TAX REFORM, TRANSACTION COSTS, AND METROPOLITAN HOUSING IN THE UNITED STATES

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ABSTRACT

This study analyzes the effect of tax reforms on the user cost and price of housing in selected metropolitan areas. The study's primary contribution is to introduce a discrete-period model of housing prices that incorporates transaction costs and a time element to housing investment; elements commonly omitted from most studies of taxes and housing. Under this discrete-period framework, this study analyzes several reforms, including the president's proposed 28 percent limitation on the value of itemized deductions; eliminating the mortgage interest and property tax deductions; limiting the mortgage interest deduction and instituting a flat subsidy for closing costs; and the increase in individual income tax rates imposed in 2013. Key findings include (1) the president's proposed limit on itemized deductions would have a minimal impact on housing prices; (2) eliminating itemized deductions altogether would cause housing prices to fall markedly, but less so under the model introduced in this study relative to prior models; (3) limiting the mortgage interest deduction while providing a flat credit for closing can boost housing prices; and (4) the higher tax rates in law in 2013 are unlikely to substantially boost housing prices, a prediction consistent with recent observed house price trends. Together, these findings suggest that plausible tax reforms will have only a modest impact on housing prices.

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1. INTRODUCTION

In the United States, homeowners are afforded several generous tax preferences. Mortgage interest and local property taxes are deductible from taxable income, and most capital gains on home sales are exempt from tax.[2] According to the Office of Management and Budget (OMB), these tax subsidies amounted to $151 billion in 2013 (Office of Management and Budget 2013), making tax expenditures for homeownership among the largest in the tax code.[3]

The search for policies to reduce persistent and growing budget deficits has put tax preferences, including those for housing, under fire. Both President Obama's fiscal commission and the Bipartisan Policy Center's Debt Reduction Task Force recommended replacing the mortgage interest deduction with a tax credit for mortgage interest paid and eliminating deductibility of property taxes (National Commission on Fiscal Responsibility and Reform 2010 and Bipartisan Policy Center 2010). In its Fiscal Year 2014 Budget, the Obama administration proposed to limit the tax benefit from itemized deductions and certain other tax preferences[4]—including interest and property taxes paid on mortgages for owner-occupied homes—to 28 percent of the amount of the deductions (Department of the Treasury 2013). Martin Feldstein, Dan Feenberg, and Maya MacGuineas (2011) proposed to limit the value of certain tax expenditures (including the mortgage interest and property tax deductions) to 2 percent of taxpayers' income. That plan would have sharply curtailed the tax benefits of homeownership since additional mortgage interest or property taxes would have no effect on taxable income for homeowners subject to the cap. Presidential candidate Mitt Romney proposed a variant on the Feldstein et al. plan, although his proposal was vague about the specifics (Brown, Gale, and Looney 2012).

The question of tax reform's impact on housing investment and prices has been traditionally studied in a user-cost framework. This framework sets the rental rate of

[2] Most economists consider the real tax preference for housing to be the exclusion of net "imputed rent"—that is, the return on the housing investment—from taxation. OMB (2013) estimates the value of that tax subsidy at $74 billion in 2013. If imputed rent were taxable, mortgage interest, property taxes, and depreciation would be deductible expenses, as they are for other rental property. OMB also lists an assortment of smaller individual and corporate tax expenditures that benefit homeowners.

[3] Toder, Harris, and Lim (2011) estimate the distribution of tax expenditures for homeownership.

[4] Deductions for the mortgage interest and state and local taxes paid are among the largest *itemized deductions.* Taxpayers typically only itemize their deduction if they exceed a *standard deduction*—$12,200 for joint and $6,100 for single returns in 2013. Only about one-third of tax filers—mostly those with higher incomes—itemize their deductions.

housing equal to the ongoing costs of homeownership, including after-tax mortgage interest and property taxes, the opportunity cost of housing equity, and maintenance, minus expected after-tax real housing appreciation. In prior analysis, the user-cost framework has shown large and immediate reductions in housing prices owing to changes in the tax treatment of housing costs. For example, one oft-cited study estimates that eliminating the mortgage interest and property tax deductions would reduce housing values by an average of 13 to 17 percent in a sample of 63 metropolitan areas (Capozza, Green, and Hendershott 1996).[5] These projected steep declines in housing prices, if correct, suggest that the efficiency and revenue gains from reforming the tax preference for owner-occupied housing might not be worth the costs—including not only depressed housing prices, but the subsequent decline in aggregate consumption and potential for financial turmoil.

This paper presents an important modification to the user-cost analysis. Under what I term a "discrete-period housing model," consumers compare the expected present value of renting over a discrete period to the expected present value of owning over the same period. The most important addition of the discrete-period model is that it allows for the inclusion of transaction costs in the price of housing. This provides a more complete portrayal of the price rational consumers would pay for a house. Moreover, including transaction costs allows for the comparison of the effects on housing prices of lump-sum housing subsidies, such as a tax credit for closing costs, with subsidies applied to the ongoing cost of homeownership.

Transaction costs in the US housing market, which include mortgage and broker fees, title services, transfer taxes, real estate agent commissions, are substantial.[6] For example, in 2001, median mortgage fees averaged about $4,700 per loan, while the median real estate commission paid by the seller was 5.5 percent of the sales price of the house. Mainly due to various transaction taxes, these transaction fees vary substantially among states and localities. As a share of housing prices in the cities studied in this paper, up front transactions costs vary from 0.8 to 2.5 percent, and back-end transaction costs range from 5.5 to 6.9 percent.

The relative importance of transaction costs depends on homeownership duration. Since transaction costs are paid only in the first and last year of homeownership, while other costs are paid continuously, transaction costs comprise a larger share of total costs for short-lived housing investments. In the discrete-period housing model, transaction

[5] As is discussed later in this paper, these declines may be considered upper-bounds for a variety of reasons, including the assumptions that the housing supply is inelastic and that MSA-level markets are homogeneous and driven by a marginal homebuyer in a high tax bracket.

[6] Moving and search costs are additional transaction costs, but are paid by renters and homebuyers alike. Here, only transaction costs specific to homeownership are modeled.

costs range from about 60 percent of total homeownership costs if a home is owned for one year to about 10 percent for a home owned for 30 years. For homeowners in selected cities at the median housing tenure, transaction costs comprise about 16 percent, on average, of the total homeownership cost.

This paper adds to the literature on the impact of tax subsidies on the user cost and price of housing using this improved framework for evaluation. I present estimates of how several proposed and enacted tax reforms affected or would affect user costs and equilibrium prices of houses in major metropolitan markets. These tax changes include the president's proposed 28 percent limitation on the value of itemized deductions; eliminating the mortgage interest and property tax deductions; limiting the mortgage interest deduction and instituting a flat subsidy for closing costs; and the increase in individual income tax rates in place in 2013 following the American Taxpayer Relief Act (ATRA) and Affordable Care Act (ACA).[7]

These tax reforms would have varying effects on the value of housing. Since housing is a tax-preferred asset, it follows that an increase in the marginal tax rate increases the value of the preference for housing. In isolation, the increase in marginal tax rates would reduce the user cost of housing capital and increase equilibrium housing prices. In contrast, limiting itemized deductions places a cap on the value of the mortgage interest and property tax deductions, increasing the user cost of housing capital. The impact of trading the mortgage interest deduction for a flat-rate credit would lower after-tax housing costs for those with low incomes and those who do not itemize deductions, but raise them for those in the highest tax brackets.

Changes in the capital gains rate would also affect the value of housing. The current tax code grants a generous exemption for capital gains on the sale of an owner-occupied home and, consequently, capital gains on the sale of owner-occupied housing are rarely taxed. Thus, while the capital gains tax rate does not directly affect the expected profits from homeownership for most taxpayers, it does affect the after-tax return to other investment and thereby alters the opportunity cost of homeownership. A higher rate of capital gains taxation makes the tax preference on owner-occupied housing relatively more valuable.

[7] ATRA permanently extended most of the Bush-era tax cuts that otherwise would have expired at the end of 2012. ATRA did not extend the lower rates on ordinary income for high-income taxpayers, but did cap the maximum rate on dividends at 20 percent (dividends were previously taxed at a maximum rate of 15 percent, but were scheduled to be taxed as ordinary income beginning in 2013). Thus, ATRA was a tax cut compared with current law, even though some taxpayers saw their tax rates increase. The ACA, on the other hand, imposed several provisions that were unambiguously tax increases, most notably a 3.8 percent surtax on investment income for high-income taxpayers earmarked to help extend Medicare's solvency.

Changes to the value of housing are visible in the user cost of housing capital—which can be considered the break-even return necessary to make a homeowner indifferent between purchasing a home and investing in an alternative investment (with the same amount of risk)—and in housing prices. The user cost in the standard model, as described in detail below, is dependent on several parameters that vary by metropolitan area, including state and local income and property tax rates. In the discrete-period housing model introduced in this paper,[8] the user cost is also driven by transaction costs and duration of homeownership. Under both models, housing values are also dependent on the local rent-to-price ratio. Variance in these values results in significantly different housing costs by metro area. To illustrate differences across local markets, I display below changes in the user cost of housing capital and housing prices for selected metropolitan areas.

The reforms would have a substantial impact on the user cost of capital and housing prices. The 28 percent limitation on itemized deductions, including mortgage interest and property taxes paid, would lead to mean housing declines of 0.4 percent and 0.3 percent under the user-cost and discrete-period models, respectively. Eliminating itemized deductions would sharply push down the price of housing, with the impact being far less under the discrete-period model (11.8 percent) relative to the user-cost model (19.1 percent). Limiting the mortgage interest deduction to 20 percent and simultaneously providing a flat 2 percent closing credit would lead to an estimated 2.5 percent housing price decline in the user-cost model, but an estimated 3.0 percent gain in housing prices in the discrete-period model. The higher tax rates after ATRA and ACA have almost no simulated effect, inducing a mean increase in the price of housing of 0.3 percent in the user-cost model, and 0.2 percent in the discrete-period model.

The analysis in this paper focuses on how including transactions costs in the user-cost framework changes predictions for how tax policies affect housing prices. I continue to make some of the same limiting assumptions as previous work. First, I assume that the supply of urban housing is perfectly inelastic. Price effects of tax changes will be muted if suppliers can respond to changes in demand by producing more housing or taking existing housing off the market—an important qualification. Second, for each city, I assume demand is driven exclusively by current residents. If other potential housing investors, such as non-profit institutions and foreign individuals, can act to offset changes in demand by taxpayers, the effects of tax policy changes on housing will be also be muted. Third, I assume that within each metropolitan market, homeowner demand for housing is determined solely by income and tax characteristics; in truth, a wide array of factors determines a household's preference for homeownership.[9] Fourth, I implicitly

[8] Others have modeled transaction costs in the housing market, including Burman (1985).

[9] The implication for a scenario in which taxable income (and marginal tax rates) is the sole determinant of the homeownership decision is that household preference for housing is increasing in income. Within each

assume segmentation of markets for housing in each metropolitan market by statutory tax bracket, ignoring the role of mobility between and within city-level markets.

These assumptions influence the interpretation of the results, especially the assumption that housing supply is inelastic. If this assumption does not hold, these estimates overstate the effects on equilibrium housing prices. Subsequently, readers who believe that housing is indeed supplied elastically in the long run may regard these estimates as transitory effects. Long-run effects will be mitigated if the stock of housing capital or demand by buyers (other than the assumed marginal buyers) adjusts in response to the change in the after-tax price of housing.

The next section provides a brief overview of the literature related to the effects of income taxes on the user cost of housing capital and housing prices. Section 3 addresses the role of housing supply elasticity and efficiency. Section 4 describes the important role of transaction costs in the housing market. A version of the standard user-cost housing model is then presented, followed by the introduction of a discrete-period housing model. Section 7 describes the data. Section 8 describes recent proposed and enacted tax reforms in greater detail. Simulation results are then presented in section 9. The final section concludes.

2. PREVIOUS STUDIES

A substantial literature exists on the link between taxes and the user cost of housing. Poterba (1992) shows that decreased marginal tax rates in the 1980s led to an increase in the user cost of housing capital for high-income households relative to middle-income households, with median-income households experiencing an increase of 2.7 percentage points (10.6 percent to 13.3 percent), compared to an increase of 7.3 percentage points (from 4.3 percent to 11.6 percent) for high-income households. Anderson, Clemens, and Hanson (2007) show that the cap on deductible mortgage interest affects a very small proportion of homeowners, but that the cap has a substantial effect on the user cost of housing for those affected taxpayers. Poterba and Sinai (2011) estimate that repealing the mortgage interest deduction would increase the user cost of housing from 5.9 percent to 6.3 percent if households don't respond to the tax change by rebalancing their portfolios and to 6.2 percent if they do. (Portfolio rebalancing occurs when homeowners switch between housing and non-housing assets. A common example is when taxpayers sell financial assets to pay down their mortgage.) Richards (2009) finds

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metropolitan market, all very high-income households should be homeowners and all very low-income households should be renters. Changes to the tax code induce those taxpayers on the margin to change their preference between renting and owning. Since the tax changes studied here are primarily directed solely at high-income taxpayers, the proportion of households owning homes will only change if there are households on the margin who are affected by the proposed tax changes. See Carpozza, Green, and Hendershott (1996) for further details.

that while the exclusion of capital gains from owner-occupied housing has little effect on the aggregate user cost of capital (about 0.33 percent), taxation of appreciated housing capital has a substantial impact—over 5 percent—on households with housing gains over the exclusion threshold. Richards also finds that the expiration of EGTRRA and JGTRRA would reduce the user cost of capital by 4.30 percent.

Others have measured the effects of tax changes on housing prices. Carpozza, Green, and Hendershott (CGH 1996) simulate the effect of proposed tax reforms on housing prices. CGH find that removing the property tax deduction would lower average national housing prices by 5 to 7 percent, and that removing both mortgage interest and property tax deductions would reduce prices by 17 percent, respectively. (If households responded to this tax change by paying down their mortgages, the price decline would be 13 to 15 percent.) Prices would decline the most in those cities with low initial rent-to-price ratios and high property tax rates. CGH estimate that the elimination of the property tax deduction would cause local price declines of between 2 and 13 percent, and eliminating both the property tax and mortgage interest deductions would reduce prices by 11 to 34 percent.[10] Harris (2011) uses a similar methodology as CGH to measure the impact of the administration's Fiscal Year 2011 Budget proposals on the equilibrium price of housing. The study finds that raising the top income tax rate to 39.6 percent, assuming the marginal taxpayer is in the 35 percent bracket, would raise housing prices by 8.60 percent. Raising the capital gains rate to 20 percent from 15 percent would boost housing prices by 11.01 percent, while limiting the benefit of itemized deductions to 28 percent would lower housing prices by 16.87 percent, on average, across selected metro areas. The combined effect of the proposals would drop metropolitan housing prices by 11.54 percent. Holtz-Eakin (1996) critiques the methods used by CGH and shows that under moderate assumptions about housing supply elasticity, income tax changes would reduce the stock of owner-occupied housing, with limited effects on the equilibrium price of housing. Indeed, the estimates by CGH and Harris overstate price effects if there is any housing supply response to the change in price.

Bruce and Holtz-Eakin (2001) estimate the changes in equilibrium housing prices from the implementation of a flat consumption tax. Unlike the techniques used in CGH and this study, Bruce and Holtz-Eakin assume elastic supply of and demand for housing. This assumption alters the model to allow for changes in both the price of housing and the housing stock. Using data for a representative taxpayer, the authors find that a

[10] CGH conclude that the effects of tax changes are fully capitalized into the price of a house. CGH test this assumption empirically by regressing the after-tax interest rate and the after-tax property tax rate on the rent-to-price ratio in 63 metropolitan areas. They find the coefficients on the net interest rate to be 1.14 and 1.09 for the net property tax rate; not statistically different than unity. These findings—combined with the observation that rents in the sample vary little relative to housing prices—indicate that the effects of tax reforms are fully capitalized into the price of the home.

consumption tax would increase the nominal price of housing by the full amount of the tax—assumed to be 17 percent in the simulation—in the long run. The authors note that in the transition period, the effect is split between the elimination of housing deductions (which causes home prices to decline by just over 1 percent) and the flattening of income tax rates (which causes home prices to immediately increase by over 10 percent). Gale (2001) criticizes Bruce and Holtz-Eakin's inconsistent treatment of consumer and producer prices and the omission of the role of land. Gale calculates that including these considerations in the model would yield real price declines in housing of between 7 to 10 percent in the short run, and 2 to 6 percent in the long run.

Several empirical papers have examined the impact of transactions costs on the housing market; these studies primarily focus on the effect of transaction taxes on volume of sales, rather than price. Dachis, Duranton, and Turner (2011) find that a transaction tax in Toronto (equal to 1.1 percent of the housing value, on average) reduced the volume of homes sold by 14 percent and drove down housing values by about 1 percent. Best and Kleven (2012) estimate that a temporary 1 percentage point drop in housing taxes in the U.K. leads to 10 percent jump in sales at the time of enactment, but that a slump in activity will occur after the cut has expired. Slemrod, Weber, and Shan (2012) study the effect of an increase in Washington, DC transfer taxes and find that a 1 percent increase reduces the volume of sales by 0.2 percent.

3. THE ROLE OF HOUSING SUPPLY ELASTICITY AND EFFICIENCY

This study closely follows the methodology utilized in CGH, including the assumption that housing supply is inelastic. In defending the perfectly inelastic housing supply assumption, CGH posit that residential housing is comprised of two aspects—elastic construction and inelastic land—rendering residential housing inelastic. Indeed, housing supply elasticity is a controversial topic.[11] For example, Blackley (1999) finds that the long-run supply of housing is price elastic, with price elasticities ranging from 0.8 to 3.7, while CGH argue that large estimates of housing supply elasticities are due to estimates that incorporate elastic supply of land on metropolitan peripheries. To account for this issue, Mayer and Somerville (2000) use repeat-sale data and find a near-inelastic supply elasticity of 0.08.

While the elasticity of aggregate housing supply is debatable, the supply of owner-occupied and rental housing are at least somewhat elastic in most markets, even if the overall supply is less so. Condominiums can quickly be converted to apartments, and vice versa. When owner-occupied housing prices fall, the supply of owner-occupied housing falls and the supply of rental housing increases, pushing up the price of the former and down the price of the latter. The ability to substitute owner-occupied housing

[11] Blackley (1999) provides an extensive overview of the housing supply elasticity literature.

for rental housing means that any estimates of the effects of tax changes on housing that assume inelastic owner-occupied housing supply, including this paper and CGH, can be regarded as either transitory or upper bounds.

If housing supply were indeed inelastic, then changes in the user cost of housing will be fully capitalized into the price of housing. Inelastic supply would also mean that the mortgage interest deduction and tax-preference for owner-occupied housing cause minimal efficiency loss since, by assumption, the market does not respond to price signals. It also means that tax subsidies for owner-occupied housing have no effect on the rate of homeownership; they simply provide windfall gains or losses for the owners of housing at the time when tax rates increase or decrease unexpectedly. In addition to the inelastic supply assumption, CGH argue that market rents are relatively constant, and would remain unchanged in the wake of tax reform. In short, the assumption that metropolitan housing is inelastic combined with fixed market rents indicates that changing the tax preference for housing would affect housing prices, and little else. Such a claim is certainly controversial and contrary to multiple studies finding efficiency losses due to the mortgage interest deduction (Holtz-Eakin 1996).

Aggregate housing supply may not be inelastic, especially in the long run. Metropolitan peripheries may change. Old structures may be replaced by new, perhaps larger, homes and buildings. In this case, the results presented in this paper overstate the changes in housing prices due to income tax reforms. If aggregate housing supply does in fact respond to the after-tax price of housing, income tax reforms that make housing more expensive will reduce the stock of owner-occupied homes and mitigate the large price declines described later in the results section. In a model incorporating a supply response (with residential housing values split evenly between land and structures), Holtz-Eakin (1996) shows that the elasticity assumption can have a substantial impact on equilibrium housing values. Specifically, Holtz-Eakin shows that increasing the elasticity of housing structures from 0 to 1.0, while holding land fixed, would limit the housing price drops from income tax reform from 20 percent to 13 percent. Slight changes in parameters, described by Holtz-Eakin as "more realistic," limit the housing price drop to 4.5 percent.

With moderate housing supply elasticity, the tax preference for housing becomes more inefficient. The tax preference for housing distorts the demand for owner-occupied homes and the allocation of capital. In the long run, a downward adjustment to the tax preference for housing would moderately depress housing prices, but increase the efficient allocation of resources in the economy. From this perspective, limiting tax preferences for housing would improve the economy in the long run, despite the initial price adjustments.

4. HOUSING MARKET TRANSACTION COSTS

Trading in the housing market encompasses various costs. Quigley (2002) classifies these costs as search costs, legal and administrative costs, adjustment costs, uncertainty costs, and financing costs. In this study, transaction costs include only explicitly monetary costs and those costs that are unique to the homeownership market, as opposed to those that are present in both the rental and ownership markets (e.g., search costs). In this study, transaction costs include loan origination costs, title charges, realtor transaction fees, and state and local transaction fees.

Transaction costs in the US housing market are substantial. In 2001, fees paid to a mortgage lender or broker averaged about $3,500, while title fees averaged $1,200 per loan. The median real estate commission paid by the seller was 5.5 percent of the sales price of the house (Woodward 2008). Among the cities in this study, the mean transaction cost upon purchase is 1.02 percent of the purchase price, while closing costs amount to 6.29 percent (5.50 percent from realtor commissions and 0.79 percent due to transfer taxes).

Transaction costs vary by state and municipality. For example, consumers purchasing a home in Chicago are subject to taxes of 0.1 percent levied by the state, 0.05 percent levied by the county, and 1.05 percent levied by the city. In contrast, homebuyers in Dallas, Houston, Portland, and St. Louis pay no transaction taxes (table 1). Up-front transaction costs vary from 0.41 percent (Detroit) to 1.56 percent (Minneapolis), as a share of housing costs, while back-end transaction costs range from 5.5 percent in cities without a real estate transaction tax (the 5.5 percent cost is the median realtor commission assumed across cities) to 9.5 percent (Philadelphia).

5. STANDARD USER-COST MODEL OF TAXATION AND HOUSING PRICES[12]

If there were no tax preference for homeownership and no transaction costs, determining the equilibrium user cost of housing capital would be a relatively simple exercise. Consumers purchase units of housing if the expected cost of homeownership—interest payments, property taxes, maintenance costs, and net depreciation net of any expected appreciation minus a risk premium—is lower than the market rate of renting. In equilibrium, consumers continue to invest in housing until the rental rate equals the cost of homeownership.

This decision is complicated by tax preferences for homeownership. Since taxpayers can deduct property taxes and mortgage interest paid, a taxpayer's marginal tax

[12] "Standard user-cost model" refers to the methodology typically employed in studies of tax and housing costs. As explained below, this approach is, in many ways, different from the original user-cost model of investment proposed by Hall and Jorgenson in 1967.

rate is a critical aspect of the user cost of homeownership. Furthermore, the homeownership decision is more complicated than simply whether to invest in housing or not; consumers must also decide what proportion of a house should be financed. The financing decision means that consumers consider not only the tax preference for homeownership, but also the expected after-tax return to other non-housing investments.

While taxes are accounted for in studies of the user cost of housing, transaction costs typically are not. As described above, transaction costs, including taxes, are paid on both the purchase and sale of a housing asset, and depend in part on the appreciation of the capital stock and the duration of ownership. Transaction costs also depend on the method of financing employed by the homebuyer. Perhaps due to these complications, these costs are regularly omitted from studies of the user cost of housing.

It is worth noting, however, that the classic user-cost model, introduced by Hall and Jorgenson (1967), included an up front investment tax credit and a depreciation deduction. The up front investment tax credit is typically omitted from studies since, other than the First-Time Homebuyers Tax Credit briefly in place from 2008–09, there is no one-time subsidy for homeownership. Prior studies have reasonably omitted the depreciation deduction since homebuyers are not allowed to deduct depreciation on homes. The Hall-Jorgenson model also set the purchase price of a capital good equal to the present value of future after-tax rental returns. From this perspective, the model introduced in the next section—which accounts for the present value of the after-tax cost of housing investment—is more akin to the original user-cost model than models used in subsequent studies. However, like other studies that have adapted the user-cost model to study housing, the Hall-Jorgenson model implicitly assumed the cost of transaction to be zero.

In a standard user-cost housing model, homeowners purchase housing until the implicit rent is equal to the user cost of capital. Here, the user cost of capital is the sum of after-tax interest payments and the opportunity cost of investing elsewhere and the after-tax cost of property tax payments. This equilibrium condition can be expressed as:

$$(1) \qquad R = [(1-\gamma t^{y})\alpha i + (1-\gamma t^{y})t^{p} + (1-t^{cg})(1-\alpha)r - g + m]P$$

where R is rent, γ is the deductible portion of mortgage interest and property taxes,[13] α is the proportion of the house that is financed, i is the mortgage interest rate, r is the return to other investments, g is net housing appreciation, m represents maintenance costs, and P

[13] Here, γ effectively limits the benefit of federal deductions. For example, for the president's proposed 28 percent limit on itemized deductions, $\gamma t^{y} = \min\{\gamma, t^{f}\} + (1 - t^{f})t^{s}$, where γ=0.28 and t^{f} and t^{s} are the federal and state tax rates, respectively.

represents price of housing. Property tax rates are represented by t^p, combined state, local, and federal income taxes are represented by t^y, and combined taxes on investment income are represented by t^{cg}.

Tax rates are defined to account for the deductibility of state income taxes paid. Income tax rates are defined as $t^y = t^f + (1 - t^f)\, t^s$ where t^f represents the statutory federal tax rate and t^s represents the statutory state tax rate. Similarly, taxes on non-housing investments are defined as $t^{cg} = t^{inv} + (1 - t^{inv})\, t^s$ where t^{inv} represents the federal tax rate on capital gains and dividends. Given constant market rents, the equilibrium condition can be rewritten as:

$$(2)\quad \frac{P_1}{P_0} = \frac{\frac{R}{P_0}}{\frac{R}{P_0} + \left[\alpha i - \gamma_1 \alpha i t_1^y + t^p - t^p \gamma t_1^y + (1 - t_1^{cg})(1-\alpha) r\right] - \left[\alpha i - \gamma_0 \alpha i t_0^y + t^p - t^p \gamma_0 t_0^y + (1 - t_0^{cg})(1-\alpha) r\right]}$$

Subscripts represent time period and superscripts on tax rates again indicate the type of tax (i.e., t^y denotes combined income tax rate, t^p denotes property tax rate, and t^{cg} denotes capital gains tax rate). Appreciation and maintenance costs are not dependent on tax parameters and are assumed to be equal across periods, and thus cancel out in equation (2). Consequently, the change in equilibrium user cost of housing capital can be denoted:

$$(3)\quad \Delta UC = \left[\alpha i - \gamma_1 \alpha i t_1^y + t^p - t^p \gamma t_1^y + (1 - t_1^{cg})(1-\alpha) r\right] - \left[\alpha i - \gamma_0 \alpha i t_0^y + t^p - t^p \gamma_0 t_0^y + (1 - t_0^{cg})(1-\alpha) r\right]$$

The change in equilibrium housing prices, calculated as $P_1/P_0 - 1$, can also be determined for various metropolitan areas from equation (2). Given variation in rent-to-price ratios, property tax levels, and state and local income tax levels, the change in prices due to the simulated tax changes can vary substantially across cities.

The model includes the capital gains taxation on non-housing assets, which affects the after-tax opportunity cost of housing, but assumes that capital gains on the sale of a house is untaxed. This treatment follows those used in previous studies, including Poterba and Sinai (2008) who state that "While [married] homeowners with gains in excess of $500,000 face taxation under current rules, the number of such taxpayers is very small. For most taxpayers, most housing gains are likely to be untaxed (Poterba and Sinai 2008, 5)." Even if capital gains on the sale of a house were included in the model, its effect would likely be small. Richards (2009), for example, finds that including excess gains in a user cost model changes the user cost by just 0.0002 percentage points (0.36 percent).

The model implicitly assumes perfectly inelastic owner-occupied housing supply. This assumption may appear extreme, but has been adopted by others (for example, CHG 1996) on the grounds that inelasticity of urban land leads to full capitalization of tax changes in housing prices. Inelastic aggregate housing supply (as opposed to inelastic owner-occupied housing supply) has also been confirmed by prior studies, including Mayer and Somerville (2000), who find an aggregate housing supply elasticity of near zero. [14] Ultimately, housing supply elasticity likely varies by city, both in the overall response and in the timing of the response. This variation has been confirmed by Green, Malpezzi, and Mayo (2005), who find significant metropolitan housing supply elasticity varying from 21.6 in Atlanta to 1.43 in Pittsburgh. In sum, the controversial assumption of inelastic owner-occupied housing supply means that the estimates presented here can be interpreted as transitory and upper bounds.

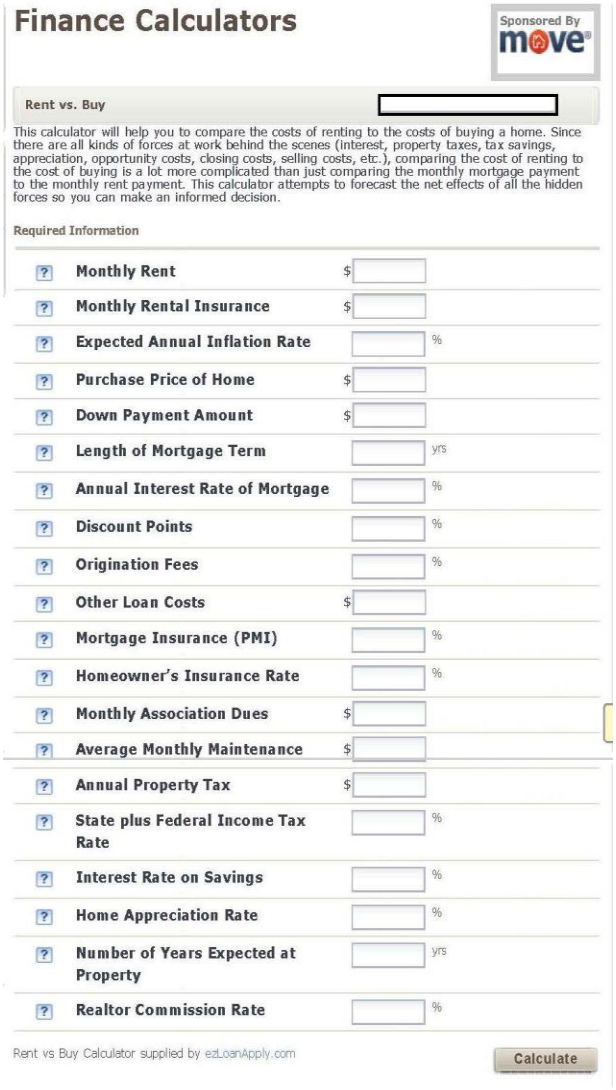
6. DISCRETE-PERIOD HOUSING MODEL

The discrete-period housing model builds on the standard user cost model to account for transactions costs. Where the standard user-cost model sets the market rate of renting equal to the after-tax price of homeownership in the period after purchase and before sale, the discrete-period housing model sets the present value of renting equal to the present value of home owning over the entire homeownership tenure. Introducing a time dynamic to the housing model allows for the inclusion of one-time costs such as title fees, mortgage origination fees, transfer taxes, and real estate agent fees.

The discrete-period housing model may better mimic the housing decision. Many, if not most, online calculators comparing the merits of renting versus buying ask potential homebuyers to indicate housing tenure. This includes calculators on websites like bankrate.com and cnnmoney.com. Even the website of the National Association of Realtors, which presumably does not have an incentive to highlight transaction costs and realtor fees, not only asks potential participants to indicate housing tenure, but also specifically asks about transaction costs (see figure 1 below).

[14] The aggregate long-run supply elasticity of housing is controversial. Blackley (1999) and Glaeser et al. (2005) discuss this issue at length.

Figure 1: *Realtor.com* Rent versus Owning Calculator



The discrete-period housing model accounts for transaction costs and housing tenure. In equilibrium, consumers set the net present value of renting for K periods equal to the net present value of owning. Initial transaction costs (i.e., those paid by the buyer) are denoted T^0 and are expressed as a share of the price. Back-end transaction costs (i.e., those paid by the seller) are denoted as T^K and are also expressed as a share of the price.[15] In addition to transaction costs, consumers also consider the net present value of after-tax mortgage interest payments and property taxes paid, the opportunity cost of housing

[15] Transactions costs are estimated as a share of the price, but the relationship between price and transactions costs is not always straightforward. For example, title charges are not exclusively a fixed cost, but are also a function of the loan amount. Realty fees have a fixed component, but are mostly a function of housing price (P); one study found that the relationship between realty costs (RC) and housing price was RC = \$970+0.045*P (Woodward 2008).

equity, and appreciated housing (π). All other notation is analogous to that in the user-cost model. Lastly, as in the standard user cost model, due to the high deduction for capital gains on owner-occupied housing, returns to housing investment are assumed to be untaxed.

$$(4)\ \sum_{t=1}^{K}\frac{R_t}{(1+i)^t} = PT^0 + P\sum_{t=1}^{K}\left[\frac{\lambda r_t(1-\tau^y)+\tau_t^P(1-\tau^y)}{(1+i)^t}\right] + P\left[\frac{(1-\lambda)((1+r(1-\tau^{cg}))^K-(1-\lambda)}{(1+i)^K}\right] + P\left[\frac{(1+\pi)^K(T^K)}{(1+i)^K}\right]$$

Thus, the user cost of housing under the user-cost model is not analogous to the user cost under the discrete-period model. In the user-cost model, the user cost equals the break-even rate on each additional unit of housing investment. In the discrete-period model, the user cost describes the present value of the total costs over the duration of the investment as a share of the housing prices.

In equilibrium, with no housing supply response and constant market rents, the analogous condition to equation (2) can be expressed as:

(5)

$$\frac{P^1}{P^0} = \frac{\frac{R}{P^0}}{\frac{R}{P^0} + \frac{(TC^1 - TC^0)}{TC^0}\cdot\frac{R}{P^0}}$$

Where $TC = T^0 + \sum_{t=1}^{K}\left[\frac{\lambda r_t(1-\tau^y)+\tau_t^P(1-\tau^y)}{(1+i)^t}\right] + \left[\frac{(1-\lambda)((1+r(1-\tau^{cg}))^K-(1-\lambda)}{(1+i)^K}\right] + \left[\frac{(1+\pi)^K(T^K)}{(1+i)^K}\right]$

For each city, this study calculates the change in user cost and housing prices for a representative taxpayer within each statutory tax bracket.[16] The change in each city equals the weighted average across statutory tax rates, with the weight equaling each statutory tax bracket's share of mortgage interest. Thus, the city-specific change is a weighted average across statutory tax rates.

[16] I assume taxpayers fall into seven tax brackets: 0, 10, 15, 25, 28, 33, and 39.6 percent. Taxpayers in the 35 percent bracket, comprising less than 0.05 percent of taxpayers in 2013, are classified as being in the 33 percent bracket. Taxpayers subject to the alternative minimum tax, which applies marginal tax rates of 26 percent and 28 percent, are classified as being in the 28 percent bracket.

This averaging of average effects is critical to the results. Prior studies, such as CGH and Harris (2011), assume the marginal unit of housing is purchased by a high-income taxpayer. This assumption means that policies that directly affect only a small proportion of taxpayers, such as the president's proposed 28 percent limitation, can have a large impact on an entire housing market. Changing the assumption so that the effect is averaged across all taxpayers leads to more modest price changes. Sensitivity analysis is performed to show the results of a simulation in which a high-income marginal buyer drives the changes in the housing market.

This analysis does not show the effects of portfolio adjustment on the user cost of housing investment. Earlier studies, such as Poterba and Sinai (2011), have shown that portfolio adjustment, especially for older, wealthier households, can mitigate a tax reform's initial increase in user cost. This calculation is often based on household-level financial data, such as that derived from the Survey of Consumer Finances; such a calculation is beyond the scope of this study.

7. DATA

Real estate transaction tax rates are derived from the National Council on State Legislatures and state and local tax agencies. In all cases except for New York, county-level transaction tax values were used. In New York, transaction taxes equaled the population-weighted average of five counties housing New York City. Also, in the circumstances in which the transaction tax rate varied with housing price, the median housing value was assumed for the 0,10,15, 25, and 28 tax brackets, and the housing value equal to the twice the median home value was used for the 33 and 39.6 percent brackets. This treatment is consistent with the notion that the marginal homebuyers in top tax brackets likely purchase a more expensive home.

Closing cost data, including the loan-to-price ratio, interest rates, and initial fees and charges, are derived from the Federal Housing Finance Agency's (FHFA) monthly survey of closing terms. FHFA provides data at the metropolitan level. The survey samples conventional single-family non-farm mortgage loans; the sample includes only conventional loans and excludes loans guaranteed by the Federal Housing Administration or the Veteran's Administration. The survey excludes refinanced, non-amortized, and balloon loans. In all cases except for Honolulu, values for the fourth quarter of 2012 are used. FHFA does not collect quarterly data for Honolulu, so 2011 data on Hawaii are used for the loan-to-price ratio and initial fees and charges. For mortgage rates, Honolulu is assumed to have the same interest rate as Los Angeles. Front-end total transaction costs, those paid by the buyer, include the initial fees and charges as reported by the FHFA. Back-end costs include transaction taxes, which are almost always paid by the seller, and real estate commission charges (table 1).

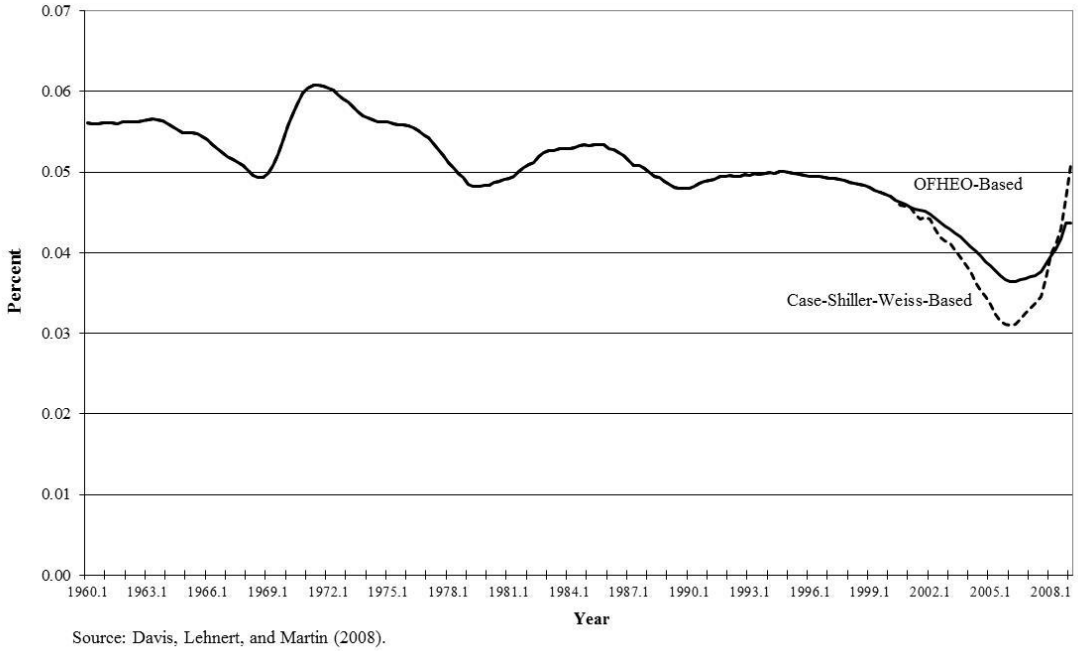
Property tax rates are derived from county-level data published by the Tax Foundation (table 2). Using the 2007 American Community Survey, the Tax Foundation published data on property tax rates for owner-occupied housing in each county in the United States with a population in excess of 65,000. Each county's property tax rate is calculated as the median property tax paid divided by the median housing price. For New York City, the population-weighted mean of the various median property tax rates is used.

State income tax rates are derived from data published by the Federation of Tax Administrators, which regularly publishes state individual income tax rates. Many states have a graduated income tax system (table 3), although the top bracket often begins at very low levels of income (e.g., Missouri has 10 tax brackets, but the top tax bracket begins at $9,001). In those states with a graduated income tax structure, the state-level tax rate corresponding to the mid-point of the relevant federal income tax bracket for married couples was used. For example, the 25 percent federal tax bracket applies to taxable income between $72,501 and $146,400 for married couples. Here, for each state, the state-level marginal tax rate for $109,451 was assumed to correspond to the 25 percent bracket.

Data on rent-to-price ratios are derived from Campbell et al. (2009). The authors use data from the Decennial Census of Housing to calculate rent-to-price ratios in 23 metropolitan markets (table 4). They compute implicit owner-occupied rents from the estimated coefficients of a regression of observed market rents on housing characteristics. In each metropolitan area, the reported rent-to-price ratio is calculated as the ratio of the mean predicted implicit rent to the mean housing value. Implicit rent and reported housing prices are then projected to year-end 2007 levels.[17] However, the national rent-to-price ratio has increased substantially since 2007. To account for this change, I adjust all 2007 rent-to-price ratios upward by the mean national trend between 2007 and 2012 to put the rent-to-price ratios in current terms.

[17] Campbell et al. (2009) index implicit rent using the Bureau of Labor Statistics data on the growth rate of market rents. The authors index housing prices using the Federal Housing Financing Agency repeat transactions home price index. Nominal growth rates are converted to real growth rates by deflating these indices using the measure of CPI minus shelter.

Chart 2. Gross Rent-Price Ratio, U.S. Stock of Owner-Occupied Housing



Source: Davis, Lehnert, and Martin (2008).

Housing tenure is primarily derived from the 2011 American Community Survey, which asks homeowners about the length of time they have been in their home. Values are not reported for Chicago and Portland for the 2011 survey, so the 2009 reported values are used instead. In all cases, the median homeownership tenure for existing homeowners is used.

Value for returns on non-housing (i.e., financial) assets and expected housing appreciation are assumed to be equal across metropolitan area. The nominal return to non-housing assets is assumed to be 6 percent, which is close to the unweighted average of stocks and 10-year Treasury bonds over the past decade. Expected appreciation is assumed to be 4.1 percent, which is the mean annual expected appreciation among professional economists surveyed in the 1Q:2013 Zillow Home Price Expectations Survey. The discount rate is assumed to be the weighted average of the equity and financing costs, with the weight set equal to the municipal loan-to-value ratio.

8. PROPOSED AND ENACTED TAX REFORMS

This study simulates changes in user costs of housing capital and housing prices for four tax policy changes. These policy changes include the president's proposed limitation of tax expenditures to 28 percent; a complete elimination of mortgage interest

and property tax deductions; a 20 percent limitation on the mortgage interest deduction coupled with a homebuyer credit equal to 2 percent of the purchase price; and the higher tax rates in 2013 compared to 2012, as a result of the Affordable Care Act and the American Taxpayer Relief Act of 2012. In the first three scenarios, the baseline is current law (i.e., tax rates following the imposition of ATRA and ARA). The scenario that models the effect of tax rates after the 2013 changes assumes 2012 law as the baseline, and shows the effect of moving to 2013 law.

The Obama administration's Fiscal Year 2014 Budget included a wide array of revenue proposals, from the reform of international corporate taxation to a series of temporary measures designed to stimulate the economy.[18] Included in this collection of reforms was a proposal aimed at increasing the tax burden on upper-income taxpayers through a limitation on itemized deductions. Since itemized deductions reduce taxable income, one dollar of itemized deductions is worth more to a taxpayer in a high statutory bracket relative to a taxpayer in a lower bracket. The Obama administration proposed to limit the value of itemized deductions for high-income taxpayers by placing a cap on the rate at which itemized deductions can reduce tax liability. Under the president's proposal, itemized deductions can reduce tax liability by a maximum of 28 percent, even if the taxpayer is in a higher statutory tax bracket. This provision would limit the rate at which housing-related itemized deductions, including mortgage interest and property taxes paid, could reduce the tax liability of upper-income taxpayers.

This study also estimates the effects of complete elimination of the deductions for mortgage interest and state and local taxes (including property taxes). While these policies are unlikely to be enacted in isolation, estimates are presented to illustrate the difference between the user-cost and discrete-period models.

An additional proposal evaluated below would combine a more stringent limit on the value of the mortgage interest deduction with a one-time credit refundable credit for closing costs for all residential house purchases. The first part of this plan is closely tied to provisions in included in two notable deficit-reduction plans—the president's National Commission on Fiscal Responsibility and Reform and the Bipartisan Policy Center's Debt Reduction Task Force—released in December 2010. Both panels proposed replacing the mortgage interest deduction with a tax credit for all taxpayers. The president's Commission proposed a non-refundable 12 percent credit, while the Bipartisan Policy Center's group proposed a refundable 15 percent credit. The president's Commission would limit the maximum size of the mortgage eligible for preferential tax treatment from $1 million to $500,000, while the Bipartisan Policy Center task force

[18] These proposals are described in Department of the Treasury (2013).

would limit the maximum value of the credit to $25,000.[19] The second part of the proposal would allow taxpayers to claim a refundable credit on the purchase of a home to help offset part of the cost of housing transactions. This provision is similar to, but broader than, the First-Time Homebuyers Tax Credit, which was enacted on a temporary basis to help mitigate the downturn in the housing markets in 2008. That credit was initially equal to $7,500, repayable in equal installments over 15 years (making it a zero-interest loan instead of a grant), but Congress eventually changed the law to make the credit a one-time $8,000 credit with no repayment requirement. In the option modeled here, the universal credit equals 2 percent of the price of the home, and effectively reduces the present value of after-tax closing costs by 27.8 percent (from 7.2 percent of the initial home value to 5.2 percent).[20]

Finally, this study evaluates the impact of the higher income tax rates in 2013 relative to 2012 for some high-income taxpayers. The higher rates are the result of both the Affordable Care Act, which raised rates on investment income by 3.8 percentage points for high-income individuals, and the expiration of long-standing tax cuts for very high-income taxpayers. Specifically, beginning in 2013, the Affordable Care Act imposed a 3.8 percent surtax on the investment returns of married taxpayers with income in excess of $250,000 and single taxpayers with income over $200,000. At the same time, tax cuts that originated in the 2001 Economic Growth and Taxpayer Relief Reconciliation Act, and were extended with subsequent tax laws, were scheduled to expire at the end of 2012. These tax cuts included a 3 percentage point reduction in most tax rates, a drop in the top rate from 39.6 percent to 35.0 percent, lowering the top capital gains tax rate from 20 percent to 15 percent, and taxing dividends at a top rate of 15 percent rather than as ordinary income. Immediately before expiration, Congress passed the American Taxpayer Relief Act of 2012, which extended these lower rates for taxpayers with incomes less than $450,000 for married couples and $400,000 for single taxpayers. The combined result of the legislation in 2013 is that married taxpayers with income between $250,000 and $450,000 will see their taxes on investment income rise from 15 percent to 18.3 percent, and most taxpayers with income over $450,000 will see their marginal tax rate on investment income rise from 15 percent to 23.8 percent and their marginal ordinary income tax rate rise from 35 percent to 39.6 percent.

It is worth noting that the higher long-term capital gain and dividend rates would generally not apply to owner-occupied housing, which would continue to be treated preferentially under the tax code. The current rules—established by the Taxpayer Relief

[19] These proposals are consistent with the recommendations from the 2005 President's Advisory Panel on Tax Reform. This panel recommended replacing the mortgage interest deduction with a 15 percent credit and limiting deductible interest to mortgage values equal to the average regional housing price.

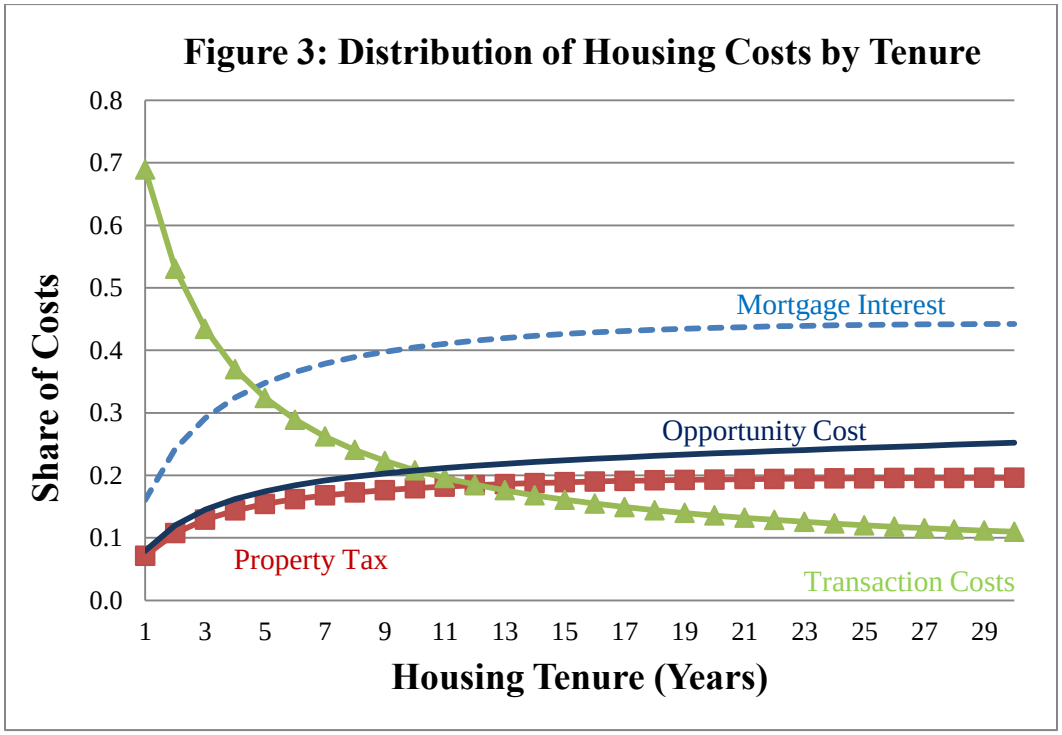
[20] For the purpose of this study, the distinction between a universal credit and accredit for first-time homebuyers only matters if the credit affects the marginal homebuyer.

Act of 1997—allow married filers to deduct $500,000 in capital gains on the sale of an owner-occupied home; single filers can deduct $250,000. This rule would continue to effectively exempt most housing-related capital gains from taxation.

9. RESULTS

The cost of housing can be decomposed into several distinct factors. Homeowners pay the after-tax cost of mortgage interest, the after-cost cost of property tax payments, and the opportunity cost of housing equity that could be invested elsewhere. In the model introduced in this study, homeowners also pay the transaction cost of trading in the housing market.

The relative magnitude of these costs depends on the factors described earlier. Under the user-cost model in the baseline case, interest costs comprise 46 percent of the cost of homeownership, while property tax payments make up 25 percent of the costs and opportunity costs make up 29 percent of the homeownership cost (table 5). These shares change under the discrete-period model. Here, transaction costs comprise 26 percent of the cost, while the relative shares fall for interest payments (38 percent), property tax payments (20 percent), and opportunity costs (16 percent). Moreover, these costs are sensitive to housing tenure, with transaction costs varying from over 60 percent of the cost of owning if the property is held for one year, to under 10 percent of the property if held for 30 years (see figure 3 below).



To illustrate the high, and perhaps surprising, role of transaction costs in the overall cost of housing, consider the simplified example of a potential homebuyer in Minneapolis. Assume the representative taxpayer is in the 25 percent income tax bracket and is subject to a capital gains tax rate of 15 percent, and that (for illustrative purposes) the homebuyer owns the home for three years. The Minneapolis homebuyer purchasing a $235,900 home—the median price in Minneapolis in 2012—will pay 1.56 percent in up front transaction costs and 6.06 percent of the home price in back-end transaction costs for a total of $19,976. By comparison, the homebuyer will cumulatively pay $13,787 in after-tax interest costs and $6,369 in property taxes over the three-year period. The cumulative opportunity cost of the $45,765 down payment is $7,246 over three years. In this example, transaction costs comprise 40 percent the total costs, compared to 30 percent for after-tax interest, 16 percent for foregone return to the down-payment (i.e., opportunity cost), and 14 percent for after-tax property tax payments.

Tax reforms affect all of these costs differently. Higher marginal tax rates reduce the user cost of capital and increase the price of housing by raising the value of itemized deductions for housing expenses. An increase in the capital gains tax rate will lower the user cost of capital and raise housing prices by reducing the after-tax return to non-housing investment relative to housing investment. Limiting or eliminating itemized deductions will raise the user cost of capital and lower housing prices by increasing the after tax cost of debt finance. Providing subsides for closing costs will lower the present value of the user cost of homeownership under a model that accounts for up front subsidies (such as the discrete-period housing model introduced in this study, and also the original Hall-Jorgenson user cost model). All four reforms analyzed in this study, described in the prior section, affect at least one of these factors.

Limiting the value of itemized deductions to 28 percent would minimally reduce the value of housing. Under the user-cost model, the user cost of housing investment rises by 0.4 percent on average, leading to a 0.4 percent decrease in the price of housing (table 6). The effect is similarly modest under the discrete-period model, with the user cost rising 0.3 percent on average and housing values falling 0.3 percent. There is little variation across cities, with the house price decline ranging from 0.2–0.5 percent under the user-cost model and 0.2–0.3 percent under the discrete-period model.

Elimination of the mortgage interest and property tax deductions cause user costs to spike in both models (table 7). Under the user-cost model, elimination leads to a 16.9 percent increase in the user cost and a 19.1 percent fall in housing prices. The effect is still severe, but much less so, under the discrete-period model. Elimination leads to a 13.9 percent increase in user costs and a subsequent 11.8 percent fall in mean housing prices.

In addition, there is much more variation in metropolitan outcomes under this reform than the other scenarios. Housing price declines under the user-cost model range from 24.0 percent (Los Angeles) to 12.5 percent (Denver). Under the discrete-period model, housing price declines range from 10.3 percent (Seattle) to 13.8 percent (Milwaukee).

Limiting the mortgage interest deduction and subsidizing the purchase of a home can raise housing prices. Limiting the mortgage interest deduction to 20 percent, while simultaneously providing a 2 percent subsidy upon purchase, would reduce the user cost under a discrete-period model by 2.9 percent and would increase housing prices by 3.0 percent (table 8). Under the user-cost model, which does not account for changes in transaction costs, the mean increase in the user cost of housing is 1.9 percent, which would lead to a 2.5 percent decline in housing values. Under the discrete-period model, the benefits would vary across metro regions, ranging from 1.5 percent (Pittsburgh) to 4.6 percent (Portland).

The higher tax rates resulting from ACA and ATRAare estimated to have minimally increased the value of the tax preference for housing for affected taxpayers, and subsequently lowered the user cost of housing investment (table 9). Under both models, the user cost of housing falls by a mean value of 0.2 percent. These changes in user costs lead to gains in the equilibrium price of housing equal to 0.3 percent in the user-cost model and 0.2 percent in the discrete-period model. As with the limitation on itemized deductions, there is little variation across cities.

These predictions are much more in line with recent trends in housing prices. Between December 2012 and January 2013 housing prices, as measured by the Case-Shiller Composite Index, rose 1.0 percent. If tax changes are immediately capitalized in the price of housing, the results of the models presented here suggest that home prices would have risen by 0.8 percent in the absence of the higher tax rates in 2013, and that the higher tax rates pushed the gain to 1.0 percent. In contrast, a user-cost model that assumes the marginal taxpayer is in the top tax bracket predicts that the higher tax rates would induce a mean increase of 12.0 percent. The slow gains in housing values in early 2013 contradict such a drastic price change.

10. SENSITIVITY ANALYSIS: WHAT IF PRICE EFFECTS ARE DRIVEN BY A MARGINAL BUYER IN THE TOP BRACKET?

It is possible that price effects in a given market are driven by a marginal homebuyer. Thus, rather than calculating the weighted mean price change across taxpayers in different income brackets, the price change would be driven solely by the change in user cost for a taxpayer in a particular tax bracket. Under this scenario, if a marginal taxpayer is unaffected by a tax policy change, then the reform is simulated to

have no effect on housing prices. Below I present results under this scenario where the marginal homebuyer is assumed to be in the top tax bracket.

In contrast to the results presented above, the simulated results under this assumption show steep price changes for nearly every policy change. The president's proposed 28 percent limit on itemized deductions would induce immediate price declines of 13.8 percent and 9.9 percent under the user-cost and discrete-period models, respectively. Eliminating itemized deductions would cause housing prices to crash, with simulated declines of 35.1 percent under the user-cost model and 27.1 percent under the discrete-period model. Limiting the mortgage interest deduction to 20 percent and adding a flat credit would cause an average 7 percent decline under the user-cost model and a small uptick under the discrete-period model. Lastly, ATRA and ACA would be expected to cause home prices to jump substantially, rising by 12.0 percent under the user-cost model and 7.9 percent under the discrete-period model. As discussed above, these dramatic effects are not supported by the mild price gains observed in the months since tax rates increased.

11. CONCLUSION

This study estimates the change in the user cost of housing capital and housing prices due to recently enacted and proposed tax changes for 23 metropolitan areas. These estimates are presented through both a standard user-cost model of housing investment and a modified model of the homeownership decision—termed the discrete-period model—that accounts for the high transaction fees and taxes in the housing market and the role of housing tenure.

Several important results emerge. One, tax changes do not have the drastic impact on housing as predicted by prior studies. Under the models presented here, both the president's proposed 28 percent limitation on the value of itemized deduction and the recently increase in tax rates for high-income taxpayers have a minimal impact on housing prices, never affected prices in any city by more than 0.5 percent. This finding is supported by recent housing price trends, which do not appear to have experienced a dramatic increase from the higher tax rates in 2013.

Another important result is that the standard user-cost model, by ignoring the critical role of transaction costs in the housing market, may overstate the impact of tax reform on the cost of housing investment and housing prices. Under the baseline scenario, transaction costs in the housing market make up over one-fourth the cost of housing. Omitting these costs strengthens the relative importance of tax-preferences for mortgage interest and property taxes, which leads to larger effects of tax changes on housing prices than if one included transactions costs as part of baseline housing costs.

Lastly, this analysis shows that under a model of housing investment accounting for transaction costs, tax reform that caps the mortgage interest deduction while adding a flat subsidy for closing costs can reduce the cost of housing investment and raise housing prices. The reform simulated in this study—capping the mortgage interest deduction at 20 percent and providing a closing cost subsidy equal to 2 percent of the home's value—will reduce the cost of housing investment by 2.9 percent and lead to a gain of equal size in housing prices.

These results and those from the standard user cost models depend on several strong assumptions. First, these estimates assume that the supply of metropolitan housing is perfectly inelastic and that there is no supply response. This assumption implies that tax changes are fully capitalized into the price of housing and that there are no effects on rent. As such, the estimates can be considered short- or intermediate-run estimates, depending on what one believes about the supply curve for metropolitan housing. Second, these calculations assume that the rent-to-price ratio for each metropolitan market is homogeneous. Third, the calculations imply that household preference for housing is based entirely on tax characteristics, interest rates, and the (homogeneous) rent-to-price ratio in each metropolitan area. All of these assumptions are subject to debate.

This analysis adds to a body of work that can serve to augment the criteria for evaluating tax reform. While it is critical to account for unintended effects of various reforms, the analysis performed in this study suggests that most plausible tax reforms are, at best, likely to have only a modest effect on the cost of housing investment and subsequent housing prices. Moreover, reforms that aim to subsidize the high cost of housing transactions, rather than the ongoing cost of homeownership, may even boost metropolitan housing prices. These findings suggest that housing prices are not necessarily a casualty of a more efficient tax code, and may even benefit from thoughtful tax reform.

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Table 1. Transaction Costs by Metropolitan Area
Expressed as a share of price

	Transaction Tax	Front-End Costs	Back-End Costs
Atlanta	0.10%	1.20%	5.60%
Boston	0.46%	1.15%	5.96%
Chicago	1.20%	2.51%	6.70%
Cincinnati	0.30%	1.35%	5.80%
Cleveland	0.40%	1.00%	5.90%
Dallas	0.00%	1.23%	5.50%
Denver	0.01%	1.03%	5.51%
Detroit	0.86%	1.27%	6.36%
Honolulu	0.10%	1.00%	5.60%
Houston	0.00%	1.32%	5.50%
Kansas City	0.00%	1.22%	5.50%
Los Angeles	0.11%	1.33%	5.61%
Miami	0.95%	1.83%	6.45%
Milwaukee	0.30%	1.42%	5.80%
Minneapolis	0.56%	2.12%	6.06%
New York	2.05%	2.20%	7.55%
Philadelphia	4.00%	1.94%	9.50%
Pittsburgh	4.00%	1.84%	9.50%
Portland	0.00%	1.02%	5.50%
San Diego	0.11%	1.24%	5.61%
San Francisco	0.68%	1.24%	6.18%
Seattle	1.78%	2.20%	7.28%
St. Louis	0.00%	0.79%	5.50%
Mean	0.78%	1.45%	6.28%
Median	0.30%	1.27%	5.80%

Source: Federal Housing Finance Agency, author's calculations.

Table 2. Property Taxes by Metropolitan Area
Expressed as a share of price

	Property Tax Rate
Atlanta	1.00%
Boston	1.31%
Chicago	2.02%
Cincinnati	1.27%
Cleveland	1.58%
Dallas	1.93%
Denver	0.70%
Detroit	1.88%
Honolulu	0.29%
Houston	2.02%
Kansas City	1.31%
Los Angeles	0.70%
Miami	1.30%
Milwaukee	1.76%
Minneapolis	1.19%
New York	1.70%
Philadelphia	1.63%
Pittsburgh	1.50%
Portland	1.05%
San Diego	0.73%
San Francisco	0.75%
Seattle	1.02%
St. Louis	1.30%
Mean	1.30%
Median	1.30%

Source: Tax Foundation (2009).

Table 3. State Individual Income Taxes 2013
(Tax rates for tax year 2013—as of January 1, 2013)

State	Tax Rate Range (percent)			Number of Brackets	Income Brackets				
	Low		High		Lowest			Highest	
California	1.0	-	12.3 (b)	9	7,455	(a)	-	500,000	(a)
Colorado	4.63			1	-----Flat rate-----				
Florida	No State Income Tax								
Georgia	1.0	-	6.0	6	750	(c)	-	7,001	(c)
Hawaii	1.4	-	11.0	12	2,400	(a)	-	200,001	(a)
Illinois	5.0			1	-----Flat rate-----				
Kansas	3.0	-	4.90	2	15,000	(a)			
Massachusetts	5.3			1	-----Flat rate-----				
Michigan	4.25			1	-----Flat rate-----				
Minnesota	5.35	-	7.85	3	24,270	(d)	-	79,730	(d)
Missouri	1.5	-	6.0	10	1,000		-	9,001	
New Jersey	1.4	-	8.97	6	20,000	(e)	-	500,000	(e)
New York	4.0	-	8.82	8	8,200	(a)	-	1,029,250	(a)
Ohio	0.587		5.925	9	5,200		-	208,500	
Oregon	5.0	-	9.9	4	3,250	(a)	-	125,000	(a)
Pennsylvania	3.07			1	-----Flat rate-----				
Texas	No State Income Tax								
Washington	No State Income Tax								
Wisconsin	4.6	-	7.75	5	10,750	(f)	-	236,600	(f)

Footnotes:

(a) For joint returns, taxes are twice the tax on half the couple's income.

(b) California imposes an additional 1% tax on taxable income over $1 million, making the maximum tax rate 13.3% over 1 million.

(c) The Georgia income brackets reported are for single individuals. For married couples filing jointly, the same tax rates apply to income brackets ranging from $1,000 to $10,000.

(d) The income brackets reported for Minnesota are for single individuals. For married couples filing jointly, the same tax rates apply to income brackets ranging from $35,480 to $140,961.

(e) The New Jersey rates reported are for single individuals. For married couples filing jointly, the tax rates also range from 1.4% to 8.97% with 7 brackets and the same high and low income ranges.

(f) The Wisconsin income brackets reported are for single individuals. For married couples filing jointly, the same tax rates apply income brackets ranging from $14,330 to $315,460.

Source: Federation of Tax Administrators (2013).

Table 4. Non-Tax Parameters

	interest rate	loan-to-price	rent-to-price	housing tenure (years)
Atlanta	0.0331	0.79	0.0348	9
Boston	0.0336	0.717	0.0214	13
Chicago	0.0337	0.784	0.0274	10
Cincinnati	0.0349	0.84	0.0330	11
Cleveland	0.0346	0.798	0.0383	14
Dallas	0.0329	0.777	0.0419	9
Denver	0.0336	0.761	0.0379	9
Detroit	0.0338	0.738	0.0356	13
Honolulu	0.034	0.725	0.0159	16
Houston	0.0327	0.765	0.0448	8
Kansas City	0.0329	0.782	0.0387	10
Los Angeles	0.034	0.721	0.0171	13
Miami	0.0334	0.733	0.0222	10
Milwaukee	0.033	0.811	0.0278	12
Minneapolis	0.0332	0.806	0.0314	11
New York	0.0336	0.715	0.0188	13
Philadelphia	0.0344	0.77	0.0283	13
Pittsburgh	0.0342	0.798	0.0365	16
Portland	0.0335	0.756	0.0236	8
San Diego	0.0341	0.701	0.0228	11
San Francisco	0.0335	0.709	0.0182	13
Seattle	0.0336	0.747	0.0235	9
St. Louis	0.0333	0.785	0.0329	11

Source: American Community Survey, Federal Housing Finance Agency, Tax Foundation.

Table 5. Distribution of Housing Costs

	User-Cost Model					Discrete-Period Model				
Rate	Interest	Property Tax	Opportunity Cost	Transaction Costs	Total	Interest	Property Tax	Opportunity Cost	Transaction Costs	Total
0	0.48	0.25	0.27	NA	1.00	0.41	0.21	0.13	0.25	1.00
10	0.47	0.25	0.29	NA	1.00	0.39	0.20	0.14	0.27	1.00
15	0.46	0.24	0.30	NA	1.00	0.38	0.19	0.15	0.27	1.00
25	0.46	0.25	0.29	NA	1.00	0.38	0.20	0.17	0.25	1.00
28	0.46	0.25	0.30	NA	1.00	0.37	0.19	0.18	0.26	1.00
28	0.46	0.25	0.30	NA	1.00	0.37	0.19	0.18	0.26	1.00
33	0.45	0.24	0.30	NA	1.00	0.37	0.19	0.19	0.26	1.00
39.6	0.45	0.24	0.31	NA	1.00	0.36	0.18	0.20	0.26	1.00
Weighted Average	0.46	0.25	0.29	NA	1.00	0.38	0.20	0.16	0.26	1.00

Source: Author's calculations.

Table 6. Effects of 28% Itemized Deduction Limit on Housing

	Change in User Cost		Change in Housing Prices	
	User-Cost	Discrete-Period	User-Cost	Discrete-Period
Atlanta	0.4%	0.3%	-0.3%	-0.3%
Boston	0.3%	0.3%	-0.4%	-0.2%
Chicago	0.4%	0.3%	-0.4%	-0.3%
Cincinnati	0.4%	0.3%	-0.4%	-0.3%
Cleveland	0.4%	0.4%	-0.3%	-0.3%
Dallas	0.4%	0.3%	-0.3%	-0.3%
Denver	0.3%	0.3%	-0.2%	-0.2%
Detroit	0.4%	0.3%	-0.4%	-0.3%
Honolulu	0.3%	0.3%	-0.5%	-0.2%
Houston	0.4%	0.3%	-0.3%	-0.3%
Kansas City	0.4%	0.3%	-0.3%	-0.3%
Los Angeles	0.3%	0.3%	-0.5%	-0.3%
Miami	0.3%	0.3%	-0.4%	-0.2%
Milwaukee	0.4%	0.4%	-0.5%	-0.3%
Minneapolis	0.4%	0.3%	-0.3%	-0.3%
New York	0.3%	0.3%	-0.4%	-0.2%
Philadelphia	0.4%	0.3%	-0.3%	-0.2%
Pittsburgh	0.4%	0.3%	-0.4%	-0.3%
Portland	0.4%	0.3%	-0.4%	-0.3%
San Diego	0.3%	0.3%	-0.4%	-0.2%
San Francisco	0.3%	0.3%	-0.4%	-0.2%
Seattle	0.3%	0.2%	-0.4%	-0.2%
St. Louis	0.4%	0.3%	-0.3%	-0.3%
Mean	0.4%	0.3%	-0.4%	-0.3%
Median	0.4%	0.3%	-0.4%	-0.3%
Min	0.3%	0.2%	-0.5%	-0.3%
Max	0.4%	0.4%	-0.2%	-0.2%

Source: Author's Calculations.

Table 7. Effects of Elimination of Itemized Deductions on Housing

	Change in User Cost		Change in Housing Prices	
	User-Cost	Discrete-Period	User-Cost	Discrete-Period
Atlanta	17.6%	14.2%	-15.8%	-12.0%
Boston	15.1%	12.7%	-20.3%	-10.9%
Chicago	17.9%	14.5%	-21.0%	-12.3%
Cincinnati	19.4%	16.4%	-19.2%	-13.6%
Cleveland	18.7%	16.4%	-17.9%	-13.6%
Dallas	17.5%	14.5%	-16.2%	-12.2%
Denver	15.8%	12.5%	-12.5%	-10.8%
Detroit	17.8%	15.7%	-20.0%	-13.1%
Honolulu	14.8%	12.3%	-22.7%	-10.6%
Houston	17.4%	14.2%	-15.6%	-12.0%
Kansas City	17.6%	14.6%	-14.8%	-12.3%
Los Angeles	15.6%	13.0%	-24.0%	-11.1%
Miami	15.5%	12.5%	-22.1%	-10.8%
Milwaukee	19.3%	16.8%	-23.4%	-13.8%
Minneapolis	18.3%	14.9%	-17.7%	-12.5%
New York	15.5%	12.5%	-21.7%	-10.8%
Philadelphia	16.5%	12.7%	-17.7%	-10.9%
Pittsburgh	18.5%	15.3%	-18.6%	-12.8%
Portland	17.1%	13.7%	-20.7%	-11.6%
San Diego	15.1%	12.4%	-19.0%	-10.7%
San Francisco	15.0%	12.3%	-21.9%	-10.6%
Seattle	15.5%	11.9%	-20.1%	-10.3%
St. Louis	17.3%	14.4%	-15.9%	-12.2%
Mean	16.9%	13.9%	-19.1%	-11.8%
Median	17.3%	14.2%	-19.2%	-12.0%
Min	14.8%	11.9%	-24.0%	-13.8%
Max	19.4%	16.8%	-12.5%	-10.3%

Source: Author's Calculations.

Table 8. Effects of Limiting MID and Adding Closing Credit on Housing

	Change in User Cost		Change in Housing Prices	
	User-Cost	Discrete-Period	User-Cost	Discrete-Period
Atlanta	2.1%	-3.7%	-2.0%	3.9%
Boston	1.9%	-2.6%	-2.9%	2.8%
Chicago	1.9%	-2.9%	-2.5%	3.1%
Cincinnati	2.1%	-2.5%	-2.3%	2.6%
Cleveland	1.8%	-1.8%	-1.9%	1.9%
Dallas	1.6%	-3.1%	-1.6%	3.2%
Denver	2.2%	-4.1%	-1.8%	4.3%
Detroit	1.4%	-1.9%	-1.9%	2.0%
Honolulu	2.3%	-2.2%	-3.9%	2.3%
Houston	1.5%	-3.5%	-1.5%	3.6%
Kansas City	2.0%	-3.3%	-1.8%	3.4%
Los Angeles	2.1%	-2.6%	-3.6%	2.7%
Miami	1.7%	-3.1%	-2.8%	3.2%
Milwaukee	1.7%	-2.2%	-2.5%	2.3%
Minneapolis	2.1%	-2.9%	-2.2%	3.0%
New York	2.1%	-2.7%	-3.2%	2.8%
Philadelphia	2.1%	-2.3%	-2.4%	2.4%
Pittsburgh	1.8%	-1.4%	-2.0%	1.5%
Portland	2.0%	-4.4%	-2.8%	4.6%
San Diego	2.0%	-3.2%	-2.7%	3.4%
San Francisco	2.0%	-2.7%	-3.3%	2.8%
Seattle	1.9%	-3.5%	-2.8%	3.7%
St. Louis	2.1%	-3.1%	-2.1%	3.2%
Mean	1.9%	-2.9%	-2.5%	3.0%
Median	2.0%	-2.9%	-2.4%	3.0%
Min	1.4%	-4.4%	-3.9%	1.5%
Max	2.3%	-1.4%	-1.5%	4.6%

Source: Author's Calculations.

Table 9. Effects of ATRA and ACA on Housing

	Change in User Cost		Change in Housing Prices	
	User-Cost	Discrete-Period	User-Cost	Discrete-Period
Atlanta	-0.2%	-0.2%	0.2%	0.2%
Boston	-0.2%	-0.2%	0.4%	0.2%
Chicago	-0.2%	-0.2%	0.3%	0.2%
Cincinnati	-0.2%	-0.2%	0.2%	0.2%
Cleveland	-0.2%	-0.2%	0.2%	0.2%
Dallas	-0.2%	-0.2%	0.2%	0.2%
Denver	-0.2%	-0.2%	0.2%	0.2%
Detroit	-0.2%	-0.2%	0.3%	0.2%
Honolulu	-0.2%	-0.2%	0.5%	0.2%
Houston	-0.2%	-0.2%	0.2%	0.2%
Kansas City	-0.2%	-0.2%	0.2%	0.2%
Los Angeles	-0.2%	-0.2%	0.5%	0.2%
Miami	-0.2%	-0.2%	0.4%	0.2%
Milwaukee	-0.2%	-0.2%	0.3%	0.2%
Minneapolis	-0.2%	-0.2%	0.2%	0.2%
New York	-0.2%	-0.2%	0.4%	0.2%
Philadelphia	-0.2%	-0.2%	0.3%	0.2%
Pittsburgh	-0.2%	-0.2%	0.2%	0.2%
Portland	-0.2%	-0.2%	0.3%	0.2%
San Diego	-0.2%	-0.2%	0.3%	0.2%
San Francisco	-0.2%	-0.2%	0.4%	0.2%
Seattle	-0.2%	-0.2%	0.4%	0.2%
St. Louis	-0.2%	-0.2%	0.2%	0.2%
Mean	-0.2%	-0.2%	0.3%	0.2%
Median	-0.2%	-0.2%	0.3%	0.2%
Min	-0.2%	-0.2%	0.2%	0.2%
Max	-0.2%	-0.2%	0.5%	0.2%

Source: Author's Calculations.

Table 10. Marginal Tax Rates for Tax Units with Home Mortgage Interest

By Cash Income Percentile, 2013

Cash Income Percentile[2,3]	Tax Units (thousands)	Home Mortgage Interest Greater Than Zero		
		Tax Units (thousands)	Median Marginal Tax Rate on Wages and Salaries	Median Statuatory Tax Rate
Lowest Quintile	40,520	8,392	0	0
Second Quintile	36,208	13,751	15	10
Third Quintile	31,370	17,208	15	15
Fourth Quintile	26,062	16,686	15	15
Top Quintile	23,189	16,899	28	25
All	158,260	73,285	25	15
Addendum				
80-90	11,692	8,312	15	25
90-95	5,736	4,397	25	25
95-99	4,615	3,439	25.5	33
Top 1 Percent	1,147	751	32.5	40
Top 0.1 Percent	117	63	40.79	40

Source: Urban-Brookings Tax Policy Center Microsimulation Model (version 0412-8).

Table 11. Effects of Selected Policies on Housing Prices

Marginal Taxpayer is in the Top Tax Bracket

	28% Limit		No Itemized Deductions		MID to 20% and Flat Housing Credit		ATRA and ACA	
	User-Cost	Discrete-Period	User-Cost	Discrete-Period	User-Cost	Discrete-Period	User-Cost	Discrete-Period
Atlanta	-11.1%	-9.9%	-30.0%	-27.3%	-5.7%	1.3%	8.4%	7.3%
Boston	-14.8%	-9.0%	-37.1%	-25.3%	-8.3%	0.2%	15.2%	8.8%
Chicago	-15.3%	-10.1%	-38.2%	-27.8%	-7.2%	0.7%	12.3%	7.3%
Cincinnati	-13.8%	-11.5%	-35.4%	-30.7%	-6.6%	-0.2%	9.3%	7.3%
Cleveland	-12.8%	-11.6%	-33.4%	-31.0%	-5.5%	-0.6%	9.0%	8.1%
Dallas	-11.5%	-10.2%	-30.6%	-27.9%	-4.7%	1.2%	8.6%	7.6%
Denver	-8.6%	-8.8%	-24.4%	-24.7%	-5.1%	1.6%	7.3%	7.6%
Detroit	-14.5%	-11.0%	-36.7%	-29.8%	-5.3%	0.0%	11.5%	8.4%
Honolulu	-16.8%	-9.1%	-40.7%	-25.5%	-11.1%	-0.6%	18.1%	9.1%
Houston	-11.0%	-10.0%	-29.7%	-27.4%	-4.3%	1.7%	8.3%	7.4%
Kansas City	-10.4%	-10.2%	-28.4%	-27.9%	-5.1%	0.9%	7.8%	7.6%
Los Angeles	-17.8%	-9.4%	-42.5%	-26.2%	-10.3%	0.1%	18.6%	8.5%
Miami	-16.2%	-8.8%	-39.7%	-24.9%	-8.1%	1.0%	16.3%	7.9%
Milwaukee	-17.4%	-11.8%	-41.7%	-31.3%	-7.1%	-0.1%	12.7%	7.6%
Minneapolis	-12.6%	-10.4%	-33.0%	-28.5%	-6.4%	0.3%	9.2%	7.3%
New York	-15.9%	-9.0%	-39.3%	-25.2%	-9.3%	0.2%	16.0%	8.1%
Philadelphia	-12.6%	-8.9%	-33.1%	-25.1%	-7.0%	-0.2%	10.8%	7.6%
Pittsburgh	-13.4%	-10.8%	-34.6%	-29.2%	-5.6%	-0.9%	9.7%	7.9%
Portland	-15.1%	-9.7%	-37.7%	-26.8%	-7.9%	2.1%	12.8%	7.2%
San Diego	-13.7%	-9.0%	-35.2%	-25.1%	-7.7%	0.9%	13.7%	8.2%
San Francisco	-16.0%	-8.9%	-39.5%	-25.0%	-9.5%	0.3%	17.0%	8.5%
Seattle	-14.6%	-8.4%	-36.8%	-23.8%	-7.9%	1.4%	14.2%	7.4%
St. Louis	-11.2%	-10.1%	-30.2%	-27.7%	-6.0%	0.4%	8.7%	7.9%
Mean	-13.8%	-9.9%	-35.1%	-27.1%	-7.0%	0.5%	12.0%	7.9%
Median	-13.8%	-9.9%	-35.4%	-27.3%	-7.0%	0.3%	11.5%	7.6%

Source: Author's Calculations.