marginal tax rates varied greatly between 2000 and 2010, which may confound the results.

Therefore, in order to estimate the effect of MID through variation in standard deduction this study will focus on the case of Oregon, where standard deduction decreased by 7,2% between 2002 and 2004, as shown on the Figure 2. Using difference-in-differences research design, I will compare after-reform homeownership rates in Oregon with those in the states which didn't not change their fiscal policy. If MID has any effect, it is expected that decrease in the level of standard deduction would lead to a higher ownership rates in Oregon than in the control states.

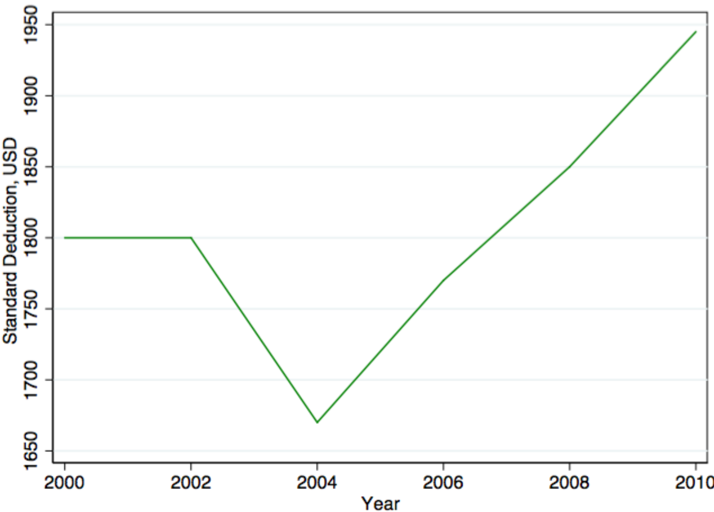


FIGURE 2: Standard Deduction in Oregon State

Source: Author's calculations based on Taxfoundation data

3 Data, Sample Definition and Descriptive Evidence

3.1 Individual Level Data

The main data source used in this study is Panel Study of Income Dynamics (PSID). In particular, I analyse waves for questionnaires collected biennially from the year 2001 to the year 2011. This is the best available dataset to answer the question if MID affect homeownership because it contains detailed information on household's portfolio and, in particular, on housing wealth as well as socio-economic characteristics of individuals followed overtime. This study concentrates on the period between 2001 and 2011 because data on state level explanatory variables is available only starting from the year 2000.

The original sample contains 48,887 observations on 12,799 heads of the households.

Table 1: Summary statistics for the PSID sample, panels 2001 - 2011

	All states			States with no MID			States allowing for MID		
	N	**Mean**	**Median**	**N**	**Mean**	**Median**	**N**	**Mean**	**Median**
All households									
Homeownership (%)	44,863	61.8		18,371	63.0		26,492	61.0	
Became an owner (%)	43,182	3.6		17,717	4.0		25,465	4.0	
Became a renter (%)	43,182	2.4		17,717	2.0		25,465	3.0	
Mortgage ownership (%)	44,863	43.9		18,371	45.0		26,492	43.0	
Second mortgage ownership (%)	44,863	6.8		18,371	7.0		26,492	7.0	
Income($)	44,863	37,249	27,000	18,371	38,630	28,000	26,492	36,292	26,955
Unemployed (%)	44,863	6.2		18,371	6.0		26,492	6.0	
Retired (%)	44,863	12.1		18,371	13.0		26,492	11.0	
Self-employed (%)	44,863	10.2		18,371	10.0		26,492	10.0	
Male (%)	44,863	70.3		18,371	70.0		26,492	71.0	
Age	44,863	45.6	44.0	18,371	46.2	45.0	26,492	45.1	44.0
Married (%)	44,863	50.9		18,371	51.0		26,492	51.0	
Number of Children	44,863	0.9	0	18,371	0.8	0	26,492	0.9	0
Years of education	44,863	14.4	12.0	18,371	14.8	12.0	26,492	14.1	12.0
State-level variables									
Unemployment rate (%)	44,863	6.0	5.6	18,371	6.0	6.0	26,492	6.0	6.0
House price index	44,863	126.6	120.2	18,371	122.7	113.8	26,492	129.4	121.1
Real GDP (.000$)	44,863	537	382	18,371	535	493	26,492	538	255
RealGDP per capita ($)	44,863	46,115	44,720	18,371	46,122	44,204	26,492	46,111	45,427
Nominal Personal Income ($)	44,863	35,342	34,422	18,371	35,840	35,080	26,492	34,996	34,341
Votes in presidential elections (% republicans)	22,105	48.8		9,071	43.0		13,034	53.0	
Urban population (%)	44,863	76.9	77.5	18,371	81.3	82.5	26,492	73.8	72.8
Country-level variables									
15 Years Mortgage Interest Rate	44,872	5.7	5.6						
30 Years Mortgage Interest Rate	44,872	6.2	6.0						
Consumer Price Index	44,872	197.1	201.6						
Individuals who changed state									
Changed state in the sample (% in full sample)	46,266	3.0		18,933	3.0		27,333	3.0	

Note: The table reports descriptive statistics for households heads in the selected PSID sample for waves 2001 through 2011. State-specific unemployment rate and Consumer price index are from Bureau of Labor Statistics. Unemployment rate is seasonally adjusted. CPI is based upon a chained year 1982-1984 = 100. House price index and 15-year fixed rate mortgage interest rates are from Freddie Mac. House price index is constructed such that December 2000 is normalised to 100. Real GDP, real GDP per capita and per capita personal income are from Bureau of Economic Analysis. Real dollar values are stated in terms of chained 2009 dollars. Votes in presidential elections are from Wikipedia. Proportion of urban population is from the State Data Centre of Iowa. 30-year conventional mortgage interest rates are based on Federal Reserve Economic Data.

The dependent variable analysed in this study is if household owns its main residence. It is a dummy that takes value 1 if household is the owner and zero of it is a renter. Since mortgage interest deduction affects housing tenure decision through changing the tradeoff between owning and renting the residence by decreased the user cost of the owner, this paper focuses on the transition from renting to owning and vice versa. Thus, if a household neither owns nor rents its residence, the observation is dropped (2612 observations corresponding to 1705 households).

Next, to address the concern that households might change state of residence due to changes in housing-related policy, I drop observations for which I observe such moves (1,403 observations). [17]

[17] The results presented in this paper are for households who never changed the state of residence. I do such a sample selection to address the concern that changes in fiscal policy might induce moving across states due to arbitrage opportunities. However, as can be seen from Table 1, on average there are around 3% of observations that changed state of residence during the observed period. In the treated states (New York, Oregon and Pennsylvania) in the period between 2002 to 2004 less than 3% of observations moved across states. In the US overall between 2002 and 2004 the proportion of movers stayed

Finally, I drop observations if the respondent refused to answer about its age (9 observations). Such a sample selection leads to a total of 44,863 observations.

Following Dahl and Lochner (2012) and Eissa and Liebman (1996), housing tenure status is linked to the income tax rates of the previous year, for which annual income is measured. Therefore, the analysed information is for tax years 2000 through 2010, and this is how it will be referred to in this study.[18] Table 1 shows summary statistics for all households in the sample. As reported in the table, homeownership rate among all states is around 62% during the observed period and it is slightly higher in states that does not allow mortgage interest deduction than in the states that do. This fact indicates that, simple comparison of average outcomes across states would have led to the biased results on the effect of MID on homeownership. This is because, the adoption of MID policy on the state-level is probably partly driven by unobservable state characteristics.

Similarly to homeownership rates, mortgage ownership rates also differ slightly across states that allow MID and those that do not, where it is 43% and 45% respectively. Furthermore, average nominal income is considerably higher in the states that do not allow MID where it is around $ 39,000. Conditioning on homeownership, average value of the house, as reported in the survey, is $ 205,000 and it is higher in the states that do not allow MID than in those that do [19]. This, along with the fact that in no MID states house price index is lower, indicates that, on average, individuals who live there own more expensive houses. Along with more expensive houses, households in the states without MID have both higher mortgages holdings and higher home equity. Finally, a slightly higher proportion of households who live in states that allow MID experienced difficulties with mortgage payments after 2008.

Despite the differences in wealth between states that allow MID and those that do not, there is no noticeable differences in the demographic characteristics of the heads of the households, except from the fact that in states that do not allow MID, the average age of the head of the household is slightly higher, being around 46 years old , which is also reflected by the fact that there are more retired: 13% in the states that do not allow MID relative to 11% in the states that do. Finally, duration of the mortgage and interest rates are roughly the same across these two groups of states.

Thus, it can be concluded, that individuals who live in the states that do not allow mortgage interest deduction from their taxable income for the state income taxation purposes, are, on average, richer and more of them own houses relative to those that live the states that allow MID.

3.2 State Level Data

The state variables are taken from Federal Reserve Economic Data (30-year conventional mortgage interest rates), Freddie Mac (15-year fixed rate mortgage interest rates and House price index), Census Bureau (total, urban and rural population in 2010), The State Data Centre of Iowa (total, urban and rural population in 2000), Bureau of Economic Analysis (Real GDP, Real GDP per capita, per capita personal income), Bureau of Labor Statistics (unemployment rate and consumer price index), Wikipedia

roughly the same. Thus, changes in mortgage interest deduction does not seem to affect the choice of the state of residence. Finally, it might be argued that non-movers are more prompt to acquire their residence and thus, dropping them from the sample leads to upward-biased results. To address this concern, I perform all the analysis for a full sample and the results do not change.

[18] PSID is collected biennially in the period between March and November. Information on income is referred to the previous year. Socio-demographic characteristics and, in particular, information on housing wealth is contemporaneous. Therefore, the change in the homeownership status, that is analysed, may have occurred in the year previous to the year of the survey, or in the year of the survey.

[19] For more details see Appendix: Table A6 which shows descriptive statistics for the sample of home- and mortgage-owners.

(results of presidential elections), PSID selected sample (state specific homeownership rate).
In order to analyse the effect of MID, variation in such state fiscal policy parameters as income tax rates and standard deduction is used. These data is taken from Tax Foundation and NBER TAXSIM calculator. Income tax rates are linked to individuals based on their income, which is grouped in five tax brackets (more details can be found in the Appendix). Standard deduction used in this study corresponds to the level set for single individuals or for married couples filing separately.
As reported in Table 1, house prices grew slower in the states that do not allow MID. Also, states that do not allow MID have higher proportion of urban population (81,3% relative to 73,8% in states that allow MID), but similar levels of Real GDP per capita. [20]

4 The effect of Fiscal Policy on Homeownership

4.1 Estimates of the effect of MID on housing tenure decision using variation in income tax rates

Figure 3 shows homeownership rates in New York, Pennsylvania and the control states. Given the difference-in-difference empirical framework, difference in the levels of the dependent variable in treatment and control groups does not prevent identification. However, the underlying assumption of this estimator is the common trends assumption, meaning that in the absence of treatment average change in outcome for the treated and control states would have been the same. As can be seen from the graph, the trend of homeownership rate in New York and in the control group before and after treatment, which occurred in 2004, is similar: it is slightly increasing in the beginning of the decade and decreases starting from year 2004 onwards. As for the Pennsylvania, the trend almost coincides with the one of the control group after 2006. However, the homeownership rate in Pennsylvania declines stronger than in the control states in the period of interest, and this decline, though much milder, started already before the treatment period. However, this study relies mainly on the changes in income tax rates in New York, whereas Pennsylvania serves to the purpose of emphasising differences in the response to increased tax between states that allow MID and those that do not. Thus, the slight divergence in the Pennsylvania homeownership trends should not affect the conclusions. The robustness of the common trend assumption is discussed more formally in section 5.
Table 2 reports averages of homeownership rates in the control states, Pennsylvania and New York in 2002 and after tax rates were increased in the treated states in 2004. The corresponding difference-in-differences coefficient shows that in New York the proportion of homeowners increased by 3.3 percentage points relative to the control states in the year after the revision of individual income tax rates. In Pennsylvania, on the other hand, proportion of homeowners decreased by 3.4 percentage points relative to the states that didn't change fiscal policy as a response to higher income tax rates. Therefore, the overall gap between the effects of the higher income taxes in New York and Pennsylvania is 6.6 percentage points. The reason for this differential impact on the ownership decision between the two states is the fact that New York state allows households to deduct their mortgage interest payments from taxable income for the purpose of state income taxation, while the Pennsylvania state does not allow for such a deduction. In fact, both Pennsylvania and New York had a comparable increase in income tax rates in 2004 relative to 2002, while other observable policy parameters stayed constant

[20] The detailed state characteristics for the years 2000 and 2010 are shown in Appendix.

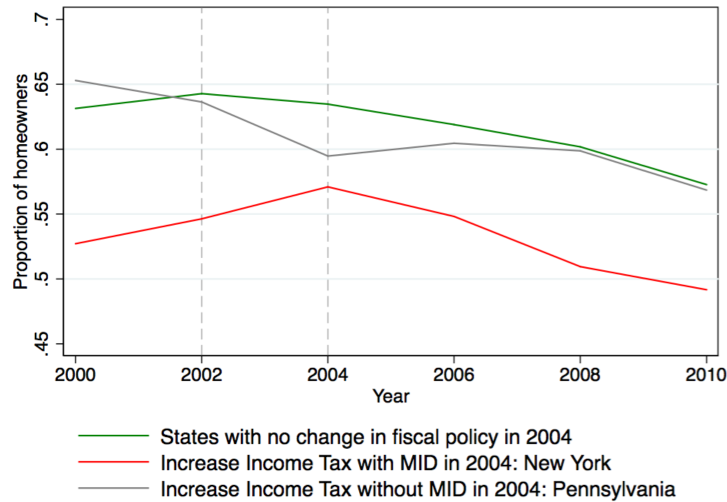


FIGURE 3: Homeownership rates in New York, Pennsylvania and control states

Source: Author's calculations based on PSID data.
Note: The graph shows proportion of homeowners in New York, Pennsylvania and control states. In New York and Pennsylvania there was an increase in marginal tax rates between 2004 and 2002.

TABLE 2: Homeownership rates before and after the increase in income tax rates in New York and Pennsylvania

	Year 2002	Year 2004	Δ 2004 vs. 2002
	(1)	(2)	(3)
New York	0.546***	0.571***	0.025***
	(0.000)	(0.000)	(0.000)
Pennsylvania	0.636***	0.595***	-0.041***
	(0.000)	(0.000)	(0.000)
Control States	0.643***	0.635***	- 0.008
	(0.015)	(0.015)	(0.007)
Change in homeownership rates,	-0.097***	-0.064***	0.033***
New York vs. Control States	(0.015)	(0.015)	(0.007)
Change in homeownership rates,	-0.007	-0.040***	-0.034***
Pennsylvania vs. Control States	(0.015)	(0.015)	(0.007)
Change in homeownership rates,	-0.090***	-0.024***	0.066***
New York vs. Pennsylvania	(0.000)	(0.000)	(0.000)

Note: Author's computations using PSID panels 2005 and 2003. Changes in homeownership rates between Pennsylvania and control states 2004 vs 2002 do not add up due to rounding. All standard errors are clustered by state. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

over this period. Therefore, the major difference between the two states is their treatment of mortgage interest deductibility at state level. This difference, thus, drives the result and is responsible for the fact that in the state in which increase in income tax rates is not associated with increase in tax savings from housing ownership, higher taxes led to a lower disposable income without affecting the user cost of housing, which had an overall negative impact on individual housing demand. In New York this negative effect of higher taxes was mitigated by increased tax savings and, therefore, lowered user cost of housing and increased ownership.

Corresponding OLS and Fixed Effect estimates of the housing tenure choice equation are reported in the Table 3. The coefficients of interest are interaction terms of New York and Pennsylvania indicators with a 2004 year dummy. These coefficients correspond to the difference-in-differences estimator and indicate the change in homeownership rates in treated states relative to the control group after treatment. The reference group across all the specifications are states which did not changed fiscal policy between 2002 and 2004. I further explicitly include states that had only minor changes in state marginal tax rates or in state-specific standard deductions (Other States). If changes in homeownership rates in New York and Pennsylvania are indeed driven by fiscal policy, there should be no effect in states that had only minor adjustments. Finally, households residing in Oregon are excluded from the sample.

Column 1 in Table 3 shows baseline estimates that corresponds to the tabulation results presented in the Table 2. Columns 2 and 3 show estimates from the regression with controls for individual and state level covariates. As can be seen, signs of the coefficients of interest are preserved. Columns 4 through 6 of Table 3 report estimates from the fixed effect model. In this case, identification comes only from the individuals who changed their homeownership status. As can be seen, even accounting for individual fixed effect, the effect of being in New York relative to the control states, has a positive effect on the ownership status, thus, confirming the result.

Table 4 shows the results of the estimation of the effect of increase in marginal tax rates on housing tenure decision using variation in income tax rates in New York.[21] Such a variation might be induced, however, not only by exogenous policy changes we are ultimately interested in, but also by big changes in individual's income, which led to changes in income tax brackets. [22]. To address this concern, I drop all the individuals who changed their tax bracket between 2004 and 2002 (1743 observation). [23] The results show that average increase in income tax rates in New York by 0.75 percentage points, observed in the sample, explains approximately 3.5 percentage points increase in the homeownership rate in New York relative to the control states. This magnitude is very close to the one found in the regression with the policy dummy and, thus, confirms positive effect of MID on homeownership. As expected, states that experienced only minor changes in fiscal policy across the years, have not reacted on changes in income tax rates. [24]

The results of the analysis of the increase in income tax rates, therefore, seem to indicate that lower

[21] I use only fixed effects model because coefficient on marginal tax rates in a pooled cross-section specification would simply reflect the fact that high-income individuals, who also face higher marginal tax rates, are more likely to be homeowners.

[22] Another case of endogenous variation in income tax rate might have been a situation when an individual changed states of residence between waves. In our case it is not a problem, however, since we do all the analysis for a subgroup of non-movers

[23] I also do the analysis for a full sample explicitly controlling for changes in the tax bracket and the results do not change.

[24] Residents of both Oregon and Pennsylvania are excluded from the sample. The effect of changes in marginal tax rates cannot be estimated explicitly for the control group, as, by definition, there has been no variation in fiscal policy in control states.

TABLE 3: OLS Regressions: increase in income tax in New York and Pennsylvania in 2004 vs 2002

	Pooled Cross-Section			Fixed-effects		
	(1)	(2)	(3)	(4)	(5)	(6)
NewYork #Year 2004	0.033***	0.039***	0.049***	0.025***	0.027***	0.045***
	(0.007)	(0.006)	(0.008)	(0.006)	(0.006)	(0.011)
Pennsylvania #Year2004	-0.034***	-0.021***	-0.016**	-0.021***	-0.019***	-0.006
	(0.007)	(0.006)	(0.007)	(0.006)	(0.006)	(0.009)
New York	-0.096***	-0.162***	-0.091***			
	(0.015)	(0.013)	(0.012)			
Pennsylvania	-0.006	-0.005	0.014			
	(0.015)	(0.013)	(0.010)			
Year 2004	-0.008	-0.009	0.010	0.021***	0.019***	0.002
	(0.007)	(0.006)	(0.009)	(0.006)	(0.006)	(0.013)
IHS Income		0.021***	0.022***		-0.001	-0.001
		(0.002)	(0.002)		(0.001)	(0.001)
Age		0.010***	0.010***			
		(0.000)	(0.000)			
Nr. Family Members		0.040***	0.043***		0.023***	0.024***
		(0.006)	(0.005)		(0.007)	(0.007)
Nr. Children		-0.032***	-0.034***		-0.001	-0.002
		(0.007)	(0.007)		(0.010)	(0.010)
Male		0.029**	0.033**			
		(0.014)	(0.013)			
Married		0.267***	0.259***		0.176***	0.176***
		(0.013)	(0.012)		(0.033)	(0.033)
College		0.065***	0.069***			
		(0.014)	(0.014)			
Self-employed		0.034***	0.032***		0.026	0.026
		(0.011)	(0.012)		(0.018)	(0.018)
Unemployed		-0.106***	-0.104***		0.004	0.005
		(0.021)	(0.021)		(0.020)	(0.020)
Retired		0.100***	0.100***		-0.017	-0.017
		(0.019)	(0.020)		(0.016)	(0.016)
Other States	0.012	-0.005	0.002			
	(0.026)	(0.025)	(0.013)			
Other States #Year 2004	-0.000	-0.005	0.001	-0.003	-0.002	-0.000
	(0.009)	(0.008)	(0.010)	(0.008)	(0.008)	(0.009)
DV Mean Control Group	0.639	0.639	0.639	0.639	0.639	0.639
P-value New York 2004=Pennsylvania 2004	0.000	0.000	0.000	0.000	0.000	0.000
Observations	14,172	14,172	14,172	14,172	14,172	14,172
R-squared	0.002	0.275	0.284	0.005	0.027	0.028
Individual Fixed Effects				YES	YES	YES
State-level controls			YES			YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable is an indicator that a household owns its residence and it takes value zero if a household is a renter. The table shows the result of estimating OLS models using: models (1)-(3) - pooled cross-section; models (4)-(6) - panel regressions. Individual level data is from PSID waves 2003- 2005. Control group are states that never changed fiscal policy between 2000 and 2010. Other states are those, that had minor changes in fiscal policy in any given year between 2000 and 2010. Observations for Oregon are excluded from the regression. Individual controls include inverse hyperbolic sine transformation of income, age of the head of the household, number of children and number of family members residing together, indicators for head of the household being male, married, having at least 12 years of education (college), being self-employed, unemployed or retired. State level controls include seasonally adjusted unemployment, house price index, Log Real GDP and Log Real GDP per capita. All standard errors are clustered by state. *** p<0.01, ** p<0.05, * p<0.1

Table 4: OLS Regressions of homeownership: increase in income tax rates in New York State in 2004 vs 2002

	Fixed Effects		
	(1)	(2)	(3)
Marginal Tax Rate in New York	4.641***	4.652***	6.614***
	(0.458)	(0.453)	(0.876)
Marginal Tax Rate in Other States	1.170	0.921	1.300
	(1.446)	(1.043)	(0.797)
Year 2004	0.013***	0.013***	0.008
	(0.004)	(0.005)	(0.011)
IHS Income		-0.001	-0.001
		(0.003)	(0.003)
Nr. Family Members		0.019**	0.019**
		(0.008)	(0.008)
Nr. Children		0.002	0.002
		(0.010)	(0.010)
Married		0.212***	0.211***
		(0.034)	(0.034)
Self-employed		0.018	0.018
		(0.021)	(0.021)
Unemployed	0.013	0.014	
		(0.024)	(0.024)
Retired		-0.038*	-0.039*
		(0.020)	(0.020)
Mean Control Group	0.639	0.639	0.639
Average change in MTR in New York, pp	0.75	0.75	0.75
Observations	11,831	11,831	11,831
R-squared	0.004	0.032	0.034
Individual Fixed Effects	YES	YES	YES
State-level controls			YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable is an indicator that a household owns its residence and it takes value zero if a household is a renter. The table shows the result of estimating individual fixed effects models. Individual level data is from PSID waves 2003- 2005. Control group are states that never changed fiscal policy between 2000 and 2010. Other states are those, that had minor changes in fiscal policy in any given year between 2000 and 2010. Observations for Oregon and Pennsylvania are excluded from the regression. Individual controls include inverse hyperbolic sine transformation of income, number of children and number of family members residing together, indicators for head of the household being married, self-employed, unemployed or retired. State level controls include seasonally adjusted unemployment, house price index, Log Real GDP and Log Real GDP per capita. All standard errors are clustered by state. *** p<0.01, ** p<0.05, * p<0.1

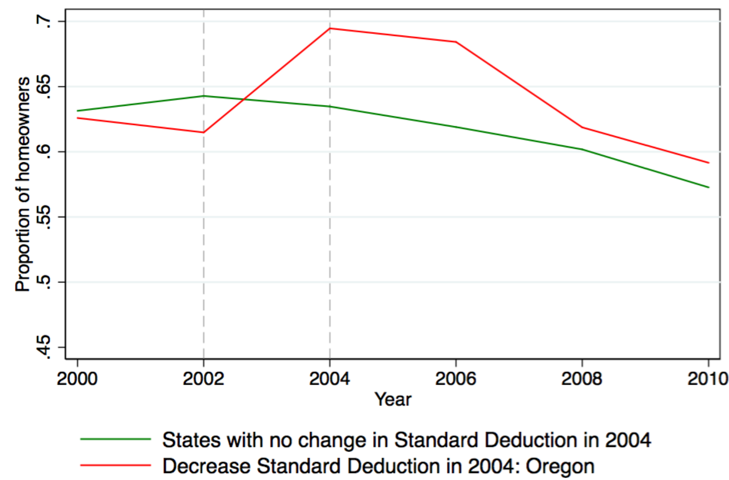


FIGURE 4: Homeownership rates in Oregon

Source: Author's calculations based on PSID data.
Note: The graph shows proportion of homeowners in Oregon and control states. In Oregon there was a decrease in standard deduction between 2004 and 2002.

user cost of housing due to higher tax savings from mortgage interest deduction, is associated to around 3.5 percentage points increase in ownership rate in New York relative to the control states.

4.2 Estimates of the effect of MID on housing tenure decision using variation in standard deduction

Figure 4 plots homeownership rates in Oregon and control states. As can be seen, between 2002 and 2004 there was a sharp increase in proportion of homeowners in Oregon.The differences in homeownership rates between control states and Oregon in 2002 and 2004 are further characterised in Table 5. As can be seen from the table, the increase in the proportion of itemising households triggered by the decrease in standard deduction led to the increase in homeownership by 8.8 percentage points in Oregon relative to the states that didn't have any changes in fiscal policy. Corresponding regression results are shown in the Table 6. Columns 1 through 3 show the results of OLS estimation using pooled cross-section regression, columns 4-6 report the results of the individual fixed effects regression. As can be seen, controlling for individual and state level characteristics decreases the magnitude of the difference-in-differences estimate to 0.054 and 0.066. By taking into account individual fixed effect, the estimated effect suggests that in Oregon after decrease of standard deduction homeownership increased relative to the control states by around 4 percentage points. Therefore, it can be concluded that decrease in the standard deduction in Oregon in between 2002 and 2004 led to increase in homeownership relative to the control states by allowing more people to itemise, thus benefitting from mortgage interest deduction and reducing the user cost of housing. This result suggests that possibility to itemise mortgage interest payments might induce households to acquire their residence.

TABLE 5: Homeownership rates before and after the decrease in standard deduction in Oregon

	Year 2002	Year 2004	Δ 2004 vs. 2002
	(1)	(2)	(3)
Oregon	0.615***	0.695***	0.08***
	(0.000)	(0.000)	(0.000)
Control States	0.643***	0.635***	- 0.008
	(0.015)	(0.015)	(0.007)
Change in homeownership rates,	-0.028*	0.06***	0.088***
Oregon vs. Control States, pp	(0.015)	(0.015)	(0.007)

Note: Author's computations using PSID panels 2005 and 2003. All standard errors are clustered by state. *** p<0.01, ** p<0.05, * p<0.1

4.3 Interpreting the results

In the previous sections there were discussed the results of the estimation of the effect of mortgage interest deduction on housing tenure decision. In particular, in order to identify this effect, variation in income tax rates and in the level of standard deduction in the states where the largest changes in fiscal policy occurred was used. If MID has any effect on the homeownership, then in Pennsylvania, where it is not allowed to decrease taxable income by the amount of mortgage interests paid, the increase in income tax rates should have a stronger negative impact on the individual housing demand than in New York state, where this negative effect would be at least partly compensated by the increase in tax savings. On the other hand, in Oregon, where there was a decrease in the level of standard deduction which leads to the increase in the share of itemising households, such a change should be associated with an increase in homeownership rates if MID has any effect on the tenure choice. In order to identify this effect, the difference-in-differences empirical strategy is adopted.

As results show, in both cases fiscal policy changes that led to a lower user cost of housing are associated with increase in homeownership rates in the treated states relative to the control states. Moreover, in Pennsylvania, where there is no MID at the state level, increase in tax rates lead to the decrease in homeownership. This fact confirms the hypothesis that lower disposable income has a negative impact on individual housing demand through the income effect when the user cost remains unchanged. There is a range of possible channels that might lead to this result. First of all, it is possible that families who consider becoming homeowners are, indeed, quite sensitive to the relation between the user cost of housing and its rental price which is affected by mortgage interest deductions. Since the cost of renting a house is especially high in urban areas, it would require less of a change in tax savings in order to revert the inequality between the two in the areas where high fraction of households rents their residences. Thus, even a slight increase in tax savings would induce city residents to reconsider their housing tenure status, which would produce the observed effect. In this case, the results might be driven by the fact that the case of the New York state, where a large portion of the population lives in the New York City, is considered. On the other hand, the positive result of mortgage interest deduction identified through the change in income tax rates might derive from the substitution effect between the two types of the investments - real estate and financial assets. Indeed, increase in income taxation not only decreases the user cost of housing, but also decreases profits from financial operations. Therefore, if households were to reconsider their portfolio, they would reallocate the sum needed for the downpayment from the financial market to the privately-owned residence. Building understand-

TABLE 6: OLS Regressions of homeownership: decrease in standard deduction in Oregon in 2004 vs 2002

	Pooled Cross-Section			Fixed-effects		
	(1)	(2)	(3)	(4)	(5)	(6)
Oregon #Year2004	0.088***	0.054***	0.066***	0.046***	0.046***	0.042***
	(0.007)	(0.006)	(0.007)	(0.006)	(0.006)	(0.014)
Oregon	-0.028*	-0.058***	-0.082***			
	(0.015)	(0.013)	(0.019)			
year_dummy3	-0.008	-0.009	0.010	0.021***	0.019***	0.002
	(0.007)	(0.006)	(0.009)	(0.006)	(0.006)	(0.013)
IHS Income		0.021***	0.021***		0.000	0.000
		(0.002)	(0.002)		(0.001)	(0.001)
Age		0.010***	0.010***			
		(0.000)	(0.000)			
Nr. Family Members		0.039***	0.043***		0.027***	0.027***
		(0.006)	(0.005)		(0.008)	(0.008)
Nr. Children		-0.032***	-0.034***		-0.003	-0.004
		(0.007)	(0.007)		(0.010)	(0.010)
Male		0.028*	0.033**			
		(0.014)	(0.014)			
Married		0.269***	0.260***		0.155***	0.155***
		(0.013)	(0.012)		(0.030)	(0.030)
College		0.066***	0.071***			
		(0.015)	(0.015)			
Self-employed		0.029**	0.027**		0.029	0.028
		(0.011)	(0.011)		(0.019)	(0.019)
Unemployed		-0.107***	-0.106***		-0.002	-0.001
		(0.022)	(0.022)		(0.020)	(0.020)
Retired		0.101***	0.101***		-0.013	-0.014
		(0.021)	(0.022)		(0.016)	(0.016)
Other States	0.012	-0.005	0.002			
	(0.026)	(0.025)	(0.013)			
Other States #Year2004	-0.000	-0.005	0.001	-0.003	-0.002	-0.000
	(0.009)	(0.008)	(0.010)	(0.008)	(0.008)	(0.009)
DV Mean Control Group	0.639	0.639	0.639	0.639	0.639	0.639
Observations	13,224	13,224	13,224	13,224	13,224	13,224
R-squared	0.000	0.274	0.284	0.006	0.026	0.027
Individual Fixed Effects				YES	YES	YES
State-level controls			YES			YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable is a dummy, indicating a household being the owner of the residence. The table shows the result of estimating OLS models using: models (1)-(3) - pooled cross-section; models (4)-(6) - panel regressions. Individual level data is from PSID waves 2003- 2005. Control group are states that never changed fiscal policy between 2000 and 2010. Other states are those, that had minor changes in fiscal policy in any given year between 2000 and 2010. Observations for Pennsylvania and New York are excluded from the regression. Individual controls include inverse hyperbolic sine transformation of income, age of the head of the household, number of children and number of family members residing together, indicators for head of the household being male, married, having at least 12 years of education (college), being self-employed, unemployed or retired. State level controls include seasonally adjusted unemployment, house price index, Log Real GDP and Log Real GDP per capita. All standard errors are clustered by state. *** p<0.01, ** p<0.05, * p<0.1

ing on the importance of this channel is of utmost relevance for policy makers and is left for the future investigation.
The findings reported in this study confirm empirical results documented in Poterba (1992) and theoretical predictions shown in Dìaz and Luengo-Prado (2008), Gervais (2002). They, however differ from those established in Glaeser and Shapiro (2002). In particular, they argue that, although tax savings generated by the possibility to deduct mortgage interest payments from the taxable income changed greatly over time, there were no such changes in homeownership rates. The difference in the results presented in this paper and those of the authors is due to the fact, that, in order to identify the effect, they used time series tests to analyse aggregate data over a long period of time, namely from 1956 to 2002, concentrating on two sources of variation in the amount of tax subsidies: changes in inflation rates and the degree of itemisation. However, their approach allows to account for less factors than it is possible with the micro data used in this study, which could potentially lead to biased results.
Despite the fact that the results found in this study are robust to a variety of specifications, as discussed in the next section, the general equilibrium effects are not analysed. In particular, it is out of scope of this analysis to investigate market mechanisms through which fiscal policy affects housing tenure decision. Thus, it is not analysed how changes in income tax rates and in the standard deduction affect market mortgage interest rates and house prices and empirical investigation of these factors is left for the future research.

5 Robustness Analysis

The validity of difference-in-differences estimation strategy hinges entirely on the common trend assumption. To evaluate this assumption and to study presence of anticipatory effects, I conduct formal test by including the identifier for the year 2000 - the year preceding the period of interest - and its interaction with the treated states. If common trend assumption holds the coefficient of the interaction term should not be statistically different from zero. The results show that this assumption holds for New York, Oregon and states where there were only minor changes in fiscal policy - the trend in homeownership in these states between 2000 and 2002 is the same as in control states. However, as has already been noticed, the common trend assumption in Pennsylvania seems to be violated since homeownership rate there was decreasing faster than in the control states. Thus, results of the analysis for Pennsylvania must be interpreted with caution.
Next, the baseline analysis presented in this paper has been limited to the years 2002 and 2004 between which the change in the policy occurred. Specifically, three baseline specifications were analysed. The first one looked at the effect of the increase in income tax rates by using difference-in-differences estimation strategy and comparing the outcomes in New York state to those in Pennsylvania and the control states with the help of a dummy variable for a fiscal policy change. The second specification used variation in marginal income tax rates in New York state within different income groups and compared the outcomes to the states that didn't have any changes in fiscal policy. The last approach analysed the effect of the decrease in the standard deduction in Oregon. To study the robustness of the results, I re-estimate all three specifications using all the available observations for time window between 2000 to 2010. The results hold across the years.
Therefore, it can be concluded, that the results found in the baseline analysis, in particular that both increase in income tax rates and increase in the proportion of itemisers is associated to higher homeownership through mortgage interest deduction, hold through a variety of robustness checks.

6 Conclusion

Understanding implications of fiscal policy on housing tenure decisions is of critical importance in order to design effective programs aimed at supporting homeownership. This paper analysed the effect of the decrease of the housing user cost on the decision to own a house. In particular, this study exploited the variation in personal income tax rates and in the standard deduction which affects user cost through mortgage interest deduction. The largest of these fiscal policy changes increased marginal tax rates by 23,9% and decreased standard deduction by 7,2% between 2002 and 2004. Using a panel of 12,504 heads of the households, allows to observe tenure decision within a household over time, and therefore, to account for unobserved household's fixed effects. The results show that housing tenure decision is sensitive to the variation in housing related tax savings and that decrease in the user cost is associated with higher probability to own a house. The results are robust to a variety of alternative specifications, including wider time windows of pre- and post- treatment periods. Therefore, it can be concluded, that, although wealthy taxpayers benefit the most from the policy, it also impacts those households who are at the margin between owning a house and renting it. Hence, this study provides an empirical evidence in favour of mortgage interest deduction as a policy supporting homeownership, leaving, however, analysis of its potentially more effective alternatives beyond the scope of this work.

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Appendix

A Estimated models for the sample restricted to time period between 2004 and 2002

A.1 Models with a dummy policy variable

Estimated baseline model, from which the effect of income taxation on homeownership is obtained, with the sample restricted to years 2004 and 2002, and New York, Pennsylvania and controlled states without individual fixed effects is:

$$homeownership_{ist} = \alpha_0 + \gamma_{NY} NewYork_{ist} + \gamma_{PA} Pennsylvania_{ist} + d2004_t + \tau_1 2004_t NewYork_{ist} + \tau_2 2004 Pennsylvania_{ist} + \epsilon_{ist} \quad (13)$$

Where $NewYork_{ist}$ and $Pennsylvaniaist$ are dummies indicating that individual i was the resident of New York and Pennsylvania respectively at time t. 2004_t is a dummy for year 2004. τ_1 and τ_2 are coefficients of interest reflecting the effect of been in a treated as opposed to the control state in 2004. Estimated baseline model for the same sample but including individual fixed effects is:

$$homeownership_{ist} = \alpha_0 + \alpha_i + d2004_t + \tau_1 PolicyNY_{ist} + \tau_2 PolicyPA_{ist} + \epsilon_{ist} \quad (14)$$

Where $PolicyNY_{ist}$ and $PolicyPA_{ist}$ indicate that individual i received treatment at time t and resided in New York or Pennsylvania respectively. This model can be written in first differences as:

$$\Delta homeownerhip_{is} = d + \tau_1 \Delta PolicyNY_{is} + \tau_2 \Delta PolicyPA_{is} + \Delta\epsilon_{is} \quad (15)$$

This is equivalent to :

$$\Delta homeownerhip_{is} = d + \tau_1 NewYork_{is} + \tau_2 Pennsylvania_{is} + \Delta\epsilon_{is} \quad (16)$$

Estimated model for the tenure choice that uses variation in standard deduction with the sample restricted to years 2004 and 2002, Oregon and controlled states without individual fixed effects is:

$$homeownership_{ist} = \alpha_0 + \gamma_{OR} Oregon_{ist} + d2004_t + \tau_1 2004_t Oregon_{ist} + \epsilon_{ist} \quad (17)$$

Where $Oregon_{ist}$ is a dummy equal to unity if individual i resides in Oregon at time t.
The corresponding model which includes individual fixed effects is:

$$homeownership_{ist} = \alpha_0 + \alpha_i + d2004_t + \tau PolicyOR_{ist} + \epsilon_{ist} \quad (18)$$

Where $PolicyOR_{ist}$ indicates that individual i received treatment at time t.
In first difference the corresponding model can be written as:

$$\Delta homeownerhip_{is} = d + \tau \Delta PolicyOR_{is} + \Delta\epsilon_{is} \quad (19)$$

This is equivalent to :

$$\Delta homeownerhip_{is} = d + \tau Oregon_{is} + \Delta\epsilon_{is} \quad (20)$$

These models can be estimated either using first difference approach or individual fixed effects. With only two period two procedures give equivalent coefficients' estimates. In this paper these models are estimated using fixed effect estimator and correcting standard error for serial correlation by clustering.

A.2 Models with a continuous policy variable

Assume only two periods 2002 and 2004. In order to estimate the effect of mortgage interest deduction on homeownership , the following model in first differences is considered:

$$\begin{aligned}\Delta homeownership_{is} =& d + \gamma\Delta \text{ MarginalTaxRate}_{is} + \gamma_1\Delta \text{ MarginalTaxRate}_{is} * \text{ Changed Bracket}_i + \\ & + \Delta X_{is} + \Delta S_s + \Delta\epsilon_{is}\end{aligned} \tag{21}$$

Variable ΔMarginal Tax Rate$_{is}$ is defined to be difference in tax rates individual is subject to if resides in New York and zero otherwise.

$$\Delta\text{Marginal Tax Rate}_{is} = \begin{cases} \Delta\text{Marginal Tax Rate}_{is} \text{ if individual lives in New York state at time t} \\ 0 \text{ otherwise} \end{cases} \tag{22}$$

Next, it is controlled for the fact the individual might have changed his marginal tax rate not because of the policy, but because of the sharp changes in his income. In the sample, the reason for such a sharp change is, most often, sharp drop in income. This is taken into account by the dummy Changed Bracket$_i$, which as defined as follows:

$$\text{Changed Bracket}_i = \begin{cases} 1 \text{ if}\Delta \text{ Bracket}_i \neq 0 \text{ meaning that individual changed the tax bracket at time t} \\ 0 \text{ otherwise} \end{cases} \tag{23}$$

B Theoretical Framework

B.1 Derivation of the user cost of housing

For an individual who itemises always independently of his housing tenure status, the user cost of housing is:

$$\begin{aligned} UC' = \theta i(1-\tau) + (1-\theta)i(1-\tau) + \tau_p(1-\tau) - \pi + d = \\ = (\bar{i} + \tau_p)(1-\tau) + d - \tau\pi = \\ = \frac{R}{P_h} - \tau(i+\tau_p) = \\ = UC - \tau(\bar{i} + \pi + \tau_p) \end{aligned} \tag{24}$$

where $\bar{i}$ denotes real interest rate.
If owner does not itemize, his per unit cost of housing is

$$\begin{aligned} UC'' = \theta i(1-\tau) + (1-\theta)i + \tau_p + d - \pi = \\ = \bar{i} + \tau_p + d - \tau\theta(\bar{i} + \pi) = \\ = \frac{R}{P_h} - \tau\theta i = \\ = UC - \tau\theta(\bar{i} + \pi) \end{aligned} \tag{25}$$

B.2 Extension of the theoretical specification for the case when mortgage interest payments are not fully deductible

For owners who always itemize, the user cost of housing services is given by:

$$\begin{aligned} R' = [(1-\theta)i(1-\tau) + \theta i(1-\tau)] + \tau_p(1-\tau) - \pi + d = \\ [i + \tau_p - \pi + d] - \tau(i + \tau_p) = \\ R - \tau(i + \tau_p) \end{aligned} \tag{26}$$

Now, consider the case, when mortgage interest rates are deductible only up to a portion τ_m. Then,

$$\begin{aligned} R'_{\tau_m} = [(1-\theta)i(1-\tau_m\tau) + \theta i(1-\tau)] + \tau_p(1-\tau) - \pi + d = \\ R - \tau(\theta i + \tau_p) - (1-\theta)i\tau_m\tau \end{aligned} \tag{27}$$

Note, that when $\tau_m = 1$, meaning that mortgage interest rates are fully deductible, we are back in the first case. Therefore, benefit of owning the house as opposed to renting it increases with τ_m.

C Robustness Analysis

This section discusses in details the robustness analysis.
The main results presented in this paper build on three baseline specifications. The first one estimates at the effect of the increase in income tax rates by using difference-in-differences estimation strategy and comparing the outcomes in New York state to those in Pennsylvania and the control states with the help of a dummy variable for a fiscal policy change. The second specification used variation in marginal income tax rates in New York state within different income groups and compared the outcomes to the states that didn't have any changes in fiscal policy. The last approach analysed the effect of the decrease in the standard deduction in Oregon. In all of these baseline specifications the analysis was limited to the years 2002 and 2004, between which the change in the policy occurred. To investigate the robustness of the findings I extend the the analysis to the time window between 2000 to 2010. Firstly, I analyse the effect of the increase in marginal tax rates in New York and Pennsylvania using all the available years. To do so, I define a policy dummy to be unity if marginal tax rates for a given tax bracket were higher after 2004 than in the observed period before then. In Pennsylvania it concerns households in all the tax brackets. In New York, however, only households whose income exceeded 40,000 USD had higher income tax in the period after 2004. Since high-income households are more

sensitive to policy changes such a specification probably overestimates the effect of MID. Also, I drop observations for year 2008, because in New York in 2008 marginal tax rates were back to the level of the year 2000. The results presented in the Table A7 show that both in Pennsylvania and in New York the results over the period 2000 to 2010 are comparable to those found using only changes occurred between years 2002 and 2004.

Next, I analyse the effect of MID using changes in marginal tax rates during all the period 2000 and 2010. To do so, I estimate separately the effect of the increase in marginal tax rates in New York by defining an interaction term between marginal tax rates faced by households and whether it increased with respect to the previous year for a given tax bracket. The results are shown in the Table A8. As predicted by the theory, increase in marginal tax rates in New York has a positive effect on homeownership relative to any other change in tax rates in New York. Moreover, changes in other states - those that experienced only slight changed in fiscal policy, does not seem to affect homeownership relative to control states. These robustness checks, thus, confirm the result that changes in income tax rates in New York are associated with higher homeownership rates in New York relative to the control states.

As for Oregon, I conduct the analysis for the time window 2000 through 2010. As shown in the Table A2, standard deduction is lower in 2006 and in 2004 than any other observed year. Therefore, I define a policy dummy to be unity for years 2004 and 2006 for the residents of Oregon. As reported in Table A9, the magnitude of the coefficient is close to those found in the baseline specification and estimates are significant across all the specifications.

Therefore, it can be concluded, that the results found in the baseline specification, in particular that both increase in income tax rates and increase in the proportion of itemisers is associated to higher homeownership through mortgage interest deduction, are robust to a specification with wider time window.

Finally I analyse the common-trend assumption by testing whether coefficient on the year 2000 is significant in treated states. As shown in Table A10 the formal test is satisfied for both New York and Oregon - the main focus of this study. However, in Pennsylvania it seems that homeownership has started decreasing already before 2004.

TABLE A1: **Mortgage interest deduction and average tax rates by state**

State*	MID at State Level	Average Tax Rate 2000, %	Average Tax Rate 2002, %	Average Tax Rate 2004, %	Average Tax Rate 2006, %	Average Tax Rate 2008, %	Average Tax Rate 2010, %	Delta pp 2010 vs 2000
D.C.	Yes	7.9	7.3	7.3	7.2	6.2	6.2	- 1.8
Rhode Island**	Yes	7.8	7.5	7.5	7.5	7.5	7.5	- 0.3
Vermont	Yes	7.6	7.6	7.6	7.6	7.6	7.3	- 0.2
North Dakota	Yes	7.2	4.2	4.2	4.2	4.2	3.7	- 3.5
Oregon	Yes	7.0	7.0	7.0	7.0	7.0	8.6	1.6
North Carolina	Yes	6.9	7.3	7.3	7.3	7.2	6.9	-
Minnesota	Yes	6.9	6.8	6.8	6.8	6.8	6.8	- 0.2
Hawaii	Yes	6.7	6.4	6.0	6.0	6.0	7.0	0.3
Montana	Yes	6.5	6.5	6.5	4.0	4.0	4.0	- 2.5
Idaho	Yes	6.0	5.4	5.4	5.4	5.4	5.4	- 0.7
Wisconsin***	Yes	6.0	6.0	6.0	6.0	6.0	6.4	0.4
New Mexico	Yes	5.5	5.5	5.1	3.8	3.7	3.6	- 1.9
Maine	Yes	5.5	5.5	5.5	5.5	5.5	6.7	1.2
Kansas	Yes	5.4	5.4	5.4	5.4	5.4	5.4	-
New York	Yes	5.3	5.3	6.0	5.9	5.3	6.2	0.9
California	Yes	5.1	5.1	5.1	5.8	5.8	6.1	1.0
Colorado	Yes	5.0	4.6	4.6	4.6	4.6	4.6	- 0.4
Iowa	Yes	4.9	4.9	4.9	4.9	4.9	4.9	-
Delaware	Yes	4.8	4.6	4.6	4.6	4.6	4.8	- 0.0
South Carolina	Yes	4.6	4.6	4.6	4.6	4.6	4.2	- 0.4
Nebraska	Yes	4.4	4.4	4.5	4.5	4.5	4.5	0.1
Arkansas	Yes	4.1	4.1	4.1	4.1	4.1	4.1	-
Louisiana	Yes	4.0	4.0	4.0	4.0	4.0	4.0	-
Mississippi	Yes	4.0	4.0	4.0	4.0	4.0	4.0	-
Kentucky	Yes	4.0	4.0	4.0	4.3	4.3	4.3	0.3
Virginia	Yes	3.9	3.9	3.9	3.9	3.9	3.9	-
Arizona	Yes	3.9	3.9	3.9	3.9	3.5	3.5	- 0.4
Missouri	Yes	3.8	3.8	3.8	3.8	3.8	3.8	-
Alabama	Yes	3.7	3.7	3.7	3.7	3.7	3.7	-
Oklahoma	Yes	3.5	3.5	3.6	3.5	3.0	3.0	- 0.5
Georgia	Yes	3.5	3.5	3.5	3.5	3.5	3.5	-
Maryland	Yes	3.5	3.5	3.4	3.4	4.3	4.5	1.0
Tennessee****	No	6.0	6.0	6.0	6.0	6.0	6.0	-
Massachusetts	No	6.0	5.6	5.3	5.3	5.3	5.3	- 0.7
New Hampshire****	No	5.0	5.0	5.0	5.0	5.0	5.0	-
West Virginia	No	4.8	4.8	4.8	4.8	4.8	4.8	-
Utah	No	4.7	4.7	4.7	4.7	5.0	5.0	0.3
Michigan	No	4.4	4.2	4.0	3.9	4.4	4.4	- 0.1
Ohio	No	4.2	4.3	4.3	4.1	3.8	3.4	- 0.8
Connecticut	No	3.8	3.8	4.0	4.0	4.0	4.8	1.1
New Jersey	No	3.5	3.5	4.6	4.6	4.6	4.6	1.1
Indiana	No	3.4	3.4	3.4	3.4	3.4	3.4	-
Illinois	No	3.0	3.0	3.0	3.0	3.0	3.0	-
Pennsylvania	No	2.8	2.8	3.1	3.1	3.1	3.1	0.3
Alaska	No	-	-	-	-	-	-	-
Florida	No	-	-	-	-	-	-	-
Nevada	No	-	-	-	-	-	-	-
South Dakota	No	-	-	-	-	-	-	-
Texas	No	-	-	-	-	-	-	-
Washington	No	-	-	-	-	-	-	-
Wyoming	No	-	-	-	-	-	-	-

Source: Author's computations based on State income tax form, CCH State Tax Handbook; information available at www.taxfoundation.org; Morris and Wang (2012) and ITEP (2011)

* States are listed in decreasing order of average tax rate in the year 2000.

** As of the year 2011 Rhode Island eliminated the use of the itemised deductions.

*** Wisconsin provides tax credit.

**** Tennessee and New Hampshire tax only investment income.

TABLE A2: **Standard deduction for single or separately filing couples by state, USD**

State*	Standard Deduction 2000, US$	Standard Deduction 2002, US$	Standard Deduction 2004, US$	Standard Deduction 2006, US$	Standard Deduction 2008, US$	Standard Deduction 2010, US$
New York	7,500	7,500	7,500	7,500	7,500	7,500
Wisconsin	5,200	7,440	7,790	8,140	8,790	9,440
Idaho	4,300	4,550	4,750	5,000	5,350	5,700
Minnesota	4,300	4,550	4,750	5,000	5,350	5,450
Nebraska	4,300	4,550	4,750	4,980	5,350	5,700
New Mexico	4,300	4,550	4,750	5,000	5,150	5,700
South Carolina	4,300	4,550	4,750	5,000	5,350	5,700
Maine	4,300	4,400	4,750	5,000	5,450	5,700
Missouri	4,300	4,400	4,750	5,000	5,150	5,700
Utah	4,250	4,550	4,750	5,000	5,450	5,700
North Dakota	na	4,550	4,750	5,000	5,350	5,700
Rhode Island	na	na	4,750	5,000	5,350	5,700
Vermont	na	na	na	5,000	5,350	5,700
Arizona	3,600	3,600	4,050	4,125	5,450	4,677
Delaware	3,250	3,250	3,250	3,250	3,250	3,250
Montana	3,020	3,130	3,330	3,560	3,810	1,750
Kansas	3,000	3,000	3,000	3,000	3,000	3,000
Virginia	3,000	3,000	3,000	3,000	3,000	3,000
North Carolina	3,000	3,000	3,750	3,000	3,000	3,000
California	2,642	2,960	3,070	3,254	3,516	3,637
New Hampshire	na	na	na	na	2,400	2,400
Georgia	2,300	2,300	2,300	2,300	2,300	2,300
Mississippi	2,300	2,300	2,300	2,300	2,300	2,300
D.C.	2,000	2,000	1,000	2,000	2,500	2,000
Alabama	2,000	2,000	2,000	2,000	2,000	2,000
Arkansas	2,000	2,000	2,000	2,000	2,000	2,000
Maryland	2,000	2,000	2,000	2,000	2,000	2,000
Oklahoma	2,000	2,000	2,000	2,000	2,000	4,250
Oregon	1,800	1,800	1,670	1,770	1,850	1,945
Hawaii	1,500	1,500	1,500	1,500	1,500	2,000
Kentucky	1,500	1,700	1,830	1,910	2,050	2,190
Iowa	1,460	1,470	1,550	1,610	1,750	1,750
Alaska	-	-	-	-	-	-
Connecticut	-	-	-	-	-	-
Florida	-	-	-	-	-	-
Illinois	-	-	-	-	-	-
Indiana	-	-	-	-	-	-
Massachusetts	-	-	-	-	-	-
Michigan	-	-	-	-	-	-
Nevada	-	-	-	-	-	-
New Jersey	-	-	-	-	-	-
Ohio	-	-	-	-	-	-
Pennsylvania	-	-	-	-	-	-
South Dakota	-	-	-	-	-	-
Tennessee	-	-	-	-	-	-
Texas	-	-	-	-	-	-
Washington	-	-	-	-	-	-
West Virginia	-	-	-	-	-	-
Wyoming	-	-	-	-	-	-
Colorado	na	na	na	na	na	na
Louisiana	na	na	na	na	na	na

Source: State income tax form, CCH State Tax Handbook; Information available at www.taxfoundation.org
* States are listed in decreasing order of standard deduction in the year 2000.

Table A3: **Summary of Income Tax Rates by State**

State*	Tax Bracket, US$ **	Tax Rate 2000, %	Tax Rate 2002, %	Tax Rate 2004, %	Tax Rate 2006, %	Tax Rate 2008, %	Tax Rate 2010, %	Delta 2004 vs. 2002, %
D.C.	-	6.0	5.0	5.0	5.0	4.0	4.0	-
	10,000	8.3	7.5	7.5	7.5	6.0	6.0	-
	20,000	9.5	9.3	9.3	9.0	6.0	6.0	-
	40,000	9.5	9.3	9.3	9.0	8.5	8.5	-
	100,000	9.5	9.3	9.3	9.0	8.5	8.5	-
Rhode Island	-	3.9	3.8	3.8	3.8	3.8	3.8	-
	10,000	3.9	3.8	3.8	3.8	3.8	3.8	-
	20,000	7.3	7.0	7.0	7.0	7.0	7.0	-
	40,000	8.1	7.8	7.8	7.8	7.8	7.8	-
	100,000	9.8	9.5	9.5	9.5	9.5	9.5	-
Vermont	-	3.6	3.6	3.6	3.6	3.6	3.6	-
	10,000	3.6	3.6	3.6	3.6	3.6	3.6	-
	20,000	7.2	7.2	7.2	7.2	7.2	7.0	-
	40,000	8.5	8.5	8.5	8.5	8.5	8.3	-
	100,000	9.3	9.3	9.3	9.3	9.3	8.9	-
North Dakota	-	4.4	2.1	2.1	2.1	2.1	1.8	-
	10,000	6.4	2.1	2.1	2.1	2.1	1.8	-
	20,000	7.9	3.9	3.9	3.9	3.9	3.4	-
	40,000	11.2	4.3	4.3	4.3	4.3	3.8	-
	100,000	11.2	5.3	5.3	5.3	5.3	4.6	-
Oregon	-	7.0	7.0	7.0	7.0	7.0	7.0	-
	10,000	7.0	7.0	7.0	7.0	7.0	7.0	-
	20,000	7.0	7.0	7.0	7.0	7.0	7.0	-
	40,000	7.0	7.0	7.0	7.0	7.0	7.0	-
	100,000	7.0	7.0	7.0	7.0	7.0	10.9	-
North Carolina	-	6.0	6.0	6.0	6.0	6.0	6.0	-
	10,000	7.0	7.0	7.0	7.0	7.0	7.0	-
	20,000	7.0	7.0	7.0	7.0	7.0	7.0	-
	40,000	7.8	7.8	7.8	7.8	7.8	7.8	-
	100,000	7.8	8.3	8.3	8.3	8.0	7.8	-
Minnesota	-	5.5	5.4	5.4	5.4	5.4	5.4	-
	10,000	7.2	7.1	7.1	7.1	5.4	5.4	-
	20,000	7.2	7.1	7.1	7.1	7.1	7.1	-
	40,000	8.0	7.9	7.9	7.9	7.9	7.9	-
	100,000	8.0	7.9	7.9	7.9	7.9	7.9	-
Hawaii	-	4.9	4.6	4.1	4.1	4.1	4.1	- 10.8
	10,000	7.8	7.5	7.0	7.0	7.0	7.0	- 6.0
	20,000	8.4	8.1	7.8	7.8	7.8	7.8	- 3.7
	40,000	8.8	8.5	8.3	8.3	8.3	8.3	- 2.9
	100,000	8.8	8.5	8.3	8.3	8.3	10.0	- 2.9
Montana	-	3.5	3.5	3.5	3.0	3.0	3.0	-
	10,000	7.0	6.5	6.5	6.5	6.5	6.5	-
	20,000	9.5	8.5	8.5	6.5	6.5	6.5	-
	40,000	11.0	10.5	10.5	6.5	6.5	6.5	-
	100,000	11.0	10.5	10.5	6.5	6.5	6.5	-

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Table A3 -- *Continued from previous page*

State*	Tax Bracket, US$ **	Tax Rate 2000, %	Tax Rate 2002, %	Tax Rate 2004, %	Tax Rate 2006, %	Tax Rate 2008, %	Tax Rate 2010, %	Delta 2004 vs. 2002, %
Idaho	-	5.7	5.0	5.0	5.0	5.0	5.0	-
	10,000	5.7	5.0	5.0	5.0	5.0	5.0	-
	20,000	8.2	7.8	7.8	7.8	7.8	7.8	-
	40,000	8.2	7.8	7.8	7.8	7.8	7.8	-
	100,000	8.2	7.8	7.8	7.8	7.8	7.8	-
Wisconsin	-	5.6	5.4	5.4	5.4	5.4	4.6	-
	10,000	6.8	6.5	6.5	6.5	6.5	6.2	-
	20,000	6.8	6.5	6.5	6.5	6.5	6.5	-
	40,000	6.8	6.5	6.5	6.5	6.5	6.5	-
	100,000	6.8	6.8	6.8	6.8	6.8	7.3	-
New Mexico	-	2.5	3.2	2.5	2.5	2.5	2.5	- 23.4
	10,000	4.7	6.0	5.4	5.2	5.0	4.8	- 10.8
	20,000	6.6	7.1	7.1	5.2	5.0	4.8	-
	40,000	8.1	8.1	7.7	5.2	5.0	4.8	- 4.3
	100,000	8.1	8.1	7.7	5.2	5.0	4.8	- 4.3
Maine	-	4.5	4.5	4.5	4.5	4.5	6.5	-
	10,000	8.5	8.5	8.5	8.5	8.5	6.5	-
	20,000	8.5	8.5	8.5	8.5	8.5	6.5	-
	40,000	8.5	8.5	8.5	8.5	8.5	6.5	-
	100,000	8.5	8.5	8.5	8.5	8.5	6.9	-
Kansas	-	3.5	3.5	3.5	3.5	3.5	3.5	-
	10,000	6.3	6.3	6.3	6.3	6.3	6.3	-
	20,000	6.5	6.5	6.5	6.5	6.5	6.5	-
	40,000	6.5	6.5	6.5	6.5	6.5	6.5	-
	100,000	6.5	6.5	6.5	6.5	6.5	6.5	-
New York	-	4.3	4.0	4.3	4.3	4.3	4.3	6.3
	10,000	5.6	4.5	5.6	5.6	5.6	5.6	23.9
	20,000	6.9	5.6	6.9	6.9	6.9	6.9	22.9
	40,000	6.9	6.9	7.5	7.4	6.9	6.9	9.5
	100,000	6.9	6.9	7.7	7.7	6.9	8.4	12.4
California	-	1.5	1.5	1.5	1.5	1.5	1.8	-
	10,000	5.0	4.0	4.0	4.0	4.0	4.3	-
	20,000	8.7	7.8	7.8	7.0	7.0	7.3	-
	40,000	8.7	7.8	7.8	9.3	9.3	9.6	-
	100,000	8.7	7.8	7.8	10.3	10.3	10.6	-
Colorado	-	5.0	4.6	4.6	4.6	4.6	4.6	-
	10,000	5.0	4.6	4.6	4.6	4.6	4.6	-
	20,000	5.0	4.6	4.6	4.6	4.6	4.6	-
	40,000	5.0	4.6	4.6	4.6	4.6	4.6	-
	100,000	5.0	4.6	4.6	4.6	4.6	4.6	-
Iowa	-	2.0	2.0	2.0	2.0	2.0	2.0	-
	10,000	6.3	6.3	6.3	6.3	6.1	6.1	-
	20,000	7.4	7.4	7.4	7.4	6.6	6.6	-
	40,000	9.0	9.0	9.0	9.0	8.5	8.5	-
	100,000	9.0	9.0	9.0	9.0	8.5	8.5	-

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State*	Tax Bracket, US$ **	Tax Rate 2000, %	Tax Rate 2002, %	Tax Rate 2004, %	Tax Rate 2006, %	Tax Rate 2008, %	Tax Rate 2010, %	Delta 2004 vs. 2002, %
Delaware	-	3.8	3.1	3.1	3.1	3.1	3.1	-
	10,000	5.6	4.8	4.8	4.8	4.8	4.8	-
	20,000	6.4	5.4	5.4	5.4	5.4	5.4	-
	40,000	6.4	6.0	6.0	6.0	6.0	7.0	-
	100,000	6.4	6.0	6.0	6.0	6.0	7.0	-
South Carolina	-	4.1	4.1	4.1	3.6	3.6	3.0	-
	10,000	7.0	7.0	7.0	6.5	6.5	6.5	-
	20,000	7.0	7.0	7.0	6.5	6.5	6.5	-
	40,000	7.0	7.0	7.0	6.5	6.5	6.5	-
	100,000	7.0	7.0	7.0	6.5	6.5	6.5	-
Nebraska	-	3.0	3.0	3.1	3.1	3.1	3.1	2.2
	10,000	5.0	5.0	5.1	5.1	5.1	5.1	2.2
	20,000	6.7	6.7	6.8	6.8	6.8	6.8	2.4
	40,000	6.7	6.7	6.8	6.8	6.8	6.8	2.4
	100,000	6.7	6.7	6.8	6.8	6.8	6.8	2.4
Arkansas	-	2.9	2.9	2.9	2.3	2.3	2.3	-
	10,000	6.0	6.0	6.0	5.3	5.3	5.3	-
	20,000	7.0	7.0	7.0	7.0	7.0	7.0	-
	40,000	7.0	7.0	7.0	7.0	7.0	7.0	-
	100,000	7.0	7.0	7.0	7.0	7.0	7.0	-
Louisiana	-	2.0	2.0	2.0	2.0	2.0	2.0	-
	10,000	4.0	4.0	4.0	4.0	2.0	4.0	-
	20,000	4.0	4.0	4.0	6.0	4.0	4.0	-
	40,000	6.0	6.0	6.0	6.0	6.0	6.0	-
	100,000	6.0	6.0	6.0	6.0	6.0	6.0	-
Mississippi	-	3.5	3.5	3.5	3.5	3.5	3.5	-
	10,000	5.0	5.0	5.0	5.0	5.0	5.0	-
	20,000	5.0	5.0	5.0	5.0	5.0	5.0	-
	40,000	5.0	5.0	5.0	5.0	5.0	5.0	-
	100,000	5.0	5.0	5.0	5.0	5.0	5.0	-
Kentucky	-	4.0	4.0	4.0	4.0	4.0	4.0	-
	10,000	4.0	4.0	4.0	4.0	4.0	4.0	-
	20,000	4.0	4.0	4.0	4.0	4.0	4.0	-
	40,000	4.0	4.0	4.0	6.0	6.0	6.0	-
	100,000	4.0	4.0	4.0	6.0	6.0	6.0	-
Virginia	-	3.3	3.3	3.3	3.3	3.3	3.3	-
	10,000	5.8	5.8	5.8	5.8	5.8	5.8	-
	20,000	5.8	5.8	5.8	5.8	5.8	5.8	-
	40,000	5.8	5.8	5.8	5.8	5.8	5.8	-
	100,000	5.8	5.8	5.8	5.8	5.8	5.8	-
Arizona	-	2.9	2.9	2.9	2.9	2.6	2.6	-
	10,000	3.2	3.2	3.2	3.2	2.9	2.9	-
	20,000	3.7	3.7	3.7	3.7	3.4	3.4	-
	40,000	4.7	4.7	4.7	4.7	4.2	4.2	-
	100,000	5.0	5.0	5.0	5.0	4.5	4.5	-

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State*	Tax Bracket, US$ **	Tax Rate 2000, %	Tax Rate 2002, %	Tax Rate 2004, %	Tax Rate 2006, %	Tax Rate 2008, %	Tax Rate 2010, %	Delta 2004 vs. 2002, %
Missouri	-	3.8	3.8	3.8	3.8	3.8	3.8	-
	10,000	3.8	3.8	3.8	3.8	3.8	3.8	-
	20,000	3.8	3.8	3.8	3.8	3.8	3.8	-
	40,000	3.8	3.8	3.8	3.8	3.8	3.8	-
	100,000	3.8	3.8	3.8	3.8	3.8	3.8	-
Alabama	-	3.7	3.7	3.7	3.7	3.7	3.7	-
	10,000	3.7	3.7	3.7	3.7	3.7	3.7	-
	20,000	3.7	3.7	3.7	3.7	3.7	3.7	-
	40,000	3.7	3.7	3.7	3.7	3.7	3.7	-
	100,000	3.7	3.7	3.7	3.7	3.7	3.7	-
Oklahoma	-	3.1	3.1	3.1	3.1	3.0	3.0	-
	10,000	6.8	6.8	7.0	6.7	3.0	3.0	3.7
	20,000	6.8	6.8	7.0	6.7	3.0	3.0	3.7
	40,000	6.8	6.8	7.0	6.7	3.0	3.0	3.7
	100,000	6.8	6.8	7.0	6.7	3.0	3.0	3.7
Georgia	-	3.5	3.5	3.5	3.5	3.5	3.5	-
	10,000	3.5	3.5	3.5	3.5	3.5	3.5	-
	20,000	3.5	3.5	3.5	3.5	3.5	3.5	-
	40,000	3.5	3.5	3.5	3.5	3.5	3.5	-
	100,000	3.5	3.5	3.5	3.5	3.5	3.5	-
Maryland	-	3.5	3.5	3.4	3.4	3.4	3.4	- 0.7
	10,000	3.5	3.5	3.4	3.4	3.4	3.4	- 0.7
	20,000	3.5	3.5	3.4	3.4	3.4	3.4	- 0.7
	40,000	3.5	3.5	3.4	3.4	3.4	3.4	- 0.7
	100,000	3.5	3.5	3.4	3.4	5.5	5.5	- 0.7
Tennessee	-	6.0	6.0	6.0	6.0	6.0	6.0	-
	10,000	6.0	6.0	6.0	6.0	6.0	6.0	-
	20,000	6.0	6.0	6.0	6.0	6.0	6.0	-
	40,000	6.0	6.0	6.0	6.0	6.0	6.0	-
	100,000	6.0	6.0	6.0	6.0	6.0	6.0	-
Massachu-setts	-	6.0	5.6	5.3	5.3	5.3	5.3	- 5.4
	10,000	6.0	5.6	5.3	5.3	5.3	5.3	- 5.4
	20,000	6.0	5.6	5.3	5.3	5.3	5.3	- 5.4
	40,000	6.0	5.6	5.3	5.3	5.3	5.3	- 5.4
	100,000	6.0	5.6	5.3	5.3	5.3	5.3	- 5.4
New Hampshire	-	5.0	5.0	5.0	5.0	5.0	5.0	-
	10,000	5.0	5.0	5.0	5.0	5.0	5.0	-
	20,000	5.0	5.0	5.0	5.0	5.0	5.0	-
	40,000	5.0	5.0	5.0	5.0	5.0	5.0	-
	100,000	5.0	5.0	5.0	5.0	5.0	5.0	-
West Virginia	-	3.0	3.0	3.0	3.0	3.0	3.0	-
	10,000	4.0	4.0	4.0	4.0	4.0	4.0	-
	20,000	4.5	4.5	4.5	4.5	4.5	4.5	-
	40,000	6.3	6.3	6.3	6.3	6.3	6.3	-
	100,000	6.3	6.3	6.3	6.3	6.3	6.3	-

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State*	Tax Bracket, US$ **	Tax Rate 2000, %	Tax Rate 2002, %	Tax Rate 2004, %	Tax Rate 2006, %	Tax Rate 2008, %	Tax Rate 2010, %	Delta 2004 vs. 2002, %
	-	4.7	4.7	4.7	4.7	5.0	5.0	-
	10,000	4.7	4.7	4.7	4.7	5.0	5.0	-
Utah	20,000	4.7	4.7	4.7	4.7	5.0	5.0	-
	40,000	4.7	4.7	4.7	4.7	5.0	5.0	-
	100,000	4.7	4.7	4.7	4.7	5.0	5.0	-
	-	4.4	4.2	4.0	3.9	4.4	4.4	- 4.8
	10,000	4.4	4.2	4.0	3.9	4.4	4.4	- 4.8
Michigan	20,000	4.4	4.2	4.0	3.9	4.4	4.4	- 4.8
	40,000	4.4	4.2	4.0	3.9	4.4	4.4	- 4.8
	100,000	4.4	4.2	4.0	3.9	4.4	4.4	- 4.8
	-	1.1	1.1	1.1	1.1	1.0	0.9	-
	10,000	3.2	3.3	3.3	3.2	2.9	2.6	-
Ohio	20,000	4.3	4.5	4.5	4.3	3.9	3.5	-
	40,000	5.8	6.0	6.0	5.8	5.3	4.8	-
	100,000	7.2	7.5	7.5	7.2	6.6	5.9	-
	-	3.0	3.0	3.0	3.0	3.0	3.0	-
	10,000	4.5	4.5	5.0	5.0	5.0	5.0	11.1
Connecticut	20,000	4.5	4.5	5.0	5.0	5.0	5.0	11.1
	40,000	4.5	4.5	5.0	5.0	5.0	5.0	11.1
	100,000	4.5	4.5	5.0	5.0	5.0	6.5	11.1
	-	1.4	1.4	1.4	1.4	1.4	1.4	-
	10,000	1.4	1.8	1.4	1.4	1.4	1.4	- 20.0
New Jersey	20,000	2.6	3.0	2.6	2.6	2.6	2.6	- 11.8
	40,000	5.9	5.9	5.9	5.9	5.9	5.9	-
	100,000	5.9	5.9	9.0	9.0	9.0	9.0	50.9
	-	3.4	3.4	3.4	3.4	3.4	3.4	-
	10,000	3.4	3.4	3.4	3.4	3.4	3.4	-
Indiana	20,000	3.4	3.4	3.4	3.4	3.4	3.4	-
	40,000	3.4	3.4	3.4	3.4	3.4	3.4	-
	100,000	3.4	3.4	3.4	3.4	3.4	3.4	-
	-	3.0	3.0	3.0	3.0	3.0	3.0	-
	10,000	3.0	3.0	3.0	3.0	3.0	3.0	-
Illinois	20,000	3.0	3.0	3.0	3.0	3.0	3.0	-
	40,000	3.0	3.0	3.0	3.0	3.0	3.0	-
	100,000	3.0	3.0	3.0	3.0	3.0	3.0	-
	-	2.8	2.8	3.1	3.1	3.1	3.1	9.6
	10,000	2.8	2.8	3.1	3.1	3.1	3.1	9.6
Pennsylvania	20,000	2.8	2.8	3.1	3.1	3.1	3.1	9.6
	40,000	2.8	2.8	3.1	3.1	3.1	3.1	9.6
	100,000	2.8	2.8	3.1	3.1	3.1	3.1	9.6
	-	-	-	-	-	-	-	-
	10,000	-	-	-	-	-	-	-
Alaska	20,000	-	-	-	-	-	-	-
	40,000	-	-	-	-	-	-	-
	100,000	-	-	-	-	-	-	-

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State*	Tax Bracket, US$ **	Tax Rate 2000, %	Tax Rate 2002, %	Tax Rate 2004, %	Tax Rate 2006, %	Tax Rate 2008, %	Tax Rate 2010, %	Delta 2004 vs. 2002, %
Florida	-	-	-	-	-	-	-	-
	10,000	-	-	-	-	-	-	-
	20,000	-	-	-	-	-	-	-
	40,000	-	-	-	-	-	-	-
	100,000	-	-	-	-	-	-	-
Nevada	-	-	-	-	-	-	-	-
	10,000	-	-	-	-	-	-	-
	20,000	-	-	-	-	-	-	-
	40,000	-	-	-	-	-	-	-
	100,000	-	-	-	-	-	-	-
South Dakota	-	-	-	-	-	-	-	-
	10,000	-	-	-	-	-	-	-
	20,000	-	-	-	-	-	-	-
	40,000	-	-	-	-	-	-	-
	100,000	-	-	-	-	-	-	-
Texas	-	-	-	-	-	-	-	-
	10,000	-	-	-	-	-	-	-
	20,000	-	-	-	-	-	-	-
	40,000	-	-	-	-	-	-	-
	100,000	-	-	-	-	-	-	-
Washington	-	-	-	-	-	-	-	-
	10,000	-	-	-	-	-	-	-
	20,000	-	-	-	-	-	-	-
	40,000	-	-	-	-	-	-	-
	100,000	-	-	-	-	-	-	-
Wyoming	-	-	-	-	-	-	-	-
	10,000	-	-	-	-	-	-	-
	20,000	-	-	-	-	-	-	-
	40,000	-	-	-	-	-	-	-
	100,000	-	-	-	-	-	-	-

Source: Author's computations based on State income tax form, CCH State Tax Handbook; information available at www.taxfoundation.org

Notes: Value of income tax rates reported in the table is rounded to the nearest tenth, but the percentage increase from 2004 to 2002 is computed using not rounded tax rates. Thus, the discrepancy between reported differences and those computed using the tax rates reported in the table are due to the rounding.

* States are listed in decreasing order of average tax rate in the year 2000.

** Dollar values of tax brackets are normalised such as to be comparable to the tax brackets provided by Taxsim Table: "State taxes for representative taxpayers through time" available at http://users.nber.org/ taxsim/state-tax-tables/

TABLE A4: **Filed Federal Returns by State: Mortgage interest deduction**

State*	Mortgage Interest p.Filer 2000, US$	Proportion Filers with Mortgage Interest 2000, %	Mortgage Interest p.Filer 2002, US$	Proportion Filers with Mortgage Interest 2002, %	Mortgage Interest p.Filer 2004, US$	Proportion Filers with Mortgage Interest 2004, %	Mortgage Interest p.Filer 2006, US$	Proportion Filers with Mortgage Interest 2006, %	Mortgage Interest p.Filer 2008, US$	Proportion Filers with Mortgage Interest 2008, %	Mortgage Interest p.Filer 2010, US$	Proportion Filers with Mortgage Interest 2010, %	CAGR Mortgage Interest p. Filer 2010 vs 2000, %	Delta pp Proportion Filers with Mortgage Interest 2010 vs 2000
California	13,247	31%	13,972	32%	14,393	32%	19,153	32%	18,876	29%	15,756	27%	2%	- 3.44
Hawaii	12,581	26%	12,322	26%	12,622	26%	15,504	26%	16,730	24%	14,955	23%	2%	- 2.74
D.C.	11,193	25%	11,732	27%	12,092	28%	16,552	29%	16,720	27%	14,986	25%	3%	0.16
Nevada	11,059	31%	11,378	33%	11,802	33%	16,532	33%	15,502	30%	12,192	25%	1%	- 6.43
Washington	11,005	31%	11,221	32%	11,142	33%	13,038	34%	14,262	31%	12,615	30%	1%	- 0.59
Colorado	10,434	36%	11,232	38%	11,976	38%	12,993	38%	13,300	35%	11,746	33%	1%	- 2.79
Connecticut	10,175	35%	10,086	36%	9,872	37%	12,359	37%	12,509	35%	10,971	34%	1%	- 0.24
Wyoming	9,821	17%	9,402	18%	8,954	18%	11,433	20%	11,350	20%	10,392	20%	1%	3.34
Florida	9,660	24%	9,714	25%	10,195	26%	12,529	28%	13,375	25%	11,169	19%	1%	- 4.10
Maryland	9,619	38%	9,929	40%	10,022	40%	14,077	40%	14,162	38%	12,448	37%	3%	- 1.25
Virginia	9,571	33%	9,941	35%	10,328	35%	13,463	36%	14,094	34%	12,591	33%	3%	- 0.13
New Jersey	9,342	33%	9,796	35%	9,706	35%	12,260	35%	13,215	33%	11,412	32%	2%	- 1.18
Arizona	9,316	33%	9,674	35%	9,741	34%	12,724	34%	13,616	32%	11,282	28%	2%	- 4.51
Texas	9,220	18%	9,041	20%	8,792	21%	9,866	22%	9,955	20%	9,112	20%	0%	1.48
Massachusetts	9,166	32%	9,741	33%	10,082	34%	12,247	34%	12,805	32%	11,367	31%	2%	- 0.40
Alaska	9,105	23%	9,352	23%	9,344	22%	10,882	24%	11,994	22%	11,120	22%	2%	- 1.05
Tennessee	9,077	19%	8,972	21%	8,422	22%	9,803	22%	10,349	21%	9,419	20%	0%	0.18
New York	9,035	25%	9,186	26%	9,572	26%	12,162	26%	12,206	24%	10,645	23%	2%	- 2.40
Oregon	9,003	34%	9,127	36%	8,868	35%	10,847	35%	11,885	32%	10,538	31%	2%	- 2.75
Illinois	8,978	29%	9,156	31%	9,489	30%	11,700	31%	11,593	29%	9,973	28%	1%	- 1.22
Utah	8,964	35%	9,217	36%	8,667	35%	9,887	35%	11,683	33%	10,204	33%	1%	- 2.19
Georgia	8,886	31%	9,293	34%	10,482	33%	10,528	33%	10,844	31%	9,591	27%	1%	- 4.22
Delaware	8,473	32%	8,810	34%	8,946	32%	11,138	33%	12,006	32%	10,811	31%	2%	- 1.70
New Mexico	8,248	21%	8,814	24%	8,485	23%	9,983	23%	10,969	21%	9,858	21%	2%	- 0.04
New Hampshire	8,179	30%	8,733	32%	8,989	31%	10,873	33%	12,142	31%	10,206	30%	2%	0.68
South Dakota	8,110	13%	8,076	14%	7,805	15%	8,970	16%	9,404	15%	8,580	16%	1%	2.59
North Carolina	8,092	30%	8,299	32%	9,049	31%	9,348	31%	10,122	29%	9,050	28%	1%	- 1.81
Minnesota	8,025	35%	8,752	37%	9,009	36%	10,638	36%	11,016	34%	9,757	33%	2%	- 1.99
Idaho	7,869	31%	7,902	32%	8,156	30%	9,751	31%	10,587	29%	9,461	27%	2%	- 3.77
Michigan	7,847	31%	8,404	33%	8,273	32%	9,383	32%	9,505	28%	8,324	26%	1%	- 5.27
Louisiana	7,623	17%	7,729	18%	9,714	17%	11,552	19%	9,526	19%	9,009	18%	2%	1.24
South Carolina	7,612	27%	7,839	29%	9,782	28%	9,351	28%	9,959	26%	9,021	25%	2%	- 2.22
Missouri	7,472	25%	7,624	27%	7,565	26%	8,930	27%	9,303	26%	8,333	25%	1%	- 0.51
Pennsylvania	7,442	26%	7,661	27%	7,837	26%	8,955	27%	9,728	25%	8,837	25%	2%	- 1.21
Rhode Island	7,392	31%	7,733	32%	8,170	32%	10,358	32%	10,951	31%	9,629	30%	3%	- 0.81
Alabama	7,375	25%	7,501	26%	7,414	25%	8,885	25%	9,267	24%	8,610	22%	2%	- 2.20
Indiana	7,293	27%	7,466	29%	7,597	26%	8,246	27%	8,637	24%	7,758	23%	1%	- 4.01
Kansas	7,181	24%	7,476	26%	7,324	25%	8,259	25%	8,647	24%	7,846	24%	1%	- 0.41
Ohio	7,139	29%	7,280	30%	7,109	29%	8,132	30%	8,475	27%	7,552	26%	1%	- 3.01
Mississippi	7,110	18%	7,122	19%	6,754	18%	7,983	19%	8,301	18%	7,649	17%	1%	- 0.56
Nebraska	7,069	23%	7,174	25%	6,987	25%	7,878	25%	8,233	23%	7,479	24%	1%	0.66
Vermont	6,969	26%	7,082	28%	7,139	25%	8,575	26%	9,299	25%	8,502	24%	2%	- 2.07
Kentucky	6,854	26%	6,952	27%	6,873	26%	7,931	26%	8,345	25%	7,554	24%	1%	- 1.82
West Virginia	6,773	15%	6,807	16%	6,938	14%	8,289	15%	8,870	15%	8,132	15%	2%	0.36
Montana	6,755	24%	7,065	26%	7,257	24%	8,831	25%	9,890	23%	8,982	23%	3%	- 0.89
Wisconsin	6,689	31%	6,949	33%	6,847	32%	8,199	32%	8,739	30%	7,793	29%	2%	- 1.61
Arkansas	6,606	19%	6,810	20%	6,832	19%	8,093	20%	8,365	19%	7,764	19%	2%	- 0.58
North Dakota	6,536	14%	6,661	15%	6,578	14%	7,705	15%	8,372	15%	7,920	15%	2%	0.66
Maine	6,501	26%	6,702	28%	6,892	26%	8,564	27%	9,798	26%	8,298	26%	2%	- 0.40
Iowa	6,336	24%	6,588	26%	6,568	25%	7,518	25%	8,104	20%	7,177	24%	1%	0.57
Oklahoma	6,282	24%	6,426	25%	6,340	24%	7,670	24%	7,992	21%	7,645	20%	2%	- 3.50

Source: Author's computations based on Internal Revenue Service data

* States are listed in decreasing order of dollar amount of mortgage interest per filer in the year 2000

TABLE A5: **State level controls**

State	MID	Homeowner ship,%		Unemploy ment,%		House Price Index		Real GDP, mln US$		Real GDP per capita, US$		Personal Income per capita, US$		Republicans at Presidential Elections		Tot. Population		Inc. Urban Population, %		Nr. Obs. in PSID	
		2000	2010	2000	2010	2000	2010	2000	2010	2000	2010	2000	2010	2000	2012*	2000	2010	2000	2010	2000	2010
D.C.	Yes	23	13	6	9	95	223	80,650	104,407	140,986	172,577	43,206	69,431	0	0	572,059	601,723	100	100	35	54
Rhode Island	Yes	75	60	4	11	95	147	43,311	48,719	41,238	46,277	30,201	43,013	0	0	1,048,319	1,052,567	91	91	4	5
Vermont	Yes	75	63	3	6	98	159	22,331	26,349	36,630	42,097	28,547	40,134	0	0	608,827	625,741	38	39	4	8
North Dakota	Yes	83	100	3	4	100	155	22,945	34,564	35,738	51,254	25,872	43,275	1	1	6,422	672,591	56	60	6	6
Oregon	Yes	61	56	5	11	100	139	132,124	190,136	38,523	49,538	28,867	35,898	0	0	3,421,399	3,831,074	79	81	133	141
North Carolina	Yes	57	47	4	11	99	119	345,483	418,473	42,749	43,778	27,859	35,435	1	1	8,049,313	9,535,483	60	66	303	428
Minnesota	Yes	81	78	3	7	96	116	238,122	268,941	48,264	50,641	32,326	42,572	0	0	4,919,479	5,303,925	71	73	108	130
Hawaii	Yes	38	20	4	7	98	192	53,646	66,432	44,207	48,694	28,927	41,668	0	0	1,211,537	1,360,301	92	92	8	5
Montana	Yes	80	50	5	7	99	154	29,028	36,576	32,119	36,918	23,593	34,612	1	1	902,195	989,415	54	56	5	10
Idaho	Yes	57	57	5	9	100	127	45,686	54,702	35,158	34,825	25,258	32,100	1	1	1,293,953	1,567,582	66	71	7	14
Wisconsin	Yes	58	49	4	9	99	121	225,812	252,794	42,019	44,431	29,384	38,728	0	0	5,363,675	5,686,986	68	70	93	103
New Mexico	Yes	60	75	5	8	100	142	69,703	81,179	38,273	39,316	23,417	33,175	0	0	1,819,046	2,059,179	75	77	5	12
Maine	Yes	76	63	3	8	97	146	45,993	50,945	36,015	38,374	27,108	37,213	0	0	1,274,923	1,328,361	40	39	21	27
Kansas	Yes	64	54	4	7	99	121	108,178	124,521	40,160	43,556	28,764	38,811	1	1	2,688,418	2,853,118	71	74	39	50
New York	Yes	50	46	5	9	96	153	997,743	1,182,857	52,508	60,974	35,307	49,582	0	0	18,976,457	19,378,102	88	88	297	298
California	Yes	53	40	5	12	95	136	1,661,865	1,924,438	48,896	51,546	33,366	42,282	0	0	33,871,648	37,253,956	94	95	568	712
Colorado	Yes	67	59	3	9	96	115	219,194	252,035	50,658	49,923	34,227	41,689	1	0	4,301,261	5,029,196	85	86	113	145
Iowa	Yes	77	71	3	6	99	120	116,880	140,473	39,904	46,052	27,583	39,033	0	0	2,926,324	3,046,355	61	64	142	146
Delaware	Yes	75	86	4	8	97	150	51,306	56,684	65,244	62,994	32,097	40,969	0	0	7,836	897,934	80	83	4	7
South Carolina	Yes	57	54	4	11	99	120	146,759	162,616	36,469	35,078	25,124	32,669	1	1	4,012,012	4,625,364	61	66	261	322
Nebraska	Yes	73	70	3	5	100	115	71,939	89,873	41,976	49,119	28,967	39,926	1	1	1,711,263	1,826,341	70	73	45	67
Arkansas	Yes	74	68	4	8	99	123	86,174	110,065	32,171	37,658	22,782	32,017	1	1	2,673,400	2,915,918	53	56	160	167
Louisiana	Yes	49	46	5	8	99	139	182,897	220,819	40,899	48,594	23,552	37,199	1	1	4,468,976	4,533,372	73	73	91	117
Mississippi	Yes	56	51	5	10	100	121	83,563	93,027	29,337	31,331	21,564	30,834	1	1	2,844,658	2,967,297	49	49	205	269
Kentucky	Yes	72	60	4	10	99	119	145,060	164,068	35,826	37,746	24,938	32,929	1	1	4,041,769	4,339,367	56	58	104	121
Virginia	Yes	57	57	2	7	97	157	332,961	417,978	46,857	52,084	32,453	44,836	1	0	7,078,515	8,001,024	73	75	208	250
Arizona	Yes	62	65	4	10	98	113	202,574	245,032	39,254	38,222	26,538	33,993	1	1	5,130,632	6,392,017	88	90	100	109
Missouri	Yes	66	57	4	10	98	117	235,031	255,496	41,915	42,610	28,006	36,606	1	1	5,595,211	5,988,927	69	70	189	223
Alabama	Yes	62	58	5	11	99	121	149,360	172,998	33,548	36,156	24,628	33,894	1	1	4,447,100	4,779,736	55	59	86	107
Oklahoma	Yes	54	49	3	7	99	131	117,692	148,038	34,071	39,377	24,802	35,912	1	1	3,450,654	3,751,351	65	66	35	59
Georgia	Yes	54	41	4	10	98	99	376,077	406,992	45,711	41,894	28,672	34,341	1	1	8,186,453	9,687,653	72	75	160	269
Maryland	Yes	51	46	4	8	97	162	243,810	313,016	45,906	54,080	35,331	50,035	0	0	5,296,486	5,773,552	86	87	188	250
Tennessee	No	66	62	4	10	100	122	224,830	252,035	39,418	39,649	27,483	35,426	1	1	5,689,283	6,346,105	64	66	122	141
Massachusetts	No	74	65	3	8	95	133	350,177	396,122	55,050	60,354	38,430	51,487	0	0	6,349,097	6,547,629	91	92	132	140
New Hampshire	No	91	65	3	6	94	130	53,958	62,187	43,519	47,224	34,280	44,963	1	0	1,235,786	1,316,470	59	60	11	20
West Virginia	No	80	54	5	9	100	130	57,997	64,553	32,096	34,818	22,096	31,798	1	1	1,808,344	1,852,994	46	49	15	13
Utah	No	72	73	3	8	100	126	86,873	116,761	38,705	42,075	24,770	32,447	1	1	2,233,169	2,763,885	88	91	57	85
Michigan	No	61	53	4	12	99	75	423,952	385,779	42,598	39,056	30,015	35,082	0	0	9,938,444	9,883,640	75	75	311	366
Ohio	No	62	55	4	10	100	99	482,655	488,557	42,474	42,342	28,620	36,199	1	0	11,353,140	11,536,504	77	78	290	337
Connecticut	No	65	68	2	9	97	139	207,734	231,643	60,887	64,766	42,198	55,216	0	0	3,405,565	3,574,097	88	88	46	44
New Jersey	No	66	68	4	10	96	156	449,275	493,213	53,291	56,025	39,156	50,941	0	0	8,414,350	8,791,894	94	95	166	178
Indiana	No	55	51	3	10	100	106	252,559	280,408	41,458	43,207	28,114	34,344	1	1	6,080,485	6,483,802	71	72	210	243
Illinois	No	51	48	4	10	98	116	615,909	645,829	49,534	50,296	32,934	42,033	0	0	12,419,293	12,830,632	88	88	203	255
Pennsylvania	No	62	54	4	8	99	149	517,523	584,412	42,129	45,976	30,482	41,635	0	0	12,281,054	12,702,379	77	79	268	327
Alaska	No	58	90	6	8	98	156	36,334	49,023	57,859	68,656	31,491	45,565	1	1	626,932	710,231	66	66	12	10
Florida	No	66	61	4	11	96	125	618,717	721,007	38,555	38,258	29,570	38,478	1	0	15,982,378	18,801,310	89	91	294	327
Nevada	No	65	61	4	14	98	97	98,325	119,242	48,706	44,102	31,208	36,657	1	0	1,998,257	2,700,551	92	94	46	56
South Dakota	No	77	55	2	5	99	134	27,522	37,960	36,412	46,507	27,260	40,613	1	1	754,844	814,180	52	57	26	31
Texas	No	57	50	4	8	98	128	937,705	1,201,992	44,771	47,617	28,341	38,065	1	1	20,851,820	25,145,561	83	85	327	493
Washington	No	64	63	5	10	99	140	298,577	356,398	50,516	52,850	32,865	42,547	0	0	5,894,121	6,724,540	82	84	120	139
Wyoming	No	57	36	4	6	98	165	24,831	37,392	50,235	66,256	28,930	45,025	1	1	493,782	563,626	65	65	14	11

Note: Real dollar values are stated in terms of chained 2009 dollars. House price index is constructed such that December 2000 is normalised to 100. Unemployment rate is seasonally adjusted. CPI is based upon a chained year 1982-1984 = 100. Unemployment is seasonally adjusted. Columns 15-16 assign value 1 if Republican party won at the presidential elections.

TABLE A6: **Summary statistics for home- and mortgage-owners in the PSID sample, panels 2001 - 2011**

	All states			States with no MID			States allowing for MID		
	N	**Mean**	**Median**	**N**	**Mean**	**Median**	**N**	**Mean**	**Median**
Homeowners									
Value of the house ($)	26,718	204,714	150,000	11,312	207,625	150,000	15,406	202,576	145,000
Mortgage ownership (%)	27,741	70.9		11,651	70.8		16,090	71.0	
Second mortgage ownership (%)	27,741	11.0		11,651	10.9		16,090	11.1	
Income($)	27,741	46,274	34,000	11,651	48,301	36,000	16,090	44,806	33,000
Unemployed (%)	27,741	3.5		11,651	3.1		16,090	3.7	
Retired (%)	27,741	15.7		11,651	17.0		16,090	14.8	
Self-employed (%)	27,741	12.1		11,651	11.8		16,090	12.3	
Male	27,741	79.4		11,651	79.1		16,090	79.6	
Age of the head	27,741	49.7	48.0	11,651	50.2	49.0	16,090	49.3	48.0
Married (%)	27,741	67.2		11,651	67.2		16,090	67.1	
Number of Children	27,741	81.6		11,651	80.9		16,090	82.1	
Years of education	27,741	14.6	12.0	11,651	15.0	12.0	16,090	14.3	12.0
Changed state in the sample (%)	28,285	1.9		11,886	2.0		16,399	1.9	
Mortgage owners									
Total Value of the mortgage ($)	18,162	340,449	268,800	7,630	344,262	274,536	10,532	337,687	262,356
Home Equity ($)	25,483	114,978	65,000	10,865	120,123	70,000	14,618	111,154	60,000
Total monthly payments ($)	19,234	1,141	922	8,059	1,167	950	11,175	1,123	900
Difficulty with mortgage payments in 2009 - 2011 (% of mortgage-holders)	6,482	24.7		2,771	24.1		3,711	25.1	
First mortgage									
Interest rate for the first mortgage (%)	17,784	6.1	6.0	7,588	6.1	6.0	10,196	6.2	6.0
Duration first mortgage (years)	18,742	24.5	30.0	7,882	24.4	30.0	10,860	24.6	30.0
Second mortgage									
Interest rate for the second mortgage (%)	2,694	7.0	7.0	1,110	6.9	7.0	1,584	7.0	7.0
Duration second mortgage (years)	2,627	15.0	14.0	1,076	14.8	14.0	1,551	15.2	14.0

Note: The table reports descriptive statistics for the sample of home- and mortgage - owners from PSID waves 2001 through 2011. Socio-demographic characteristics are of households heads. Differences in number of observations are due to missing answers on different questions. Home equity is defined to be the difference between the value of the house and the remaining mortgage principal. The total value of the mortgage is calculated based on the answers about the duration of the mortgage and monthly payments.

TABLE A7: **OLS Regressions of homeownership: increase in income tax in New York and Pennsylvania between 2000 and 2010**

	Pooled Cross-Section						Fixed-effects					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
NY # Post 2004	0.157***	0.077***	0.077***				0.030***	0.027***	0.027***			
	(0.004)	(0.006)	(0.006)				(0.005)	(0.005)	(0.005)			
PA # Post 2004	-0.024***	-0.019***	-0.020**				-0.025**	-0.019*	-0.023**			
	(0.008)	(0.007)	(0.008)				(0.010)	(0.010)	(0.010)			
NewYork #Year2004				0.162***	0.085***	0.083***				0.016**	0.017**	0.017**
				(0.005)	(0.005)	(0.006)				(0.007)	(0.007)	(0.007)
NewYork #Year2006				0.134***	0.066***	0.065***				0.039***	0.030***	0.031***
				(0.005)	(0.007)	(0.007)				(0.006)	(0.006)	(0.006)
NewYork #Year2010				0.227***	0.087***	0.092***				0.058***	0.066***	0.065***
				(0.005)	(0.008)	(0.008)				(0.005)	(0.006)	(0.007)
Pennsylvania#Year2004				-0.046***	-0.029***	-0.030***				-0.027***	-0.022**	-0.023**
				(0.008)	(0.007)	(0.007)				(0.009)	(0.009)	(0.009)
Pennsylvania#Year2006				-0.018*	-0.020**	-0.023***				-0.020**	-0.015*	-0.019**
				(0.009)	(0.007)	(0.008)				(0.009)	(0.008)	(0.009)
Pennsylvania#Year2010				-0.009	-0.008	-0.008				-0.027*	-0.019	-0.027*
				(0.009)	(0.008)	(0.009)				(0.015)	(0.014)	(0.014)
New York	-0.113***	-0.153***	-0.077***	-0.113***	-0.153***	-0.077***						
	(0.014)	(0.014)	(0.012)	(0.014)	(0.014)	(0.013)						
Pennsylvania	0.006	0.002	0.020**	0.006	0.002	0.021**						
	(0.014)	(0.013)	(0.009)	(0.014)	(0.013)	(0.009)						
Other States	0.013	-0.002	0.003	0.013	-0.002	0.003						
	(0.024)	(0.023)	(0.012)	(0.024)	(0.023)	(0.012)						
Other States # Post 2004	-0.003	-0.011	-0.008	-0.003	-0.011	-0.011	-0.018**	-0.018**	-0.016**	-0.018**	-0.018**	-0.016**
	(0.011)	(0.009)	(0.009)	(0.011)	(0.009)	(0.009)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
DV Mean Control Group	0.619	0.619	0.619	0.619	0.619	0.619	0.619	0.619	0.619	0.619	0.619	0.619
Observations	36,342	36,342	36,342	36,342	36,342	36,342	36,342	36,342	36,342	36,342	36,342	36,342
R-squared	0.005	0.287	0.296	0.005	0.287	0.295	0.011	0.054	0.054	0.011	0.054	0.055
Socio-demographic controls		YES	YES		YES	YES		YES	YES		YES	YES
State-level controls			YES			YES			YES			YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Individual Fixed Effects							YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable is a dummy, indicating a household being the owner of the residence. The table shows the result of estimating OLS models using: models (1)-(6) - pooled cross-section; models (6)-(12) - panel regressions. Individual level data is from PSID waves 2001- 2011. Year 2008 corresponding to panel 2009 is omitted. NY # Post 2004 is unity only for those tax brackets for which marginal tax rate post 2004 is higher than both in the year 2000 and 2002. Other states are those that had only minor changes in fiscal policy. State level controls include seasonally adjusted unemployment, house price index, Log Real GDP and Log Real GDP per capita. Individual level control variables include IHS transformation of Income, age, number of family members, number of children, indicator for a Male head of the household, indicator for a married head, having at least college degree, self-employment, unemployment, retirement. All standard errors are clustered by state. *** p<0.01, ** p<0.05, * p<0.1

TABLE A8: **OLS Regressions of homeownership: changes in income tax rates in New York State between 2000 and 2010**

	Fixed Effects		
	(1)	(2)	(3)
Increase in Marginal Tax Rate in New York	0.511***	0.492***	0.426***
	(0.069)	(0.067)	(0.056)
Marginal Tax Rate in New York	-0.953	-1.516**	-1.079
	(0.696)	(0.686)	(0.725)
Marginal Tax Rate in Other States	0.774***	0.257	0.271
	(0.245)	(0.245)	(0.237)
IHS Income		0.005***	0.005***
		(0.001)	(0.001)
Nr. Family Members		0.045***	0.045***
		(0.005)	(0.005)
Nr. Children		-0.018**	-0.018**
		(0.007)	(0.007)
Married		0.190***	0.190***
		(0.017)	(0.018)
Self-employed		0.018*	0.018*
		(0.009)	(0.009)
Unemployed		0.018*	0.018*
		(0.010)	(0.009)
Retired		-0.005	-0.005
		(0.010)	(0.011)
Mean Control Group	0.618	0.618	0.618
Average change in MTR in New York, pp	0.08	0.08	0.08
Observations	32,152	32,152	32,152
R-squared	0.013	0.057	0.058
Individual Fixed Effects	YES	YES	YES
Year FE	YES	YES	YES
State-level controls			YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable is an indicator that a household owns its residence and it takes value zero if a household is a renter. The table shows the result of estimating individual fixed effects models. Individual level data is from PSID waves 2001- 2011. Control group are states that never changed fiscal policy between 2000 and 2010. Other states are those, that had minor changes in fiscal policy in any given year between 2000 and 2010. Observations for Oregon and Pennsylvania are excluded from the regression. Individual controls include inverse hyperbolic sine transformation of income, number of children and number of family members residing together, indicators for head of the household being married, self-employed, unemployed or retired. State level controls include seasonally adjusted unemployment, house price index, Log Real GDP and Log Real GDP per capita. All standard errors are clustered by state. *** p<0.01, ** p<0.05, * p<0.1

TABLE A9: **OLS Regressions of homeownership: decrease in standard deduction in Oregon: time window 2000 - 2010**

	Pooled Cross-Section						Fixed-effects					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Oregon # Year 2004 and 2006	0.062***	0.056***	0.054***				0.046***	0.047***	0.046***			
	(0.006)	(0.006)	(0.006)				(0.009)	(0.009)	(0.009)			
Oregon #Year2004				0.058***	0.055***	0.052***				0.042***	0.043***	0.047***
				(0.006)	(0.006)	(0.007)				(0.010)	(0.010)	(0.010)
Oregon #Year2006				0.066***	0.056***	0.056***				0.049***	0.050***	0.045***
				(0.007)	(0.007)	(0.007)				(0.008)	(0.009)	(0.008)
Oregon	0.001	-0.063***	-0.073***	0.001	-0.063***	-0.073***						
	(0.016)	(0.014)	(0.009)	(0.016)	(0.014)	(0.009)						
IHS Income	0.020***	0.020***		0.020***	0.020***		0.004***	0.004***		0.004***	0.004***	
		(0.001)	(0.001)		(0.001)	(0.001)		(0.001)	(0.001)		(0.001)	(0.001)
Age		0.010***	0.011***		0.010***	0.011***						
		(0.000)	(0.000)		(0.000)	(0.000)						
Nr. Family Members		0.039***	0.043***		0.039***	0.043***		0.047***	0.047***		0.047***	0.047***
		(0.005)	(0.005)		(0.005)	(0.005)		(0.005)	(0.005)		(0.005)	(0.005)
Nr. Children		-0.031***	-0.034***		-0.031***	-0.034***		-0.018***	-0.018***		-0.018***	-0.018***
		(0.006)	(0.005)		(0.006)	(0.005)		(0.005)	(0.005)		(0.005)	(0.005)
Male		0.019*	0.022**		0.019*	0.022**						
		(0.010)	(0.010)		(0.010)	(0.010)						
Married		0.280***	0.273***		0.280***	0.273***		0.176***	0.176***		0.176***	0.176***
		(0.009)	(0.009)		(0.009)	(0.009)		(0.015)	(0.015)		(0.015)	(0.015)
College		0.075***	0.079***		0.075***	0.079***						
		(0.014)	(0.013)		(0.014)	(0.013)						
Self-employed		0.032***	0.031***		0.032***	0.031***		0.015*	0.015*		0.015*	0.015*
		(0.008)	(0.008)		(0.008)	(0.008)		(0.007)	(0.007)		(0.007)	(0.007)
Unemployed		-0.079***	-0.075***		-0.079***	-0.075***		0.006	0.006		0.006	0.006
		(0.012)	(0.012)		(0.012)	(0.012)		(0.008)	(0.008)		(0.008)	(0.008)
Retired		0.082***	0.082***		0.082***	0.082***		-0.006	-0.006		-0.006	-0.006
		(0.016)	(0.015)		(0.016)	(0.015)		(0.008)	(0.008)		(0.008)	(0.008)
Other States	0.011	-0.010	-0.004	0.011	-0.010	-0.004						
	(0.028)	(0.026)	(0.011)	(0.028)	(0.026)	(0.011)						
Other States # Year 2004 and 2006	-0.001	-0.004	-0.001	-0.001	-0.004	-0.001	0.004	0.003	0.005	0.004	0.003	0.005
	(0.008)	(0.007)	(0.007)	(0.008)	(0.007)	(0.007)	(0.006)	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)
DV Mean Control Group	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616	0.616
Observations	41,176	41,176	41,176	41,176	41,176	41,176	41,176	41,176	41,176	41,176	41,176	41,176
R-squared	0.003	0.289	0.299	0.003	0.289	0.299	0.010	0.050	0.051	0.010	0.050	0.051
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Individual Fixed Effects							YES	YES	YES	YES	YES	YES
State-level controls			YES			YES			YES			YES

Note: The dependent variable is a dummy, indicating a household being the owner of the residence. The table shows the result of estimating OLS models using: models (1)-(6) - pooled cross-section; models (6)-(12) - panel regressions. Individual level data is from PSID waves 2001 - 2011. Control group are states that never changed fiscal policy between 2000 and 2010. Other states are those, that had minor changes in fiscal policy in any given year between 2000 and 2010. Observations for New York and Pennsylvania are excluded from the regression. Individual controls include inverse hyperbolic sine transformation of income, number of children and number of family members residing together, indicators for head of the household being married, self-employed, unemployed or retired. State level controls include seasonally adjusted unemployment, house price index, Log Real GDP and Log Real GDP per capita. All standard errors are clustered by state. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

TABLE A10: **Homeownership trends between 2000 and 2004**

	Pooled Cross-Section			Fixed-effects		
	(1)	(2)	(3)	(4)	(5)	(6)
Post-treatment						
New York#Year 2004	0.033***	0.039***	0.049***	0.021***	0.023***	0.022***
	(0.007)	(0.006)	(0.008)	(0.007)	(0.007)	(0.007)
Pennsylvania#Year 2004	-0.034***	-0.020***	-0.015**	-0.026***	-0.024***	-0.025***
	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
Oregon#Year 2004	0.088***	0.055***	0.069***	0.026***	0.025**	0.019*
	(0.007)	(0.006)	(0.007)	(0.010)	(0.010)	(0.010)
Other States#Year 2004	-0.000	-0.004	0.003	0.001	0.001	-0.004
	(0.009)	(0.008)	(0.010)	(0.008)	(0.008)	(0.008)
Pre-treatment						
New York#Year 2000	-0.008*	-0.000	-0.011	0.001	-0.002	-0.002
	(0.004)	(0.003)	(0.007)	(0.006)	(0.006)	(0.007)
Pennsylvania#Year 2000	0.028***	0.012***	0.010*	0.030***	0.025***	0.024***
	(0.004)	(0.003)	(0.006)	(0.007)	(0.007)	(0.008)
Oregon#Year 2000	0.022***	-0.007**	-0.010	-0.017*	-0.012	-0.008
	(0.004)	(0.004)	(0.007)	(0.009)	(0.010)	(0.011)
Other States#Year 2000	0.006	0.004	-0.000	0.009	0.010	0.011
	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)
Fixed-effects						
NewYork	-0.096***	-0.162***	-0.086***			
	(0.015)	(0.013)	(0.012)			
Pennsylvania	-0.006	-0.005	0.012			
	(0.015)	(0.013)	(0.009)			
Oregon	-0.028*	-0.058***	-0.073***			
	(0.015)	(0.013)	(0.015)			
Other States	0.012	-0.005	0.003			
	(0.026)	(0.025)	(0.013)			
Year 2000	-0.011***	-0.015***	-0.049***	-0.033***	-0.033***	-0.017
	(0.004)	(0.003)	(0.014)	(0.006)	(0.006)	(0.011)
Year 2004	-0.008	-0.010	0.008	0.023***	0.021***	0.025***
	(0.007)	(0.006)	(0.009)	(0.006)	(0.006)	(0.008)
DV Mean Control Group	0.636	0.636	0.636	0.636	0.636	0.636
Observations	21,443	21,443	21,443	21,443	21,443	21,443
R-squared	0.002	0.269	0.277	0.012	0.040	0.041
Socio-demographic controls		YES	YES		YES	YES
State-level controls			YES			YES
Individual Fixed Effects				YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable is an indicator that a household owns its residence and it takes value zero if a household is a renter. The table shows the result of estimating OLS models using: models (1)-(3) - pooled cross-section; models (4)-(6) - panel regressions. Individual level data is from PSID waves 2001- 2005. Control group are states that never changed fiscal policy between 2000 and 2010. Other states are those, that had minor changes in fiscal policy in any given year between 2000 and 2010. Individual controls include inverse hyperbolic sine transformation of income, age of the head of the household, number of children and number of family members residing together, indicators for head of the household being male, married, having at least 12 years of education (college), being self-employed, unemployed or retired. State level controls include seasonally adjusted unemployment, house price index, Log Real GDP and Log Real GDP per capita. All standard errors are clustered by state. *** p<0.01, ** p<0.05, * p<0.1