

Tax Benefits to Housing and Inefficiencies in Location and Consumption

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Abstract:

Tax benefits to owner-occupied housing provide incentives for housing consumption, offsetting disincentives the property tax causes. These benefits also help counter the penalty federal taxes impose on households who work in productive high-wage areas, but also reinforce incentives to consume local amenities. We simulate the effects of these benefits in a calibrated model, and determine the consequences of various tax reforms. Reductions in tax benefits generally increase efficiency in consumption, but reduce efficiency in location, unless they are accompanied with tax-rate reductions. The most efficient policy would eliminate tax benefits and index taxes to local wage levels.

Keywords: Federal Taxation, General Equilibrium Tax Incidence, Geographic Inequality, Locational Efficiency, Mortgage Interest Deduction, Cost of Living, Tax Reform.

JEL: H24, H5, H77, R1

I. Introduction

Since its inception, the federal tax code has given preferred status to housing, particularly housing occupied by owners. Today, this preferred status manifests itself in several ways. First, mortgage interest costs on up to \$1 million of debt on primary and secondary homes are deductible from taxable income.¹ Second, capital gains from home sales of up to \$500,000 for married couples, and \$250,000 for singles, are also deductible. Third, owner-occupiers are not required to report imputed rents, or what an owner-occupant would be willing to pay to live in their unit, as income. The Office of Management and Budget projects that these benefits to home owners will result in foregone tax revenues – or “tax expenditures” – for the 2014 fiscal year of over \$200 billion,² equal to 14 percent of federal income tax revenues.³ Similar tax expenditures cost state government billions of dollars in foregone income tax revenues. There are also implications of these tax expenditures for sales tax revenues, as new homes and home improvements are not subject to sales taxes.⁴

Projected shortfalls in government revenues have caused some policymakers to question whether the preferred treatment of housing should be revoked in order to raise additional revenues. Reforming the deductions for mortgage interest and property taxes are both targets for major overhaul in the tax reform proposal put forth recently by the National Commission on Fiscal Responsibility and Reform.⁵ A discussion about reforming the mortgage interest

¹ Homeowners can also deduct up to \$100,000 in home equity secured debt, effectively pushing the lending cap to \$1.1 million.

² See Burman and Phaup (2012) for a discussion of how much additional revenue would actually be collected if these and other tax expenditures were eliminated. They point out that revenue depends on the behavioral response of tax payers, the interaction with other aspects of the tax code (rates, itemization, and other deduction).

³ All dollar amounts of tax expenditure come from the “Analytical Perspectives, Budget of the United States Government, Fiscal Year 2013” and reflect estimates of the foregone revenue from 2013 tax collection.

⁴ The purchases of materials for home improvements is taxed, but not the labor that is put into home improvements.

⁵ The Commission suggested transforming the mortgage interest deduction to a 12 percent tax credit limited to mortgages less than \$500,000. The Commission also recommended eliminating itemized deductions, which would include the deduction for property taxes paid. Green and Vandell (1999) simulate the effects of a revenue neutral change from the mortgage interest and property tax deductions to a housing tax credit and find that such a policy would increase aggregate homeownership rates.

deduction has been on-going for some time as the President's Advisory Panel on Tax Reform proposed replacing the mortgage interest deduction (MID) with a 15% credit, and limiting applicable mortgages based on regional housing prices in 2005. Such reforms tend to be quite popular with economists; in a recent poll of tax economists, 77 percent favor repealing the MID; a poll of real estate economists and similar experts indicated that only 10 percent support the MID in its current form. Nevertheless, these tax benefits are popular with the electorate and politicians, so perhaps this is an issue where better information and understanding could bridge the gap in opinion.

The consequences and costs of housing's tax-preferred status have received considerable attention in the economic literature (see Rosen (1979a), Mills (1987), Poterba (1992), and Hanson (2012) for examples). This literature has focused primarily on how these tax benefits affect investment in housing capital. The general consensus is that the tax-preferred treatment of housing relative to other capital causes inefficiently high quantity of housing capital, leverage of mortgage debt, and consumption of housing services relative to other goods. A less noticed phenomenon, noted in Hall (1996), is that property taxes discourage the consumption of housing if buying a larger home does not result in proportionately larger benefits in local services paid for by those taxes. A number of arguments, summarized in Glaeser and Shapiro (2003), have been made that homeownership deserves subsidization, because it produces positive externalities. These include greater voter participation, and external home maintenance. However, empirical evidence (Glaeser and Shapiro 2003, and Hanson 2012) shows no relationship between existing housing tax benefits and homeownership.

Far less attention has been given to the issue of how tax- benefits may influence where households choose to live, work, and enjoy local amenities. Gyourko and Sinai (2003, 2004) demonstrate that the geographic distribution of housing benefits is strongly tilted towards areas where housing prices, income levels, and home-ownership rates are high, and that this distribution is quite stable over time. However, examining the current distribution of benefits does not show how the population might be distributed in the absence of such incentives, or how these incentives operate in the context of a location-distorting income tax. Albouy (2009) considers how price and income differences stem from variation in local quality of life and the productivity of firms through household mobility when land is scarce. He demonstrates that housing benefits may indeed distort

location choices towards expensive areas with desirable local quality-of-life amenities. But, when prices are high because an area has a strong labor market and high wages, housing benefits may dull the tax disincentive to work in such areas. In this case, housing benefits may enhance efficiency by allowing households to deduct part of the expenses of working in a highly productive area.

This paper examines the consequences of tax benefits for housing on both location and consumption decisions simultaneously. These tax advantages effectively subsidize households to live in areas with greater amenities, leading to inefficient overcrowding; on the positive side, these advantages mitigate the tax penalty of working in areas with better paying jobs, as high wage areas are often high housing cost areas. To analyze the effect of housing's preferred status on location choice, we first need to place it in context of the income tax. Across American metropolitan areas, wages and housing costs exhibit a strong positive correlation. Theoretically, this suggests that cost-of-living differences are due more to productivity differences for firms rather than quality-of-life differences for households. As a result, tax benefits to housing on the whole reduce locational inefficiency, as higher deductions help to offset higher taxes workers' pay in high-wage cities more than they subsidize life in amenable areas. At the same time, federal tax subsidies to owner-occupied housing are generally larger on the margin than local property taxes, meaning that households have an incentive to over-consume housing relative to other goods.

Besides considering the impact on location, this paper makes a number of other additions to the literature on tax benefits to housing. We estimate the degree to which housing may be inefficiently consumed by also taking into account the potentially countervailing or reinforcing effects of property taxes on housing and sales taxes on non-housing consumption. In addition, we relax the typical assumption of perfectly elastic housing supply and incorporate local variation in the elasticity of housing supply to provide more accurate measures of efficiency costs in housing consumption. We also consider how tax reforms, such as eliminating tax benefits for housing or indexing taxes to local wage levels, would affect local housing costs,

employment, and the efficiency of housing consumption and household locations across the country.⁶

Our simulation results imply that the existing system of income taxation with tax-benefits for owner occupied housing causes \$27 billion a year in deadweight loss from housing consumption, and an additional \$15 billion a year in deadweight loss from locational choice decisions. Eliminating the mortgage interest and property tax deductions would reduce deadweight loss for housing consumption to about \$5 billion, but increase deadweight loss from locational choice decisions to \$28 billion. Thus, the net effect of eliminating the deductions would be efficiency improving. A reform that eliminates these deductions accompanied by indexing income taxes for local wage levels has the largest impact on reducing deadweight loss, bringing deadweight loss to less than \$13 billion.

The remainder of the paper begins with a presentation of models that incorporate income taxes into location and housing consumption choice. The models produce equations for the deadweight loss caused by the tax code's interaction with these markets. We then calibrate the models using data on wages, home prices, and location characteristics using data from the American Community survey and the Internal Revenue Service ZIP code file, and use it to present deadweight loss estimates under the current income tax regime and simulate the deadweight loss effects of several tax reforms. The final section of the paper concludes.

II. Modeling Locational and Housing Consumption Inefficiency

How taxes alter the location choice decision

We model the relationship between taxes, housing benefits, and location choice using the general equilibrium framework of Albouy (2009), which adds federal taxes to the Rosen (1979) and Roback (1982) model of wages, amenities, and housing costs. In this framework, households

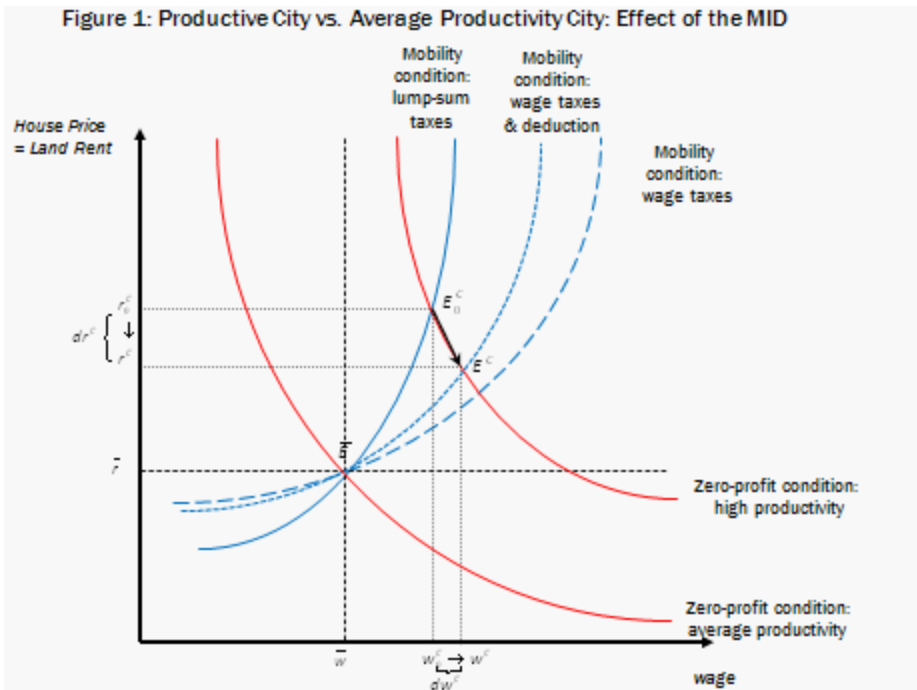
⁶ Previous studies consider how eliminating deductions would affect revenues and incentives (Poterba and Sinai, 2008a), as well as the user cost of housing (Anderson et al. 2007, Poterba and Sinai 2008b), how switching to a consumption based tax would impact the housing market in general (Bruce and Holtz-Eakin, 1999), and how housing might be treated by a national retail sales tax (Feenberg et al.1997), but none consider the impact on location choices.

must purchase housing in the city where they live and work, and thus cities are effectively metropolitan areas. We assume that households are fully mobile across cities and have homogenous tastes. Firms hire labor, capital, and land to produce local housing goods, as well as goods that are tradable across cities, which we assume have the same price everywhere. The second main assumption is that these firms make zero profits, paying factors their marginal products. These strong equilibrium assumptions make the framework best suited for understanding outcomes over the long-run and when applied to cross-sectional data.

Cities vary in essentially two attributes, the productivity of their firms, and the quality of life they offer to their residents. Through the twin assumptions that households are mobile and firms make zero profits, firm productivity and quality of residential life simultaneously determine housing prices and wages in each city. Because households are mobile they will pay more for housing in cities where wages are high or where quality of life is good. Firms will pay higher prices for local land in areas where wages are low, or productivity is high.

We demonstrate this model and its consequences for the burden of taxes in figure 1 and 2 using the simplifying assumption that we may approximate the price firms pay for land with price workers' pay for housing.⁷ Figure 1 illustrates the case for cities that vary in productivity: two cities, Nashville and Chicago both offer the national average in quality of life, but Chicago has above-average productivity. Each have downward-sloping zero profit curves for firms, as they will be willing to pay less to be in cities with higher wages. Chicago's curve is above Nashville's as firms will pay more to be in a more productive area. The mobility condition for workers slopes upward, as workers will pay more to live in cities where wages are high. This condition completes the equilibrium, whereby Chicago offers higher wages and has higher prices than Nashville.

⁷ We then are just modeling firms that produce tradable goods, with firms that produce non-tradable housing completely in the background. Albouy (2009) demonstrates that when cities are good at producing housing will produce the opposite effect on prices and wages than when they are good at producing tradable goods. Without land prices, the two are observationally impossible to disentangle, but for purpose of tax policy it does not matter.

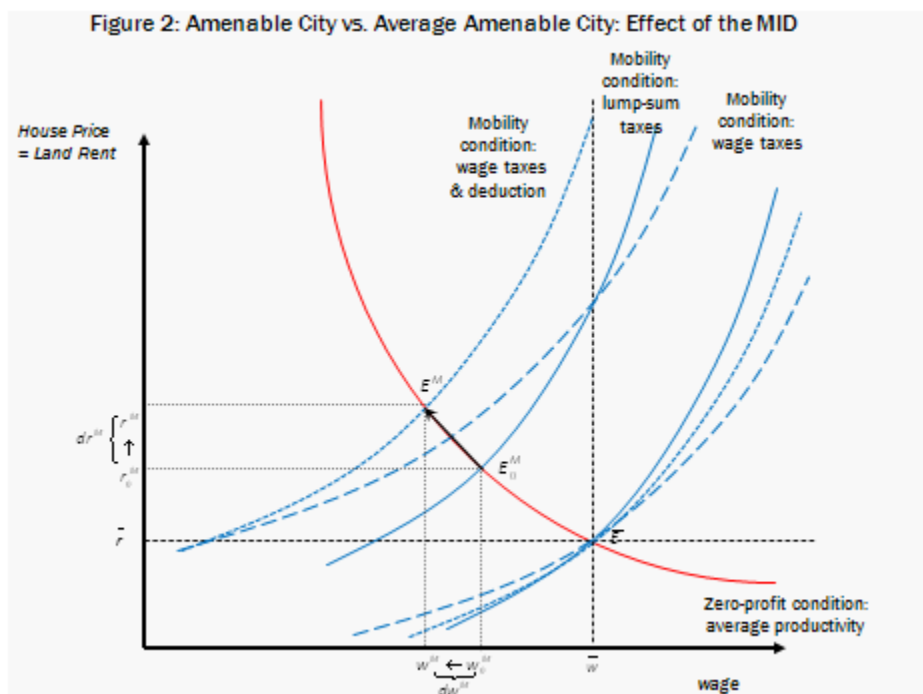


Federal taxes on wages reduce the bid that households will pay to live in a high-wage city, rotating the mobility condition clockwise. This increases the equilibrium wage and reduces the equilibrium price in Chicago relative to Nashville. When there is any elasticity in the supply or demand for local land this will also cause the population to leave Chicago for places with lower productivity. If we assume that tax revenues are redistributed lump sum, then federal taxes will have no effect on Nashville's prices, since residents there receive no net change in benefits.⁸

The effect of federal tax benefits for local housing are seen in the shorter dashed curve. It is rotated counter-clockwise by effective housing subsidy since it causes households to increase their bid to live in higher-wage cities. This moves the equilibrium wage down and the price up, producing an outcome closer to the initial neutral tax equilibrium. With the federal tax in place the housing tax benefit helps undo the tax distortion created by the income tax. The higher the marginal tax rate a household pays, the greater this distortion is and the greater is the correction provided by the housing tax benefit.

⁸ By symmetry, presumably there are also lower productivity city, which gain population, see housing prices and wages rise. The wage predictions rely on the assumption that there are fixed factors in production and that agglomeration economies in production are fairly weak.

Figure 2 demonstrates how federal income taxes and housing tax benefits change the locational equilibrium for two cities that vary by residential quality of life. Miami represents a city with a quality of life that is above average, where Nashville is an average quality of life city. Here, both Nashville and Miami share the same zero-profit condition for their firms. Miami's mobility condition for their workers is shifted higher: for a given wage, households will pay a higher price to enjoy a better quality of life. In equilibrium, the price in Miami is higher, and the wage lower, relative to Nashville.



Federal taxes reduce the net pay cut that households endure for living in a nicer city, rotating the mobility conditions for both quality-of-life levels clockwise around the average national wage. As in the previous example, prices remain stable in Nashville. However, in Miami prices are bid up, and wages are bid down, as more residents migrate there. Interestingly, employers who locate in beach towns or other amenable locations are effectively offering their workers an untaxed fringe benefit; although residents end up passing on the tax benefit to landowners.

Tax benefits to housing increase the bid households pay for higher wages and greater quality of life, rotating the mobility condition counter-clockwise around the average price level.

In Miami, this further increases the price of housing and lowers the wage households are willing to endure to enjoy a higher quality of life. Across cities that differ in quality of life, tax benefits to housing exacerbate the spatial distortion caused by federal income taxes on labor.

A similar argument holds for neighborhoods. If wage earners face equal commute times in Arlington and Bethesda, but Bethesda offers better quality of life, then tax benefits will artificially inflate housing prices and population numbers there. As noted by Wildasin (1986), taxes on labor lower the value of time of workers, causing them to commute for too long, leading to sprawl. Tax benefits to housing may mitigate this effect by increasing the bid to locate more centrally. It could lead to more sprawl, as subsidies increase the aggregate demand for housing and residential land. In addition, denser multi-family buildings that tend to be located centrally are typically rented and thus do not benefit from housing tax benefits like the mortgage interest and property tax deductions (see Glaeser 2011).

The formal model, detailed in Albouy (2009), produces a federal tax differential for each city, defined as the additional taxes paid by household in location j relative to the national average as a fraction of average income. It can be neatly approximated by log-linearizing the federal tax schedule and applying the envelope conditions implied by household mobility and zero profits, to produce

$$(1) \frac{d\tau^j}{m} = \tau'(s_w \hat{w}^j - \delta s_y \hat{p}^j)$$

where τ' is the marginal tax rate, m^j is household income, \hat{w}^j and \hat{p}^j are observed log wage and price differentials, relative to the national average. Which on average determines the share s_w of household income m^j . Households spend their income on a non-tradable good, y , with price p^j , that on average takes up the share s_y of gross expenditures, some of which is housing, h , which takes up the share s_{hous} . Households pay a federal tax $\tau(m^j - f^j \sigma s_{hous} p^j h^j)$, where f^j indicates the fraction of home goods which are deducted as housing, σ , is the effective deduction rate for housing, and $p^j h^j$ are housing expenditures. The term δ denotes the fraction of home goods deducted as housing.

Federal taxes not only influence prices, but also cause factors such as labor to move across cities. By making high-wage cities more expensive to live and hire in, federal taxes induce workers and businesses to move away from high-wage areas towards low-wage areas. This causes an efficiency loss from misallocating workers across areas. The employment effect of a differential tax can be written as $\Delta \hat{N}^j = \varepsilon \cdot d\tau^j / m$, where $\Delta \hat{N}^j$ is the change in log employment due to mobility, and ε is the elasticity of local employment with respect to a local, uncompensated tax, written as a percent of total income. In principle, reduced-form estimates of this elasticity can be estimated or calibrated from a structural theoretical model.

Because workers locate in response to federal income taxes, the resulting spatial distribution of employment becomes inefficient, or "locationally inefficient" (Wildasin, 1980). Consistent with Harberger (1964), this deadweight loss, expressed as a fraction of national income, is proportional to half the size of the tax differential times the induced change in migration, averaged across cities.

$$(2) \quad \frac{DWL}{National\ Income} = \frac{1}{2} E \left(\Delta \hat{N}^j \frac{d\tau^j}{m} \right) = \frac{\varepsilon}{2} \cdot Var \left(\frac{d\tau^j}{m} \right)$$

Whatever the distribution of city attributes, this formula captures the entire efficiency loss from all of the distortions created by unequal geographic taxation, including the indirect distortion on the location of capital. This equation assumes that city attributes are unaffected by employment levels.

To conclude this section, we consider the impact of indexing taxable income to local price levels. If we provided a full cost-of-living adjustment by dividing taxable income by an ideal cost-of-living index, this would be equivalent in this model to setting $\delta = 1$. In this case, only differences in real incomes would be taxed. In equilibrium, this would occur only across households in cities that vary in their quality of life. In other words, a full cost-of-living indexation would fully eliminate the tax incentive to leave productive cities for unproductive ones. It would preserve the incentive to leave low quality-of-life cities for high quality ones. In effect, the tax benefits to housing provide a partial cost-of-living index for those who claim it. Replacing the tax benefits to housing with an equivalent partial cost-of-living index would then produce similar effects on renters and non-itemizers and reduce the marginal incentive to consume housing discussed below.

To completely prevent taxes from distorting location decisions, taxable labor income would need to be indexed by an ideal measure of local wage levels. Such an index should account for how the income of workers depends on where they live, and effectively control for local characteristics of the workforce. As households are inherently different, producing such an index would of course be difficult. Nevertheless, wage rates across different types of workers by education, experience, gender, race, and occupation do appear to be strongly correlated across cities.

How taxes alter the housing consumption decision

Here we consider the more standard problem of how tax benefits affect housing consumption relative to other kinds of consumption in a partial equilibrium setting. Besides taking into account the three federal benefits, we also incorporate state and local policies that, while known by others, are rarely considered at the same time. The most important of these are local property taxes, which matter if they act as an excise tax on the margin. The second is due to the absence of sales taxes on new housing purchases or improvements.

We begin with how taxes affect the effective price of additional housing, e.g. the incentive to consume additional square footage or a second bathroom, within a given neighborhood. The effective ad valorem subsidy created for housing consumption in area j is:

$$(3) \quad \sigma_j = (1 - UC_{Preferred}/UC_{Neutral}) + \tau_S$$

where UC_{Tax} is the user cost of housing with special tax considerations, and UC_{NoTax} is the user cost of housing without them, and τ_S is the state sales tax.⁹

⁹ We do not consider other fees that may act like taxes on a home purchase such as closing costs due at the time of purchase. In general, the fraction of closing costs that represent fees that act like taxes is small compared to those that represent services. Title search and insurance fees typically represent the largest portion of closing costs, which offer buyers the service of ensuring that there are no other liens, easements, or other restrictions on the property- a service to buyers. Treatment of closing costs varies in the literature from being considered part of the equity financed portion of the user cost (Genesove and Mayer, 1997) to being a separate parameter affecting housing supply (Yinger, 1981).

To calculate the user cost of housing with and without special treatment in the tax code we use a model similar to that in Poterba and Sinai 2008a and 2008b.¹⁰ This user cost model adds to previous versions by considering the housing specific risk premium as a cost to borrowers, while recognizing that buyers benefit from the reduction in risk associated with being able to pre-pay or default.¹¹ Thus, the model excludes the mortgage interest rate in excess of the risk free rate as a cost. Our no-tax baseline is the user cost of housing without differential tax treatment, removing the mortgage interest deduction, property taxes, and taxing capital gains. The user cost model without differential tax treatment for housing is:

$$(4) \quad UC_{Neutral} = (1 - \tau_Y(1 - \lambda))r_T + (1 - \tau_Y)\beta + m - (1 - \tau_{CG})\pi$$

Where, τ_Y is the marginal income tax rate applying to investment income,¹² λ is the share of the home financed with debt, r_T is the risk-free interest rate, β is a housing specific risk premium, m is annual maintenance and depreciation costs. The tax neutral case treats housing like any other investment, and thus the risk-free equity cost of capital, (r_T), and the house-specific risk premium, β , would be taxed at normal income tax rate, τ_Y . In keeping tax neutral treatment, we include a tax housings capital gain. The capital gain itself is represented by price inflation, (π), and is subject to the capital gains tax rate, τ_{CG} . This representation ignores the limit on the exclusion for capital gains taxation on housing assets. For practical purposes, we expect that leaving out the limit on capital gains, \$250,000 for singles and \$500,000 for married filers, will not change our simulation results appreciably. In principle, we could include this limit in our model, but with no known data source to parameterize this limit, we cannot include it in simulations.

Since we are interested to see how changing the tax treatment of housing creates deadweight loss, we also need a variant of the user cost model that reflects current law tax

¹⁰See Rosen (1979a, 1979b, 1985), Poterba (1984, 1992), Green and Vandell (1999), Glaeser and Shapiro (2003), Himmelberg, Mayer and Sinai (2005), and Anderson et al. (2007) for variants of the user-cost model.

¹¹ Berkovic and Fullerton (1992) model tax incentives in general equilibrium setting and present evidence that ownership is determined primarily by demographics, while the amount of housing consumed depends on its relative price. They demonstrate that taxing imputed rent reduces undiversified risk face by households, and can actually increase home-ownership rates.

¹² In our simulations, tax rates include both state and federal income taxes.

treatment. We add in the mortgage interest deduction, as well as the deduction for property taxes to the user cost equation in (5). In adding the differential tax parameters, we consider that the full mortgage interest rate is deductible,¹³ while only the interest rate in excess of the risk free rate is a cost. We also consider that property taxes may be considered as either excise taxes or benefit taxes. See Miezkowski (1972) for a full explanation of the excise view of property taxes, also see Zodrow (2001) for an explanation of the difference (and reconciliation) of competing views of property taxation.¹⁴ With these considerations, and current tax treatment, the user cost of housing with preferential tax treatment is:

$$(5) UC_{Tax} = (1 - \{\tau_D(1 - s)\lambda + \tau_Y(1 - \lambda)\})r_T + (1 - \tau_Y)\beta \\ - \tau_D(1 - s)\lambda(r_M - r_T) + m + (1 - \tau_D - k)\tau_P - \pi$$

where τ_D represents the marginal income tax rate applying to deductions, r_M represents the mortgage interest rate, and τ_P is local property taxes. s is the share of the mortgage that exceeds the current law cap on interest deductibility. We also include the current limit on mortgage interest deductibility, set at \$1 million in the s parameter. This parameter follows Anderson et al. (2007), and represents the average share of mortgage that exceeds the current law cap. The parameter, k , also an innovation to the user cost model added by Poterba and Sinai (2008) allows flexibility in viewing the property tax as a benefit tax or an excise tax. If the property tax is completely a benefit tax, then $k = 1$, and we are left with only the deduction portion, if $k = 0$, then the property tax is completely an excise tax and the full cost (minus deduction) is included.

To estimate the excess burden from preferential tax treatment on housing consumption, we start with a standard deadweight loss equation (Rosen, 1979a, Poterba, 1992). The excess burden on housing consumption that results from the tax code is:

¹³ Our simulations account for differences in state mortgage interest deductibility.

¹⁴ The literature on the behavioral response to property taxes focuses on the mobility (Fox et al. (1989), O’Sullivan et al. (1995), Knapp et al. (2001), Shan (2010)), property improvement (Oates and Schwab (1997), Anderson (1998), and urban sprawl (Song and Zenou (2006), Banzhaf and Lavery (2010)). See Deskins and Fox (2008) for a recent review of the literature on the behavioral response to property taxation, there is also an extensive empirical literature on the relationship between property tax and home values; see Palmon and Smith (1998) for an excellent example and Sirmans et al. (2008) for a recent review of the capitalization literature.

$$(6) \text{ DWL/Income} = (1/2)|\bar{\eta}_j|s_y\sigma_j^2$$

where s_y represents the share of income spent on housing, and σ_j^2 represents the squared value of the change in the cost of housing services induced by differential tax treatment. One departure we make from previous studies is that we relax the assumption that housing supply is perfectly inelastic. Accordingly, we incorporate local housing supply elasticities into our measure of deadweight loss by defining $\bar{\eta}_j$ as the harmonic sum of minus the compensated price elasticity of demand, η^{cd} , and the local housing supply elasticity, η_j^s , or $\bar{\eta}_j = \eta^{cd}\eta_j^s / (\eta^{cd} + \eta_j^s)$. Including supply elasticities provides smaller deadweight loss estimates than assuming they are infinite.

III. Calibrating Models and Examining Validity

Calibration

To make our models useful for simulation, we need to assign values to the parameters using available data and previous work. According to our calibration, labor receives $s_w = 75$ percent of income; housing cost differences are used to measure home-good price differences. Using this measure requires that the expenditure share for home goods equals the expenditure share on housing of 22 percent plus the estimated expenditure share on non-housing home goods of 14 percent, to produce $s_y = 0.36$ – see Albouy (2008a) for details – meaning 59 percent of home goods are housing. As non-tradable goods are land intensive, the fraction of land in tradables is 17 percent, while the fraction of labor in tradables is 70.4 percent. The elasticity of employment with respect to local taxes, ϵ , is taken at -6.0 from Bartik's (1991) meta-analysis of the effect of local taxes on local levels of output and employment, controlling for local public spending. It can also be consistent with a fully calibrated model, seen in Albouy and Stuart (2013). As this value is crucial to the locational inefficiency measure, we also consider a very conservative value of -1.0.

The marginal federal income tax rate on gross wages is 23.8 percent according to TAXSIM (Feenberg and Coutts 1993); this rate is comparable to the empirical tax findings. Adding the marginal payroll tax rate on both the employer and employee sides, net of additional Social Security benefits (Boskin et al. 1987), leads to a higher effective rate of 32.0 percent. For housing, 67 percent of returns (weighted by income) itemize deductions, and according to

TAXSIM save 20 cents per dollar of mortgage, or 84 percent of the marginal tax rate. This only applies to the 59 percent of non-tradable goods that are housing, implying a savings of only 2.94 percent of income for every one percent in the housing-cost level. At the state level, the average effective marginal tax rate on wages is 6.2 percentage points, and ranges from 0 in Alaska to 9.0 percent in Minnesota. These differences apply only to wage differences within state, which, on average are only 44 percent as large as wage differences across the country. Across states and cities, tax differences may be approximated by using a tax rate of 38.0 percent, and a deduction on all non-tradable goods of 29.4 percent.

To calculate the difference in user cost across cities in our sample we use the federal and state tax rates described above- excluding payroll taxes. We apply the tax on income, τ_Y , differently than the tax rate that applies to deductions, τ_D , according to state tax rules on allowance of the MID. For the property tax rate, τ_P , we use the average rate reported at the city level by respondents of the 2007 American Community Survey. We use estimates from Anderson et al. (2007) for the share of mortgage exceeding current law MID limits.¹⁵ Following Poterba and Sinai, we assume a combined 2.5 percent maintenance and depreciation rate, and a risk premium of 2 percent. We use a mortgage interest rate, r_M , of 6 percent, reported as the average interest rate on first lien mortgages for the stock of mortgages in 2007 by the Survey of Consumer Finances (SCF). We also use the 2007 SCF to determine an average loan to value ratio of 0.624.¹⁶ The risk free rate, r_T , is the 10 year Treasury bond yield in 2003. The primary difference between our parameterization and Poterba and Sinai (2008a) is that they use individual data from the Survey of Consumer Finances to estimate marginal tax rates. They use these estimates to describe differences across income and age groups, whereas we are primarily interested in geographic differences. We also use the ACS for property tax rate estimates, whereas they use the SCF which does not differentiate across geography. In addition, we use local measures of how house price inflation differs across locations instead of a national average.

¹⁵ We use the variation across cities in their sample for all caps. They use data on actual mortgages originated in 2003 to calculate values of the s parameter.

¹⁶ The loan to value ratio is the average family holdings of debt on mortgages (\$149,500) plus the debt holdings on home equity lines of credit (\$39,200). We divide this by the average asset value of primary residence (\$302,400).

Our baseline assumption is that, on the margin, property taxes act as excise taxes, so that $k = 0$. We also show an alternative with $k = 1$, which is the pure benefit case. We prefer $k = 0$ based on the idea that property taxes discourage households from consuming housing more than they discourage them from consuming public services. This appears to be largely true of public services such as education, parks, and public safety, since their consumption depends mainly on the number of individuals, especially children, in the households that live in the community. The assumption appears less true for local roads and fire protection, since smaller houses may require fewer roads and fewer firemen, although we expect such effects to be rather minor. We are also unaware of any evidence that property taxes cause households to have fewer children by making housing more expensive.¹⁷

Our estimates of local housing supply elasticities come from Saiz (2010), who estimates this parameter across metropolitan areas using satellite-generated data on the slope of local terrain and presence of natural boundaries such as bodies of water and wetlands. For the compensated housing demand price elasticity, we use -0.5, which is conservative relative to recent empirical estimates in Hanson and Martin (in press) and those used in other simulations (Poterba, 1992).

Wage and Housing-Cost Differentials

Wage and home-good price differentials are estimated using 1 percent samples of the American Community Survey from 2005 to 2009 from the Integrated Public Use Microdata Series (IPUMS). Home-good price differentials are based on housing costs, as they are a prime determinant and predictor of cost-of-living differences. Cities are defined at the Metropolitan Statistical Area (MSA) level using 1999 OMB definitions. Consolidated MSAs are treated as a single city (e.g. San Francisco includes Oakland and San Jose), as are the non-metropolitan areas of each state.

¹⁷ If true, Such a finding would certainly be very interesting. If anything, we might guess that higher property tax rates increase the amount of local redistribution through public services from households with no or few children to households with many children.

Inter-urban wage differentials are calculated from the logarithm of hourly wages for full-time workers, ages 25 to 55. We compute raw differentials across areas and separate the effects explained by observable characteristics, using the residuals to explain the remaining difference. This is done by regressing log wages on city-indicators, to identify the location effects, and an extensive set of controls --- each fully interacted with gender ---for education, experience, race, occupation, industry, and veteran, marital, and immigrant status, to identify the composition effects. The locational wage differentials correspond to those in the model and are interpreted as the causal effect of city j 's attributes on a worker's wage. Identifying these differentials requires that workers do not sort across cities according to their unobserved skills.¹⁸

Housing values and gross rents reported in the Census are used to calculate home-good price differentials. To reduce measurement error from imperfect recall or rent control, the sample includes only units that were acquired in the last ten years. Price differentials are separated into compositional and locational components, and are estimated in a manner similar to wage differentials, using a regression of rents and values on flexible controls --- interacted with tenure --- for size, rooms, acreage, commercial use, kitchen and plumbing facilities, type and age of building, and the number of residents per room. Proper identification of housing-cost differences requires that the average unobserved housing quality does not vary systematically across cities.

Locational wage and housing-cost differences across areas are graphed in Figure 3;¹⁹ Panel A of Table 1 reports the mean and standard deviations of these differentials, which together with the figures, reveal that most of the average raw wage and housing-cost differences across areas are not explainable by observable characteristics, but appear to be due to locational effects.

¹⁸In reality, workers do not all have the same endowments and tastes or pay the same marginal tax rate, nor are they equally sensitive to productivity differences. However, as shown in Albouy (2008b), workers with different tastes and endowments can be aggregated without serious complications, so long as each is weighted by their share of income (which we do, although it has little impact on the estimates).

¹⁹ Appendix Figure A1 displays wage and housing-cost differences explained by observable worker and housing composition.

Figure 3: Locational Wage and Housing Costs across Areas: 2007



To check the accuracy of the calibrated model, we make comparisons to measured tax and deduction differentials across metropolitan areas using federal tax data from the IRS ZIP Code files in Albouy and Hanson (2013). The IRS ZIP code files are ZIP code level data created from individual tax returns for 2007.²⁰ The IRS ZIP code level data allow us to produce

²⁰ These data are generated from the universe (the Individual Master File System) of all Form 1040, 1040A, and 1040EZ filed with the IRS between January 1, 2008 and December 31, 2008. The IRS determines the ZIP code of each taxpayer using what is reported on tax forms, and does not make any attempt to correct invalid ZIP codes or impute missing ZIP codes. ZIP codes with fewer than ten returns are not included in the data.

measured tax and deduction differences across metro areas by aggregating ZIP code level data to the state and metropolitan area.²¹ The IRS data are beneficial for this purpose as they give actual tax payments and number of claims, but they do not allow us to control for composition differences in the population. For descriptive purposes, Panel B of Table 1 shows summary statistics for the IRS data aggregated to the metropolitan area level. The metro area average adjusted gross income for tax filers in our sample is \$27,766 with a substantial standard deviation of \$7,457. With the detail of the IRS data we can also see that about 27 percent of the tax filers in the sample claim the mortgage interest deduction with an average claim of \$11,658. The standard deviation on the average mortgage interest deduction is substantial at \$3,789.²²

IV. Simulation Results

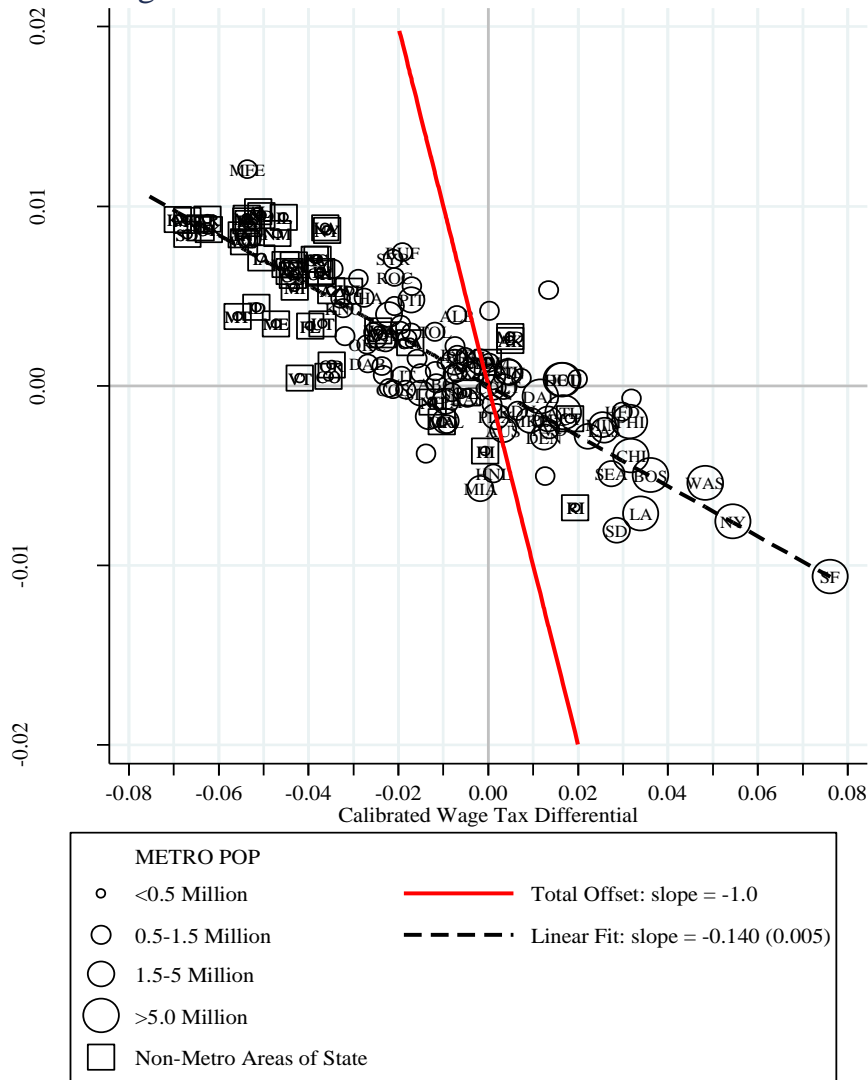
Locational Tax Distortions

Figure 4 displays the tax differentials or locational wedges due to wage and housing-cost differences across areas, according to equation (1): these are divided into the portion due to higher wages on the horizontal axis, and lower housing costs, on the vertical axis. The solid line in the graph shows where the deduction differential would offset the wage-tax differential one for one. The size of a city's total differential is determined by its distance to the right of or above this line (note the difference in scale).

²¹ We allocate ZIP code areas to MSA's and non-metro areas of states using the MABLE/GeoCorr2K database available online at: <http://mcdc2.missouri.edu/websas/geocorr2k.html>. The majority of ZIP codes (over 83 percent) have complete overlap with an MSA or non-metro area, we allocate the IRS ZIP code data for ZIP codes with partial overlap to MSAs based on the population overlap between the two areas.

²² As predicted we found the relationship between taxes and wage levels to be positive and convex, reflecting progressivity in the tax code. The slope of this relationship is 0.252 at the average, which is statistically indistinguishable from the calibrated tax rate of 0.238. This shows that on average, our calibration fits the measured data quite well.

Figure 4: Calibrated Tax and Deduction Differentials



The standard deviations reported in Table 2 reveal that location tax distortions due to housing benefits are indeed smaller than those due to wages. However, as seen in the dashed regression line in Figure 4, they are negatively related, as places with higher wages have higher costs, and thus, higher deductions, helping to offset the tax differential somewhat. If tax deductions were eliminated, the solid, total-offset line would effectively become vertical, as total tax differentials become wage-tax differentials. To the extent that general equilibrium effects can be ignored (our simulations predict they are small), this would increase the size of the total tax differentials. If wage-tax differentials are eliminated, the total offset-line becomes vertical, decreasing the magnitude of the total tax differentials.

Table 3 reports the predicted effects of the consumption and location distortions across select metropolitan areas in our sample. Employment effects are determined by the standard deviation of the tax differentials and the elasticity of employment, which if taken at -6, implies a standard deviation of employment effects of 16 percent, meaning an area with a tax differential of one positive standard deviation has a long-run employment level 16 percent lower than it would under a geographically neutral tax system; the opposite is true of areas with negative differentials, which have positive employment effects.²³ In total, the deadweight loss from locational inefficiency caused by the special tax treatment of housing amounts to about \$15 billion per year, or 0.13% of income as shown in Table 4. The deadweight loss increases to \$21 billion, or 0.17 percent of income if we ignore the tax benefits to capital gains. This is because tax benefits to housing on the margin reduce locational inefficiencies. Naturally, the locational deadweight loss is sensitive to the elasticity of employment: if we use -1 instead of the -6 found in the literature, deadweight loss falls to only \$3 billion, or 0.02 percent of income.

Housing Quantity Tax Distortions

Table 5 reveals the average size of the housing quantity-tax distortions, expressed as an ad valorem subsidy to consumption. If we consider the tax distortions individually, on average the mortgage interest deduction reduces the effective price of housing by 18.5 percent, while property taxes increase it by 16 percent. The lack of sales taxes increases the average effective subsidy by 4.6 percentage points. Taking into account correlations in the data between property and sales taxes, tax policies as whole reduce the effective cost of housing on average by 34 percent, with a standard deviation of 6 percent.

Table 3 reports the size of the quantity effects across select metropolitan areas using variation in state tax policy and local property tax rates. In this grouping Washington, D.C and Orlando, FL have the largest housing quantity distortions, with about a 31 percent ad valorem subsidy. Table 3 also shows the simulated effect on the quantity of housing consumed per capita, reported in column 6. These calculations reflect local housing elasticities in column (1), and show that housing consumption is as much as 10 percent higher because of tax preferences in Oklahoma City and Nashville, while only about 5 percent higher in San Antonio.

²³ If estimated, rather than calibrated tax differentials are used, this increases to 17 percent.

The overall efficiency cost of tax subsidies for housing is calculated in Table 4 for our benchmark case and several alternatives. On average, we find that the typical household consumes housing at a rate approximately 7 percent above the efficient level (assuming there are no positive externalities from consuming more housing), creating a welfare loss of \$27 billion, or 0.23 percent of income. Deadweight loss increases to \$57 billion or 0.47 percent of income if we consider property taxes to be entirely benefit taxes, as the restraint on consumption from the excise tax is eliminated. Ignoring capital gains produces slightly smaller estimates of deadweight loss than the benchmark case, seen in column (3), since the distortion is made smaller. Assuming a compensated price elasticity of -1 more than triples the deadweight loss estimates since it triples the typical harmonic sum with the supply elasticity.

Our benchmark estimates are smaller than Poterba (1992) who estimates over consumption of housing in 1990 to be between 12.4 and 23.2 percent, depending on taxpayer income. Our estimates are smaller due to the decline in interest rates, the decline in marginal tax rates, the choice of compensated demand elasticity (Poterba chooses -0.80), and our treatment of the property tax. Our results are similar to Poterba if we use a compensated price elasticity of -1.0, showing that over consumption is 21.9 percent.

The Simulated Effects of Federal Tax Reforms

Table 6 reports the simulated effect of several federal tax reforms, including eliminating housing tax deductions, eliminating capital gains allowances, taxing imputed rent, or indexing taxes to local wage levels. Column 1 reports that eliminating the mortgage interest and property tax deductions would lower quantity inefficiency costs from 0.23 to 0.04 percent of income. This would be offset by a rise in location inefficiency costs from 0.13 to 0.24 percent of income. The net effect would be to reduce the total deadweight loss by about only 20 percent (from 0.35 to 0.28 percent of income). Therefore, holding taxes on labor constant, these policy simulations suggest that ignoring locational inefficiencies may lead to vastly overstated gains in efficiency from eliminating tax benefits to housing.

Interestingly, we find that enacting all of the reforms, and repealing all of the tax advantages of housing, would lead to greater deadweight loss than just eliminating deductions. The locational inefficiency continues to rise, from 0.24 to 0.37 percent of income. Somewhat surprisingly, quantity inefficiencies also rise slightly, from 0.04 percent to 0.11 percent, as

households go from over-consuming housing to under-consuming housing. This occurs as property tax rates provide a greater excise tax than the implicit subsidy housing receives from not being subject to sales tax and because imputed rent is taxed while not allowing for a mortgage interest deduction. The last column of Table 6 shows the locational inefficiency is completely removed by indexing tax payments to local wage levels. This reform assumes perfect indexing, which is hard to achieve in practice. With all of the major tax benefits to housing eliminated, such indexing would no longer distort location decisions.

The policy change simulations are sensitive to alternative calibrations (using a smaller locational choice elasticity), although indexing income taxes to local wage levels and eliminating the mortgage interest and property tax deductions is still the reform that reduces deadweight loss the most. The primary difference under the alternative calibration is that eliminating the mortgage interest and property tax deductions without indexation reduces total deadweight loss (despite increasing it for locational choice).

Another exercise worth considering is lowering the marginal tax rate on labor income so that the tax reform is revenue neutral. Eliminating the tax benefits to housing should raise income tax revenues by somewhat less than 14 percent, their current value, since households would reduce their mortgage debt, as well as their housing services. Nevertheless, a compensating reduction in marginal tax rates by 10 percent could appreciably lower the tax distortion on location due to wage differences.²⁴

²⁴ Our reforms do not take into account changes in extensive and intensive labor supply from labor market participation and hours worked. Simply eliminating the tax benefits to housing should in principle lower (compensated) labor supply, since the return to working and buying housing consumption should fall. A compensating tax cut on labor income should undo this labor supply response, and possibly push it in a positive direction by increasing consumption efficiency. This ignores the complementarity between housing and leisure. Presumably, housing and leisure are complements, since housing should aid in (or require) household production, by making it more desirable to cook at home and do housework for a larger house. In that case, reducing housing quantities could improve efficiency in the labor market by lowering the value of leisure. Following the insight of Corlett and Hague (1953), it would then be efficient to tax housing more heavily than other goods, which are less of a complement to leisure.

V. Conclusion

We consider the efficiency consequences of housing tax benefits on both the quantity of housing consumed and where that housing is located. We estimate that in 2007, tax distortions caused over 10 percent of the population to live in locations that are economically inefficient, at a cost of 0.13 percent of income, or \$15 billion per year. We also find that the tax benefits to housing overpower any disincentives to consume housing due to property taxes. On net, the typical household sees a 34 percent discount in housing relative to typical consumption goods, causing housing consumption per capita to be 7 percent above the efficient level. This inefficiently high level of housing consumption and investment comes with a welfare cost of about 0.23 percent of income, or \$27 billion per year.

Overall, our simulation results suggest that reducing the tax benefits to housing should typically improve efficiency by reducing the quantity of housing consumed. But if property taxes are indeed an excise tax on the margin, these tax benefits work in the opposite direction of a pre-existing distortion, and thus the efficiency gains are not as large as some would suppose. Furthermore, if marginal tax rates are not reduced, location decisions will be made less efficient, since housing benefits are skewed towards high-wage areas where workers receive a high tax penalty for locating there. Across metro areas, variation in housing prices appears to be due more to differences in labor market conditions than to differences in quality of life.

Although the insight that housing tax benefits are efficiency enhancing from a locational choice perspective is new, this does not suggest a policy recommendation. These deductions (especially for mortgage interest) have long been criticized for being expensive, regressive, and not well targeted to their stated goal of subsidizing home ownership. These criticisms all have their merit. We would also like to raise the point that gains to locational efficiency housing benefits could be reproduced and applied to a larger fraction of the population, by indexing taxable income to local cost of living. Furthermore, this indexing could be made more efficient by indexing taxable income to local wage levels.

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Figure A1: Compositional Wage and Housing Costs across Areas: 2007

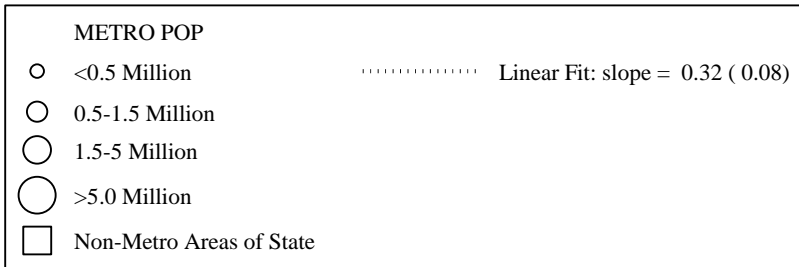
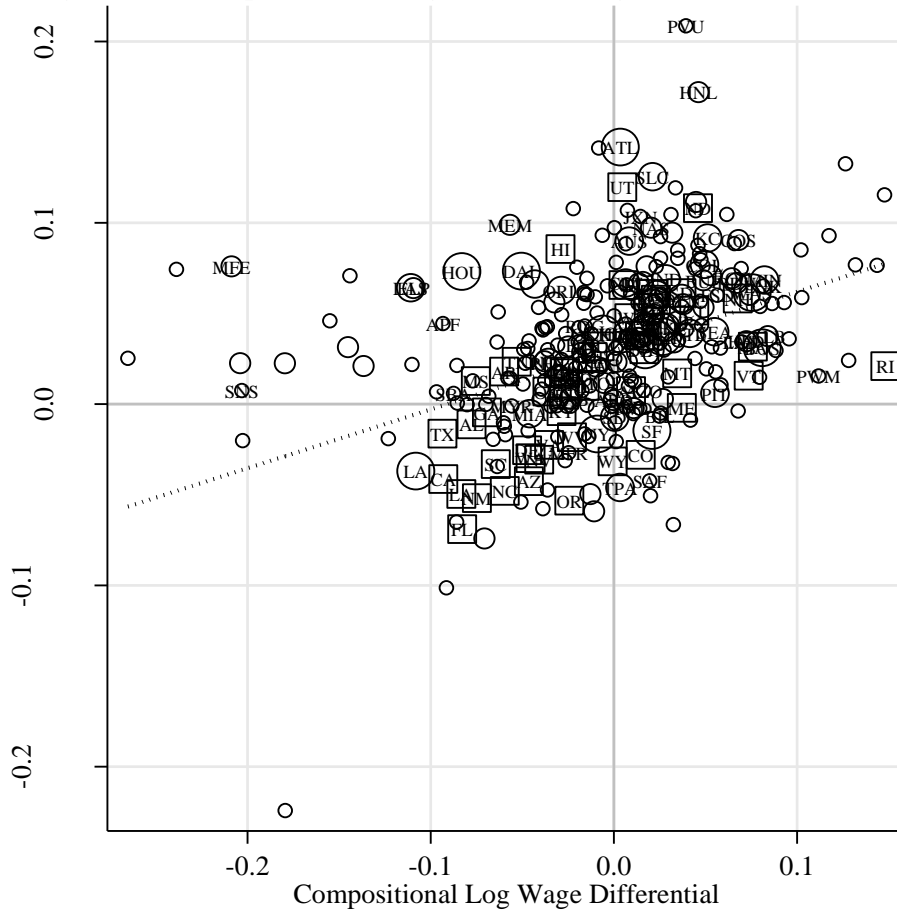


TABLE 1: DESCRIPTIVE STATISTICS
OF DIFFERENCES ACROSS AREAS, 2007

	Mean	Std. Dev
	(1)	(2)
<i>Panel A: American Community Survey Data 2005-2009</i>		
Log Wage Differences:		
Raw	0.0	0.152
Predicted by Location	0.0	0.135
Predicted by Composition	0.0	0.057
Standard Deviation within MSA	0.706	0.042
Log Housing-Cost Differences:		
Raw	0.0	0.340
Predicted by Location	0.0	0.345
Predicted by Composition	0.0	0.045
Standard Deviation within MSA	0.819	0.076
Effective Property Tax Rate	0.010	0.004
<i>Panel B: Statistics On Income Data per Capita</i>		
Filers	0.494	0.066
Adjusted Gross Income	27,766	7,457
Non-Wage Income	8,957	3,430
Taxes Owed	3,722	1,505
Claiming Mortgage Interest Deduction	0.267	0.068
Mortgage Interest Deduction if Claimed	11,658	3,789
<i>Panel C: State Tax Data</i>		
State Sales Tax Rate	5.52%	1.41%
State Income Tax Rates	4.22%	2.44%

Data for 325 Metro-level observations, including 50 non-metro areas of states.
Means and standard deviations weighted by population.

TABLE 2: SIZE OF LOCATIONAL DISTORTIONS
ACROSS METRO AREAS, 2007

	Standard Deviation (1)
<i>Implied Equilibrium Metro Area Attribute Values</i>	
Quality of Life	0.047
Productivity	0.088
<i>Locational Tax Distortion</i>	
Total Distortion	0.020
Tax Distortion from Wages Alone	0.035
Tax Distortion from Housing Benefits Alone	0.019
<i>Total Tax Distortion after Simulated Reforms</i>	
Removing Interest and Property-Tax Deductions	0.028
Removing Deductions and Capital Gains	0.031
Removing Deductions & Taxing Implicit Rents	0.031
Removing Deduction, Taxing Rents and C. Gains	0.035

TABLE 3: LOCAL ELASTICITIES, TAX DISTORTIONS, AND THEIR EFFECTS ON HOUSING AND EMPLOYMENT, 2007

Pay- ment Rank		Total Behavioral Elasticities		Consum. Tax	Location Tax Distortion		Tax Effects	
		Housing	Population	Distort. (fr. of price)	(percent of income)		Housing Per Capita	Metro Population
		(1)	(2)	(3)	Total	Housing	(6)	(7)
	<i>Main city in MSA/CMSA</i>							
1	Houston-Galveston-Brazoria, TX	0.39	-5.94	0.19	0.022	0.005	0.049	-0.17
2	Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD	0.35	-4.23	0.24	0.028	-0.004	0.063	-0.16
3	Hartford, CT	0.33	-3.77	0.23	0.030	0.001	0.058	-0.16
4	Washington-Baltimore, DC-MD-VA-WV	0.33	-3.77	0.31	0.026	-0.023	0.094	-0.14
5	Dallas-Fort Worth, TX	0.39	-6.35	0.18	0.014	0.002	0.049	-0.13
6	Detroit-Ann Arbor-Flint, MI	0.33	-3.70	0.21	0.020	0.003	0.054	-0.12
7	San Francisco-Oakland-San Jose, CA	0.18	-1.67	0.29	0.042	-0.034	0.049	-0.11
44	Nashville, TN	0.38	-5.94	0.27	-0.007	-0.002	0.10	0.00
45	San Antonio, TX	0.42	-8.12	0.18	-0.005	0.017	0.05	0.00
46	Orlando, FL	0.28	-2.67	0.31	-0.017	-0.007	0.08	0.00
47	Greenville-Spartanburg-Anderson, SC	0.41	-7.33	0.26	-0.007	0.013	0.10	0.01
48	Greensboro-Winston Salem-High Point, NC	0.42	-8.45	0.23	-0.011	0.009	0.08	0.05
49	Oklahoma City, OK	0.42	-9.03	0.27	-0.019	0.008	0.10	0.13
	United States (mean)	0.33	-5.53	0.26	0.000	0.000	0.07	0.00
	United States (std dev)	0.10	3.78	0.05	0.021	0.019	0.03	0.15

TABLE 4: SIMULATED EFFECTS BASED ON DATA (WITH ALTERNATIVES)

	Benchmark case (1)	Property Taxes Benefit Housing (2)	Ignoring Capital Gains (2)	High Hous. Low Mob. Elasticity (4)
<i>Economic Parameters</i>				
Baseline Comp. demand elast for home goods η	-0.500	-0.500	-0.500	-1.000
Baseline Elasticity of employment to tax/income ϵ	-6.000	-6.000	-6.000	-1.000
<i>Deadweight Loss from Locational Inefficiency</i>				
Standard deviation of employment effects	0.150	0.150	0.174	0.021
As a percent of income, E(DWL/Nm)	0.13%	0.13%	0.17%	0.02%
Total, billions per year, 2007\$	15	15	21	3
Per capita per year, 2007\$	51	51	69	8
<i>Deadweight Loss from Quantity Inefficiency</i>				
Average quantity effects	0.070	0.124	0.050	0.219
Standard deviation of quantity effects	0.027	0.034	0.026	0.068
As a percent of income, E(DWL/Nm)	0.23%	0.47%	0.15%	0.71%
Total, billions per year, 2007\$	27	57	18	86
Per capita per year, 2007\$	91	190	61	288

TABLE 5: HOUSING CONSUMPTION TAX DISTORTIONS ACROSS METRO AREAS, 2007

	<i>Itemizers</i>		<i>Non-Itemizers</i>	
	Mean	Std. Dev	Mean	Std. Dev
	(1)	(2)	(1)	(2)
<i>Panel A: User Cost of Housing</i>				
Housing tax treatment similar to other capital (Neutral)	0.062	0.003	0.058	0.003
Actual tax treatment (Preferred)	0.044	0.005	0.053	0.006
<i>Panel B: Consumption Tax Distortion (Ad Valorem Subsidy to Housing)</i>				
Total effect of Taxes	0.344	0.067	0.141	0.087
Effect of Federal and State Income Taxes	0.429	0.034	0.265	0.031
Eliminating Mortgage Interest Deduction	0.185	0.023	0.265	0.031
Eliminating Mortgage Deduction and Taxing Capital Gains	0.092	0.015	0.165	0.023
Taxing Imputed Rents, Interest, and Capital Gains	0.000	0.000	0.000	0.000
Effect of Property Taxes	-0.160	0.071	-0.171	0.075
Sales Tax Effect (Renters Only)	0.046	0.012	0.052	0.015

TABLE 6: DIFFERENTIAL TAX EFFECTS AND DEADWEIGHT LOSS FROM LOCATION AND QUANTITY INEFFICIENCY WITH DIFFERENT TAX REFORMS, 2007

	Existing System (0)	Eliminate Deductions (1)	Eliminate Deductions, Add Capital Gains (2)	Eliminate Deductions, Tax Imputed Rent (3)	Eliminate All Advantages (4)	All Reforms Index Taxes to Wages (5)
<i>DWL as a Percent of Income</i>						
<u>Baseline calibration</u>						
from Locational Inefficiency	0.13%	0.24%	0.30%	0.30%	0.37%	0.00%
from Quantity Inefficiency	0.23%	0.04%	0.04%	0.05%	0.11%	0.11%
<i>Total</i>	0.35%	0.28%	0.34%	0.35%	0.49%	0.11%