TAX BENEFITS TO HOUSING AND INEFFICIENCIES IN LOCATION AND CONSUMPTION

David Albouy
Andrew Hanson

Tax Benefits to Housing and Inefficiencies in Location and Consumption
David Albouy and Andrew Hanson
NBER Working Paper No. 19815
January 2014
JEL No. H24,H77,R13,R21,R31

<u>ABSTRACT</u>

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

David Albouy
Department of Economics
University of Illinois at Urbana-Champaign
214 David Kinley Hall
Urbana, IL 61801-3606
and NBER
albouy@illinois.edu

Andrew Hanson
Department of Economics
Marquette University
P.O. Box 1881
Milwaukee, WI 53201
andrew.r.hanson@marquette.edu

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 and foremost, owner-occupiers do not report imputed housing rents – i.e., rents they effectively receive as their own landlords – as income. Yet, 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 excluded from taxable 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 governments 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]

Shortfalls in government revenues and the recent rise in the top marginal tax rate have caused some policymakers to question whether the preferred treatment of housing should be revoked in order to raise additional revenues or reduce tax rates (e.g., Bartlett 2013). In 2005, 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. Similar ideas have been echoed in the tax reform proposal put forth in 2010 by the National Commission on Fiscal Responsibility and Reform (i.e., the "Simpson-Bowles Commission").[5] The recent boom and bust of housing prices and its impact on the economy has

---

[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 and the interaction with other aspects of the tax code (rates, itemization, and other deductions).

[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 2014 tax collection.

[4] The purchase of materials for home improvements is taxed, but labor put into home improvements is not taxed.

[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

only raised awareness of the tax treatment of housing. Many economists believe that eliminating the mortgage-interest deduction would deleverage investments in housing and lead to greater housing-price stability (e.g., Green 2011). At the same time, policy-makers remain leery of reforming housing tax benefits while prospects for the housing market, and the economy in general, are uncertain.

In general, such reforms tend to be quite popular with economists, but not with the public at large. In a recent National Tax Association (NTA) poll of tax economists, 77 percent favor repealing the MID (Michigan News 2013). A poll of real estate economists and similar experts by Zillow indicates that a majority want to repeal the MID; only 11 percent favor keeping the MID in its current form (Pulsenomics 2012). Nevertheless, the electorate appear to want to keep tax benefits for housing: the NTA poll found that only 10 percent of the public favors repealing the MID. In a United Technologies (2013) poll, 61 percent of Americans indicate that it is "very important" to preserve the MID, holding it in higher regard than the deduction for charitable contributions. The support for the MID in polls is somewhat surprising as only 24 percent of tax filers in 2011 deducted any mortgage interest on their tax return.[6] In a more nuanced poll by Pew (2012), the public was evenly split on whether the MID should be limited in order to reduce the debt. Unless economists have different values than the population at large, this may be an issue where better understanding could bridge the gap in opinion, making policy reforms more realistic.

The consequences 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). Housing benefits are distributed regressively, with high income households receiving greater benefits because of their high rates of home ownership, more expensive houses,

---

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.

[6] Percent of tax filers claiming the MID is calculated using 2011 IRS statistics of income tables for total number of tax returns and number of returns that include an MID claim. The 2011 tax year represents a low point in MID claims for the last 5 years, with the claim rate reaching as high as 28.5 percent of tax filers in 2007.

and higher marginal tax rates (see Poterba and Sinai 2008). In theory, lowering the cost of housing through tax benefits could encourage homeownership, which many argue produces positive externalities worthy of subsidization. Homeownership seems to increase exterior maintenance and voter participation, and may benefit children (see Glaeser and Shapiro (2003) for a summary). The limited scope of externalities considered in these studies makes the case for subsidization tenuous, as does the empirical evidence that tax benefits in their current form do little to encourage homeownership (e.g. Hanson 2012).

Most of the literature on the consequences of housing tax benefits focuses on how they affect investment in housing capital, its price, as well as the leveraging of mortgage debt. These studies sometimes ignore how 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. Furthermore, they usually ignore the preferential sales tax treatment of housing, discussed in Hall (1996)

Far less attention has been given to the issue of how housing 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 tax 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 location choices may be influenced by these benefits, or how they operate in the larger context of a location-distorting income tax. Albouy (2009) argues that taxes on labor income discourage households from living in places where wage levels are high, while tax benefits encourage households to live where price levels are high. Tax benefits to housing implicitly provide a form of cost-of-living adjustment in the federal tax code. Such an adjustment may offset disincentives to live in high-wage areas if price levels are positively related to wages, or magnify them if prices negatively related to wages. A positive relation will occur when price variation is driven by the relative productivity of firms, while a negative relation will occur when prices are driven by relative differences in quality-of-life amenities. As a result, tax benefits to housing will mitigate the tax penalty of working in an

area with better-paying jobs, but augment the implicit tax subsidy given to workers who accept lower pay to live in the most desirable areas.

Empirically, wage and price levels exhibit a strong positive correlation across American metropolitan areas. As a result, indexing taxes to local costs-of-living tends to reduce locational inefficiency by reducing tax burdens in high-wage areas, albeit imperfectly. Thus, tax benefits to housing generally reduce inefficiency of location choices, even though they increase inefficiency of housing investment and consumption choices.

Besides considering the impact on location, this paper makes a number of other additions to the literature on the tax benefits to housing. We estimate the degree to which housing may be inefficiently consumed relative to non-housing goods by taking into account property taxes on housing versus 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 and worker locations. We also consider how tax reforms, such as eliminating benefits for housing or indexing taxes to local wage levels, would affect local housing costs, employment, and the efficiency of housing consumption and locational choice across the country.[7]

Our simulation results imply that the existing system of income taxation with tax-benefits to housing caused the typical house to be 4 percent too large in 2007, creating an annual deadweight loss of $7 billion.[8] Without any tax benefits in the income tax code, houses would instead be two percent too small because of property taxes, causing an efficiency loss of $2 billion. Our simulations show that 15 percent of the population is inefficiently located at a cost $26 billion annually. Eliminating the mortgage interest and property tax deductions would

---

[7] 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).

[8] This figure is substantially smaller than recent estimates in Hanson and Martin (In Press) that account for the full range of housing consumption distortions by examining the effect of mortgage interest deductibility on the amount of mortgage interest deducted. They estimate the annual deadweight loss from housing consumption to be $16-36 billion.

reduce the inefficiency cost in housing consumption by about $3.5 billion, and increase the inefficiency cost from locational choices by less than $1 billion, so that on net it would improve efficiency. Eliminating the favorable capital gains treatment in addition, would produce no additional gains, as costs in inefficient location choices would offset any further reductions in consumption inefficiency. More efficient reforms would eliminate housing benefits altogether and deflate taxable income by local costs-of-living or local wage levels.

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 parameterize the models using data on wages, home prices, and location characteristics from the American Community survey and the Internal Revenue Service ZIP code file. We use the parameterized model to present deadweight loss estimates under the current income tax regime and simulate the deadweight loss effects of several tax reforms. The final section 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 must purchase housing in the city where they live and work; 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 two essential 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 exceptional. Firms will pay higher prices for land in areas where wages are low, or productivity is high.

We demonstrate this model and its consequences for the distortionary effect of taxes in figures 1 and 2, in a simplified setting where we equate housing purchased by households with land purchased by firms.[9] Figure 1 illustrates the case for cities that vary in productivity. Consider two cities, Nashville and Chicago. Both cities offer the national average quality of life, but Chicago has above-average productivity. Each city has downward-sloping zero profit curves for firms, as firms will bid less for land in cities with higher wages. Chicago's zero profit curve is above Nashville's as firms will pay higher price to be in a more productive area. The mobility condition for workers slopes upward, as workers will bid more to live in cities where wages are high. The intersection between the zero-profit and the mobility conditions, i.e., the bid curves for firms and households, determines the equilibrium prices and wages. More productive cities, like Chicago at E_0^C, offer higher wages and charge higher prices, than in less productive cities, like Nashville at $\bar{E}$.

Federal taxes on wages reduce the net earnings a worker gains when moving from a low-wage to a high-wage city. This reduces the willingness-to pay of households to live in higher wage cities. In the graph, this lower bid rotates the mobility condition clockwise. If we compare the effect of an income tax relative to a neutral lump-sum tax, the rotation occurs through Nashville, since Nashville pays the same amount with either tax.[10] This increases the equilibrium wage and

---

[9] We then are just modeling firms that produce tradable goods. This simplification works well when housing is made with land and mobile capital, without labor. Albouy (2009) presents a fuller model. He demonstrates that when cities are good at producing housing, the model 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 the purpose of examining tax policy this assumption does not affect the model's predictions.
[10] This is not exactly true with either a progressive or regressive tax, but we can easily redefine an "average city" as one paying an amount of taxes without much loss of generality. Alternatively, we may assume that tax revenues are

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 equilibrium population in Chicago to be lower. These losses are offset by higher population levels in places with below-average productivity.[11]

The location distortion from income taxes could be undone if federal taxes were indexed to local wage levels. Suppose that a typical advertising agent gets paid $60,000 in Nashville and $90,000 in Chicago. Agents face a flat marginal tax rate of 33.3 percent on labor income, and to simplify matters, suppose the government revenues are redistributed lump-sum so that workers everywhere receive $20,000. Then, an agent in Nashville pays on net zero to the government, but is subjected to a $10,000 penalty for moving to Chicago, reducing her incentive to move there. An ideal wage index would tell us that advertisers are paid 50 percent more in Chicago. If taxable income was deflated using this index, then the advertiser would be taxed only on $60,000 in Chicago, and not face any tax penalty for moving.[12]

Federal tax benefits increase the bid households are willing to pay for higher wages or quality of life, since a higher bid results in a lower tax burden. Graphically, the mobility condition with housing benefits, shown by the shorter dashed curve in figure 1, is rotated counter-clockwise relative to the zero mobility condition with income taxes. This moves the equilibrium wage back down and the price back up to E^C, producing an outcome closer to the initial neutral tax equilibrium at E_0^C. With a federal income tax in place, the housing tax benefit helps undo the tax distortion created by the income tax. Both the distortion from the income tax and the correction from housing tax benefits (assuming it is a deduction) increase with a household's marginal tax rate.

---

redistributed in equal lump sum payments, and define an average city as one that pays on net zero dollars to the federal government.

[11] By symmetry, presumably there is also a lower productivity city than Nashville, which will gain population, and 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.

[12] If this indexation scheme applied to all workers then the equilibrium would move back to E_0^C. In this case, the index would need to take into account the change in equilibrium wages.

Following the example of the advertising agent above consider that they pay $20,000 more a year for a house in Chicago relative to a comparable one in Nashville. Now suppose that three-quarters of this amount can be deducted from her income taxes (some taxes on labor income, such as payroll, do not allow for such deductions). Then, the agent would receive one third of $15,000 back in her taxes, $5,000, helping to offset the $10,000 income-tax penalty from working in Chicago.

If housing is the only good that varies in price across cities, then a 100 percent deduction of housing expenditures will completely undo the location distortions income taxes induce across cities that vary in productivity. With more than one good that varies in price across cities, location distortions of this kind could be undone by deflating income levels by an ideal cost-of-living index, which would reflect the cost households bear for locating in higher-wage locations. For the advertising agent, costs-of-living are one-third higher for the agent, as they offset her after-tax income gain of $20,000 in Chicago relative to $60,000 in Nashville (assuming she pays zero net taxes there). The tax system can be made geographically neutral if workers with the same after-tax real incomes pay the same in taxes. Once in a tax-neutral equilibrium, this adjustment is fairly straightforward and equivalent to wage indexation. For example, say making taxes neutral reduces the agent's salary from $90,000 to $87,000 and raises her extra housing expenditures from $20,000 to $27,000. Both the cost-of-living and wage index would be 45 percent higher in Chicago than Nashville

When cities vary in quality of life, instead of productivity, cost-of-living adjustments and tax benefits make location decisions less, rather than more, efficient. 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, and Nashville is an average quality of life city. Here, both Nashville and Miami share the same zero-profit condition for firms, as they are both of average productivity. Because quality of life is higher in Miami, households there will bid more for the price of housing than in Nashville at every wage level. They are willing to sacrifice the consumption of market goods that they may

8

purchase indirectly, to consume non-market goods, such as beaches and sunshine. These non-market goods are scarce and indirectly paid for through the land market. Graphically, Miami's mobility condition is shifted up to reflect this higher bid. In equilibrium, nicer quality-of-life cities, like Miami, charge higher prices and offer lower wages than less desirable cities, like Nashville.

Federal taxes reduce the net pay cut that households endure for living in a nicer city. For example, a bartender that takes a $3,000 pay cut to relocate from Nashville to Miami, may only experience a $2,000 pay cut after taxes. This income tax effect rotates the mobility conditions for both quality-of-life levels clockwise; when compared to the case with a neutral lump-sum tax, around cities with average national wage. As in the previous example, house prices and wages remain stable in Nashville. However, in Miami home prices are bid up, and wages are bid down, as more residents migrate into the city from lower than average quality of life locations. Employers who locate in beach towns or other amenable locations are effectively offering their workers an untaxed fringe benefit; although residents end up passing this benefit on to landowners in the form of higher rents.

Tax benefits to housing increase the bid households pay in areas with higher 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.[13]

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

---

[13] A similar argument holds for neighborhoods within a city. 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 amount of investment into structures located more centrally. This may be seen by taking the opposite results of Brueckner and Kim (2003) for the property tax, which they find would differentially reduce investments in central structures. It is unclear whether this effect would reduce sprawl, since subsidies increase the demand for those structures. In addition, denser multi-family buildings that tend to be located centrally are usually rented and thus do not benefit from housing tax benefits like the mortgage interest and property tax deductions (see Glaeser 2011).

as a fraction of average income. It uses a representative agent model, which under certain assumptions may be used to approximate the economy using an average of households weighted by their income. Differences in federal tax burdens across cities may be neatly approximated by log-linearizing a federal tax schedule and applying the envelope conditions implied by household mobility and zero profits. This approximation produces the following locational "tax differential" or "tax distortion," expressed as a fraction of household income.

$$(1) \quad \frac{d\tau^j}{m} = \tau' s_w \widehat{w}^j - f\sigma s_h \hat{p}^j$$

Here, m is average household income, τ' is the marginal tax rate, $\widehat{w}^j$ and $\hat{p}^j$ are log wage and price differentials relative to the national average, s_w is the share of income from labor, f is the fraction of itemizers, σ is the percent reduction in housing costs, and s_h is the share of income spent on housing. This value may be positive or negative, depending on whether a city pays more or less than the national average.

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 $\Delta \widehat{N}^j = \varepsilon^j \cdot d\tau^j / m$, where $\Delta \widehat{N}^j$ is the change in log employment due to mobility, and ε^j 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 derived from a structural theoretical model.

Because workers locate in response to federal income taxes, the resulting spatial distribution of employment and population is 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.

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

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 overall population levels.

If housing is the only local good, providing a full cost of living adjustment by indexing taxable income to local price levels would be equivalent to setting $f = 1,\ \sigma = \tau'$ in equation (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 eliminate the tax incentive to leave productive cities for unproductive ones, but 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 create similar incentives for renters and non-itemizers on how they locate and reduce the marginal incentive to consume housing discussed in the next section.

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 be difficult. Empirically, however, 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 how tax benefits affect housing consumption relative to other kinds of consumption, in a partial equilibrium setting. Besides taking into account the federal benefits, we also incorporate state and local policies that 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. We also consider the absence of sales taxes on new housing purchases or the labor component of 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:

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

where $UC_{Preferred}$ is the user cost of housing with special tax considerations, and $UC_{Neutral}$ is the user cost of housing without them, and τ_S is the state sales tax.[14]

To calculate the user cost of housing with and without special treatment in the tax code we use a model similar to Poterba and Sinai 2008a and 2008b.[15] 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.[16] Thus, the model excludes the mortgage interest rate in excess of the risk free rate as a

---

[14] 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).

[15] See 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.

[16] Berkovoc 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.

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:

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

where, r_T is the risk-free interest rate, β is a housing specific risk premium, m is annual maintenance and d is depreciation costs. In keeping tax neutral treatment, we include a tax on 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 treatment. We add in property taxes, the mortgage interest deduction, as well as the deduction for property taxes to the user cost equation in (4). In adding the differential tax parameters, we consider that the full mortgage interest rate is deductible,[17] 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.[18] With these considerations, and current tax treatment, the user cost of housing with preferential tax treatment is:

---

[17] Our simulations account for differences in state mortgage interest deductibility.
[18] 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

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

where τ_Y is the marginal income tax rate applying to investment income,[19] λ is the share of the home financed with debt, 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. 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:

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

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 $\bar{\eta}_j = \eta^{cd}\eta_j^s / (\eta^{cd} + \eta_j^s)$.

---

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.

[19] In our simulations, tax rates include both state and federal income taxes.

III.   Parameterizing the Model and Examining Validity

Parameterization

To make our models useful for simulation, we need to assign values to the parameters using available data and previous work. According to our parameterization, labor receives $s_w = 75$ percent of income; housing cost differences are used to measure home-good price differences. The starting point for our 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 is also consistent with a fully parameterized model, seen in Albouy and Stuart (2013). As this value is crucial to the locational inefficiency measure, we also consider a conservative value of -1.0 as an alternative.

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. 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.

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.[20] 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

---

[20] 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.

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.[21] 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 an average capital gain π of 0.02, which we adjust slightly for local differences based on housing price changes between 2000 and 2007.

Our baseline assumption is that, on the margin, property taxes act mostly as excise taxes, so that $k = 0.25$. We also show an alternative with $k = 1$, which is the pure benefit case. We prefer $k = 0.25$ 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.[22]

Our estimates of local housing supply elasticities, η_j^s, 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 $\eta^{cd} = -0.5$, which is conservative relative

---

[21] 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).
[22] 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.

to recent empirical estimates in Hanson and Martin (in press) and those used in other simulations (Poterba, 1992). We also use these elasticities to adjust estimates of local population responses ε^j to differences in federal taxes, starting from the typical value of -6.0.

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.

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.[23]

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

---

[23]In 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).

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.[24] 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.

To check the accuracy of the parameterized 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.[25] The IRS ZIP code level data allow us to produce measured tax and deduction differences across metro areas by aggregating ZIP code level data to the state and metropolitan area.[26] 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

---

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

[25] 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.

[26] 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.

mortgage interest deduction with an average claim of $11,658. The standard deviation on the average mortgage interest deduction is substantial at $3,789.[27]

IV. Simulation Results

Locational and Quantity 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 housing tax treatment 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).

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, benefit more from the tax-preferred status of housing, helping to offset the tax differential somewhat. If tax preferences for housing 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 reveals the average size of the housing quantity-tax distortions, expressed as an ad valorem subsidy to consumption. For itemizers, a neutral tax treatment would make the user cost

---

[27] 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 parameterized tax rate of 0.238. This shows that on average, our parameterization fits the measured data quite well.

7.3 percent, although the actual user cost is typically 6.2 percent, a 17 percent reduction. If we consider the tax distortions individually, benefits in the income tax code create an effective ad valorem subsidy of 23 percent on average; property taxes without a deduction create an effective ad valorem tax of 6 percent; this is offset with the lack of sales taxes, which increase the average effective subsidy by 3 percent. The net effects are generally smaller for non-itemizers, especially since they cannot itemize property taxes. However, they still benefit from having implicit rents untaxed, which in our sample are rather large, since non-itemizers have greater equity in their homes.

Simulated Effects of Tax Distortions across U.S. Cities

Table 4 reports the size of the quantity effects across select metropolitan areas using variation in state and local taxes, as well as housing supply, which creates the variety of behavioral elasticities in column (1). The elasticities imply that housing is more responsive to demand in cities like Houston and Greenville, than in Los Angeles and Miami. However, the consumption tax distortions in column (3) are sometimes larger in the less elastic cities, like San Francisco and Salt Lake City. This appears partly due to these cities receiving more from the favorable tax treatment of their larger capital gains. In the grouping in column (6), we predict that housing consumption per capita is as much as 7 percent higher because of tax preferences in Oklahoma City, while it remains nearly unchanged in Miami due to the small elasticity. On average, the typical house is 4 percent larger.

Table 4 also reports the predicted effects of location distortions across these metro areas. Population effects are determined by the standard deviation of the tax differentials and the elasticity of population, reported in column 2, which varies because of local elasticities in housing supply. The population effects must average out to zero as they are population-weighted, and have a large standard deviation of 16 percent. This means an area with a tax differential of one positive standard deviation, or 2.6 percent of income, has a long-run population level 16 percent lower than

it would under a geographically neutral tax system; the opposite is true of areas with negative differentials, which may be seen as subsidies.[28]

Efficiency Cost of Tax Distortions

Table 5 presents the efficiency costs of tax benefits to housing using the parameterized model and data under a variety of modeling scenarios. In our benchmark case, the deadweight loss from locational inefficiency amounts to about $26 billion per year, or 0.22% of income as shown in Table 5. 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 4 percent above the efficient level (assuming there are no positive externalities from consuming more housing), creating a welfare loss of $7 billion, or 0.06 percent of income.

If property taxes are entirely benefit taxes, they no longer provide a countervailing force pushing houses to be inefficiently small. In this case, reported in column 2, houses are on average 7.4 percent too large, and the deadweight loss from quantity inefficiency increases to $19 billion or 0.16 percent of income. If we ignore the reduction in tax burdens due to the deductibility of property taxes, this would reduce locational inefficiency very slightly.

In column 3, we ignore the tax benefits given to capital gains in housing, the deadweight loss in location inefficiency increases to $30 billion, or 0.25 percent of income. This is because places with higher wages benefit most from this exemption. Looking at quantity inefficiency, this decreases, since households have less of an incentive to invest in housing. Ignoring state income and sales taxes would also produce smaller measures of inefficiency, since these taxes generally exacerbate pre-existing distortions. The effects are generally rather small.

Naturally, the locational deadweight loss is sensitive to the elasticity of population: if we use -1 for all of the cities, deadweight loss falls to only $4 billion, or 0.04 percent of income. Assuming a compensated price elasticity of -1 across cities (say with perfectly elastic supply across

---

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

cities), results in houses being 13 percent too large, and tripling the deadweight loss from quantity inefficiency.

Our benchmark estimates of the efficiency costs in housing quantity are smaller than Poterba (1992) who estimates in 1990 that housing is over-consumed by between 12.4 and 23.2 percent, depending on taxpayer income. Our estimates are smaller due to lower interest rates, lower marginal tax rates, and a lower compensated demand elasticity (Poterba chooses -0.80). Furthermore, we treat the property tax as distortionary in the opposite direction and incorporate finite supply elasticities. Even when we use a similar elasticity to Poterba (1992), our results are about half the size of the over consumption, owing to the treatment of the property tax and supply elasticities.

The Simulated Effects of Federal Tax Reforms

Table 6 reports the simulated effect of several federal tax reforms, such as eliminating housing tax deductions, eliminating the capital gains exemption, or indexing taxes to local costs-of-living and wage levels.[29] Column 1 reports that eliminating the mortgage interest and property tax deductions would lower quantity inefficiency costs from 0.06 to 0.03 percent of income. This would be offset by a slight rise in location inefficiency costs. The net effect would be to reduce the total deadweight loss by about $4 billion a year.

Taxing capital gains on housing would produce no net efficiency improvement, since the reduction in quantity efficiency would be offset by an equally large increase in location efficiency. If deductions are already eliminated, taxing capital gains appears to make the economy slightly less efficient.

Somewhat surprisingly, we find that repealing all of the tax advantages of housing would lead to greater total deadweight loss than the existing tax system. Quantity inefficiencies fall from

---

[29] We do not run simulations for taxing imputed rents. We found that incorporating the taxation of imputed rent could actually decrease the user cost of housing using the fomula provided by Poterba and Sinai (2008). This is due to their conclusion that user costs are reduced even further from capital gains and the implicit tax subsidy to the mortgage premium due to prepayment and foreclosure risk. We are less sure these conclusions would hold in a more general equilibrium setting.

0.06 percent to 0.2 percent, as households consume houses that are inefficiently small. Meanwhile, the locational inefficiency would rise substantially, from 0.22 to 0.39 percent of income, as households in high-wage productive areas would no longer receive tax breaks for their higher housing costs.

One possible shortcoming of these simulations is that they hold tax rates fixed. If total revenues remained constant, marginal tax rates on labor income could be reduced when housing tax benefits are eliminated. If we were to do this, we find that this would improve locational efficiency substantially relative to the scenario with no rate cuts. Even with these improvements, the overall costs are still higher than in the benchmark case.

These static simulations so far suggest that the most efficient policy would be to eliminate the housing and property tax deductions. As we mentioned earlier, it may be more efficient to completely undo the preferential treatment of housing, and to index income to local costs-of-living or wages. We do this in columns 6 and 7, cutting rates to take into account the tax savings from taxing housing more heavily. Indexing income to local costs-of-living would indeed lead to higher overall efficiency: houses would be only slightly too small, due to the property tax, and would be disproportionately located in high quality-of-life areas. The overall cost would be only 0.17 percent of income. With an ideal wage indexation, the location inefficiencies would be eliminated entirely, leading to the most efficient outcome.

The policy change simulations are sensitive to alternative parameterizations (e.g., using different elasticities). Nonetheless, indexing income taxes to local wage levels and eliminating the housing tax preferences is still the reform that reduces deadweight loss the most. It is worth noting that our model does not consider the interaction between housing tax benefits and the alternative minimum tax (AMT). Presumably, the presence of the AMT would reduce the size of the changes we estimate as filers subject to the AMT are already subject to rollbacks on most deductions. [30]

---

[30] 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

V. Conclusion

Housing tax benefits affect not only the quantity of housing people consume, but where that housing is located. Furthermore, tax benefits in the income tax code must be framed relative to other distortions. In affecting the quantity of housing, benefits work against the property tax, more than correcting it, causing houses to be too large rather than too little. In affecting the location of housing, benefits work to help locate workers in high-cost areas. Since high-cost areas tend to be high-wage areas, they typically help to correct the disincentive created by the tax code to live and work in high-wage areas. In this case, benefits to housing are much smaller than the effect they work against.

An upshot of these other distortions is the somewhat surprising conclusion that housing benefits are not as distortionary as previous analysis suggests. Reducing benefits improves quantity efficiency, but the value of this improvement is somewhat small, mainly because of limited elasticity in the demand and, in some cases, the supply of housing. Furthermore, if marginal tax rates are not reduced, location decisions will be made less efficient. If the population truly is very responsive to these differences over the long run, these efficiency costs may be quite high, since they cause workers to work in areas where they are less productive.

Although the insight that housing tax benefits are efficiency enhancing from a locational choice perspective is new, this does not imply 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. It is also important to raise the point that gains to locational efficiency from housing tax benefits could be reproduced and applied to a larger fraction of the population by indexing

---

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.

taxable income to local cost of living. Such an indexing could be further improved by adjusting for local quality of life, which would be equivalent to by indexing by local wage levels.

References

Albouy, David, 2008. "Are Big Cities Bad Places to Live? Estimating Quality of Life across Metropolitan Areas" NBER WP 14472.

Albouy, David, 2009a. "The Unequal Geographic Burden of Federal Taxation" The Journal of Political Economy, 17(4): 635-667.

Albouy, David, 2009b. "What Are Cities Worth? Land Rents, Local Productivity, and the Value of Amenities." NBER WP 14981.

Albouy, David and Andrew Hanson, 2013. "The Geographic Incidence and Welfare Effects of Federal Tax Reform," Unpublished Manuscript.

Albouy, David and Bryan Stuart, 2013. "Urban Population and Amenities," Unpublished Manuscript.

Anderson, John, Jeffrey Clemens, and Andrew Hanson, 2007. "Capping the Mortgage Interest Deduction" *National Tax Journal*, 60(4): 769-785.

Anderson, Nathan, 2008. "Property Tax Exemptions for Residential Capital Investment" *State Tax Notes*, 47(5): 355-373.

Banzhaf, Spencer and Nathan Lavery, 2010."Can the Land Tax Help Curb Urban Sprawl? Evidence from Growth Patterns in Pennsylvania" *Journal of Urban Economics*, 67(2): 169-179.

Bartik, Timothy J. 1991. Who Benefits from State and Local Economic Development Policies? Kalamazoo, MI: Upjohn Institute.

Bartlett, Bruce 2013 "The Sacrosanct Mortgage Interest Deduction" *New York Times*

Berkovoc, James and Don Fullerton, 1992. "A General Equilibrium Model of Housing, Taxes, and Portfolio Choice" *Journal of Political Economy* 100(2), 390-429.

Bruce, Donald and Douglas Holtz-Eakin, 1999. "Fundamental Tax Reform and Residential Housing" Journal of Housing Economics, 8(4): 249-271.

Brueckner, Jan and Hyun-A Kim. 2003. "Urban Sprawl and the Property Tax." *International Tax and Public Finance*, 10(1): 5-23.

Burman, Leonard and Marvin Phaup, 2012. "Tax Expenditures, the Size and Efficiency of Government, and Implications for Budget Reform" *Tax Policy and the Economy* 26, 93–124.

Corlett, W.J. D.C. Hague, 1953. "Complementarity and the Excess Burden of Taxation" *Review of Economic Studies*, 21(1), 21–30.

Deskins, John, and William Fox, 2008. "Measuring Behavioral Responses to the Property Tax" In *Challenging the Conventional Wisdom on the Property Tax*, R. Bahl, J. Martinez-Vazquez, and J. Youngman, editors, Lincoln Institute of Land Policy, 2010.

Feenberg, Daniel, Andrew Mitrusi, and James Poterba, 1997. "Distributional Effects of adopting a National Retail Sales Tax" *Tax Policy and the Economy* 11, 49–90.

Fox, William, Henry Herzog, and Alan Schlottman, 1989. "Metropolitan Fiscal Structure and Migration" *Journal of Regional Science*, 29(4): 523-536.

Genesove, David, and Christopher Mayer, 1997. "Equity and Time to Sale in the Real Estate Market" *American Economic Review*, 87(3): 255-269.

Glaeser, Edward, 2011. "Rethinking the Federal Bias Toward Homeownership" *Cityscape: A Journal of Policy Development and Research*, 13 (2), 5–37.

Glaeser, Edward and Jesse Shapiro, 2003."The Benefits of the Home Mortgage Interest Deduction." *Tax Policy and the Economy* 17, 37–82.

Green, Richard 2011. "Testimony of Richard K. Green to US Senate Finance Committee" October 6, 2011.

Green, Richard and Kerry Vandell, 1999."Giving Households Credit: How Changes in the U.S. Tax Code Could Promote Homeownership." *Regional Science and Urban Economics* 29(4), 419-444.

Green, Richard K. and Andrew Reshovsky. 1999. "Using Tax Policy to Subsidize Homeownership" in A. Stager, Ed., *Public Spending and Incentives for Community Development Federal Reserve Bank of Boston-Aspen Institute*

Gyourko, Joseph and Todd Sinai, 2003. "The Spatial Distribution of Housing-Related Ordinary Income Tax Benefits" Real Estate Economics 31(4), 527–575.

Gyourko, Joseph and Todd Sinai, 2004. "The (Un)Changing Geographical Distribution of Housing Tax Benefits: 1980-2000" *Tax Policy and the Economy* 18, 175–208.

Hall, Robert, 1996. "The Effects of Tax Reform on Prices and Asset Values" *Tax Policy and the Economy* 10, 71–88.

Hanson, Andrew, 2012. "Size of Home, Home Ownership, and the Mortgage Interest Deduction." *Journal of Housing Economics*, 21(3): 195–210.

Hanson, Andrew and Hal Martin, In press. "Housing Market Distortions and the Mortgage Interest Deduction." *Public Finance Review*, Forthcoming.

Himmelberg, Charles, Christopher Mayer, and Todd Sinai, 2005."Assessing High House Prices: Bubbles, Fundamentals, and Misperceptions." *Journal of Economic Perspectives* 19(4), 67–92.

Harberger, Arnold, 1964. "The Measurement of Waste," *American Economic Review*, 54(3), 58-76.

Knapp, Thomas, Nancy White, and David Clark, 2001. "A Nested Logit Approach to Household Mobility"*Journal of Regional Science*, 41(1): 1-22.

Mieskowski, Peter, 1972. "The Property Tax: An Excise Tax or a Profits Tax?" *Journal of Public Economics*, 1(1): 73-96.

Oates, Wallace, and Robert Schwab, 1997. "The impact of Urban Land Taxation: The Pittsburgh Experience" *National Tax Journal*, 50(1): 1-21.

O'Sullivan, Arthur, Terri Sexton, and Steven Sheffrin, 1995. "Property Taxes, Mobility, and Home Ownership" *Journal of Urban Economics*, 37(1): 107-129.

Palmon, Oded and Barton Smith, 1998. "New Evidence on Property Tax Capitalization" *Journal of Political Economy*, 106(5): 1099-1111.

Pew Research Center, 2012, *Deep Divisions over Debt Reduction Proposals*.

Poterba, James M, 1984. "Tax Subsidies to Owner-Occupied Housing: An Asset Market Approach." *Quarterly Journal of Economics* 99 (4), 729–752.

Poterba, James, 1992. "Taxation and Housing: Old Questions, New Answers." *American Economic Review* 82(2): 237-242.

Poterba, James, and Todd Sinai, 2008a. "Revenue Costs and Incentive Effects of the Mortgage Interest Deduction for Owner-Occupied Housing" *National Tax Journal*, 64(2): 531–564.

Poterba, James and Todd Sinai, 2008b. "Tax Expenditures for Owner-Occupied Housing: Deductions for Property Taxes and Mortgage Interest and the Exclusion of Imputed Rental Income," *American Economic* Review, 96(2): 84–89

Pulsenomics, 2012 *September 2012 Home Price Expectations Survey*. Press release.

Roback, Jennifer, 1982. "Wages, Rents, and the Quality of Life." The Journal of Political Economy 90(4):1257–78.

Rosen, Harvey, 1979a. "Housing Decisions and the U.S. Income Tax: An Econometric Analysis." *Journal of Public Economics* 11(1), 1–23.

Rosen, Harvey, 1979b. "Owner Occupied Housing and the Federal Income Tax: Estimates and Simulations." *Journal of Urban Economics*, 6(2), 247–266.

Rosen, Sherwin, 1979. "Wages-Based Indexes of Urban Quality of Life." In *CurrentIssues in Urban Economics*, edited by P. Mieszkowski and M. Straszheim. Baltimore:Johns Hopkins Univ. Press.

Saiz, Albert, 2010. "The Geographic Determinants of Housing Supply." Quarterly Journal of Economics, 125(3): 1253–1296.

Shan, Hui, 2010. "Property Taxes and Elderly Mobility" *Journal of Urban Economics*, 67(2): 194-205.

Sirmans, Stacy, Dean Gatzlaff, and David Macpherson, 2008. "The History of Property Tax Capitalization in Real Estate" *Journal of Real Estate Literature*, 16(3): 327-343.

Song, Yan and Yves Zenou, 2006. "Property Tax and Urban Sprawl: Theory and Implications for US Cities" *Journal of Urban Economics* 60(3): 519-534.

Wildasin, David E. 1980. "Locational Efficiency in a Federal System." Regional Science and Urban Economics 10 (November): 453-471.

Yinger, John, 1981. "A Search Model of Real Estate Broker Behavior" *American Economic Review*, 71(4): 591-605.

Zodrow, George, 2001. "The Property Tax as a Capital Tax: A Room with Three Views" *National Tax Journal*, 54(1): 139-156.

TABLE 1: DESCRIPTIVE STATISTICS
OF DIFFERENCES ACROSS AREAS, 2007

	Mean	Std. Dev
	(1)	(2)
Panel A: American Community Survey Data 2005-2009		
Standard Deviation within MSA	0.706	0.042
Log Housing-Cost Differences:		
Raw	0.0	0.340
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
Panel B: Statistics On Income Data per Capita		
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
Panel C: Tax Data		
Combined Federal Tax Rate on Labor	32.0%	
Reform Federal Tax Rate on Labor	29.3%	
State Sales Tax Rate	5.5%	1.4%
State Income Tax Rates	4.2%	2.4%

American Community Survey data for 325 Metro-level observations, including 50 non-metro areas of states. Means and standard deviations weighted by population. Statistics on Income data from tax year 2007 ZIP code level file. Panel C tax data from NBER Taxsim.

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

	Standard Deviation (1)
Locational Tax Distortion	
Total Distortion	0.026
Tax Distortion from Wages Alone	0.035
Tax Distortion from Housing Benefits Alone	0.010
Total Tax Distortion after Simulated Reforms	
Eliminating Mortgage Interest Deduction	0.027
Taxing Capital Gains on Housing	0.028
Eliminating Mortgage Deduction and Taxing Capital Gains	0.028
Tax Distortion from Wages Alone with Lower Rates	0.032

We consider metropolitan areas as the unit of analysis as they represent areas where residents both live and work. The location distortion measures the impact of taxes on choice of residence across metropolitan areas. The mean distortion will be zero, and standard deviations represent movement across locations.

TABLE 3: HOUSING CONSUMPTION TAX DISTORTIONS, 2007

	Itemizers		Non-Itemizers	
	Mean	Std. Dev	Mean	Std. Dev
	(1)	(2)	(3)	(4)
Panel A: User Cost of Housing				
Actual tax treatment	0.062	0.003	0.068	0.004
Treatment similar to other capital	0.073	0.001	0.073	0.001
Panel B: Consumption Tax Distortion (Ad Valorem Subsidy to Housing)				
Total effect of Taxes	0.17	0.04	0.09	0.05
Effect of Federal and State Income Taxes	0.23	0.01	0.23	0.02
Eliminating Mortgage Interest Deduction	0.18	0.01	0.23	0.02
Taxing Capital Gains on Housing	0.19	0.01	0.19	0.02
Eliminating Mortgage Deduction and Taxing Capital Gains	0.14	0.01	0.19	0.02
Effect of Property Taxes (no deduction)	-0.06	0.05	-0.06	0.05
Sales Tax Effect	0.03	0.01	0.03	0.01

User cost of housing calculated as in equations (4) and (5). Ad Valorem subsidy for housing calculated as in equation (3).

TABLE 4: BEHAVIORAL ELASTICITIES, TAX DISTORTIONS, AND TAX EFFECTS ACROSS SELECT METROPOLITAN AREAS

	Total Behavioral Elasticities		Consum. Tax Distort. (fr. of price)	Location Tax Distortion (percent of income)		Tax Effects	
	Housing	Population		Total	Housing	Housing Per Capita	Metro Population
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
San Francisco-Oakland-San Jose, CA	0.15	-1.67	0.21	0.057	-0.020	0.02	-0.16
New York, Northern New Jersey, Long Island, NY-NJ-CT-PA	0.22	-2.10	0.15	0.041	-0.014	0.02	-0.15
Washington-Baltimore, DC-MD-VA-WV	0.36	-3.77	0.19	0.037	-0.012	0.05	-0.20
Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD	0.38	-4.23	0.14	0.029	-0.003	0.04	-0.19
Hartford, CT	0.36	-3.77	0.14	0.028	-0.001	0.04	-0.17
Boston-Worcester-Lawrence, MA-NH-ME-CT	0.19	-1.90	0.17	0.027	-0.009	0.02	-0.12
Chicago-Gary-Kenosha, IL-IN-WI	0.21	-2.08	0.14	0.026	-0.006	0.02	-0.12
Minneapolis-St. Paul, MN-WI	0.35	-3.63	0.20	0.021	-0.004	0.05	-0.14
Las Vegas, NV-AZ	0.34	-3.45	0.21	0.020	-0.006	0.05	-0.14
Houston-Galveston-Brazoria, TX	0.43	-5.94	0.10	0.019	0.003	0.03	-0.18
Los Angeles-Riverside-Orange County, CA	0.10	-1.47	0.22	0.019	-0.015	0.02	-0.09
Miami-Fort Lauderdale, FL	0.04	-1.21	0.18	-0.013	-0.011	0.00	-0.05
Greenville-Spartanburg-Anderson, SC	0.46	-7.33	0.18	-0.013	0.008	0.06	0.03
San Antonio, TX	0.47	-8.12	0.10	-0.013	0.009	0.04	0.04
Orlando, FL	0.28	-2.67	0.18	-0.014	-0.004	0.04	-0.03
Greensboro--Winston Salem--High Point, NC	0.47	-8.45	0.15	-0.014	0.005	0.06	0.06
Salt Lake City-Ogden, UT	0.13	-1.57	0.21	-0.016	-0.001	0.02	-0.04
Norfolk-Virginia Beach-Newport News, VA-	0.17	-1.78	0.20	-0.017	-0.003	0.03	-0.04
Oklahoma City, OK	0.48	-9.03	0.18	-0.022	0.005	0.07	0.13
United States (mean)	0.35	-5.53	0.16	0.000	0.000	0.04	0.00
United States (std dev)	0.10	3.78	0.04	0.026	0.010	0.02	0.20

Housing elasticities reflect the harmonic sum of demand and supply elasticities. Housing supply elasticities come from Saiz (2010) and are estimated using local geological features. The consumer tax distortion for housing represents the percentage discount in user cost following equations (4) and (5). Tax effects represent inefficiency in housing consumption and location choice for each metropolitan area.

TABLE 5: SIMULATED EFFICIENCY COSTS USING DATA: BASELINE AND ALTERNATIVES, 2007

Economic Parameters	Benchmark with Cap Gains and 25% Ben. (1)	Property Taxes 100% Benefit (2)	Ignoring Capital Gains Treatment (3)	Ignoring State Income and Sales Taxes (4)	High Hous. Low Mob. Elasticity (5)
Average housing elasticity	0.35	0.35	0.35	0.35	1.00
Average population elasticity	-5.53	-5.53	-5.53	-5.53	-1.00
Deadweight Loss from Location Inefficiency					
Standard deviation of location effects	0.20	0.19	0.21	0.18	0.03
As a percent of income, E(DWL/Nm)	0.22%	0.21%	0.25%	0.18%	0.04%
Total, billions per year, 2007$	26	25	30	22	4
Per capita per year, 2007$	88	85	101	74	14
Deadweight Loss from Quantity Inefficiency					
Average quantity effects	0.043	0.074	0.034	0.035	0.126
Standard deviation of quantity effects	0.019	0.031	0.016	0.016	0.032
As a percent of income, E(DWL/Nm)	0.06%	0.16%	0.04%	0.04%	0.18%
Total, billions per year, 2007$	7	19	5	5	22
Per capita per year, 2007$	24	64	15	17	73

Benchmark case includes deduction for mortgage interest and property tax, assumes 25 percent of additional

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

	Existing System (0)	Eliminate Deductions (1)	Tax Capital Gains (2)	Eliminate Deductions, Tax Capital Gains (3)	Eliminate All Advantages (5)	Eliminate Advantages Lower Marg. Rates (6)	All Reforms Index Taxes to Costs of Living (7)	All Reforms Index Taxes to Wages (8)
DWL as a Percent of Income								
from Locational Inefficiency	0.22%	0.22%	0.24%	0.25%	0.39%	0.31%	0.15%	0.00%
from Quantity Inefficiency	0.06%	0.03%	0.04%	0.01%	0.02%	0.02%	0.02%	0.02%
Total	0.28%	0.25%	0.28%	0.26%	0.41%	0.33%	0.17%	0.02%
Total, billions per year, 2007$	34	30	34	31	50	39	20	2

Existing system includes local property taxes, sales taxes, housing capital gains exclusion, and mortgage interest and property tax deductions. Deadweight loss for locational choice based on equation (2). Deadweight loss calcuation for housing based on equation (6).

Figure 1: Equilibrium Prices and Wages in Cities that Vary in Productivity with Income Taxes and Housing Benefits: Nashville and Chicago

Land Rent = House Price

Mobility condition: lump-sum taxes

Mobility condition: income taxes & benefits

Mobility condition: income taxes

r_0^c

dr^c

r^c

E_0^c

E^c

$\bar{E}$

$\bar{r}$

Zero-profit condition: high productivity

Zero-profit condition: average productivity

$\bar{w}$
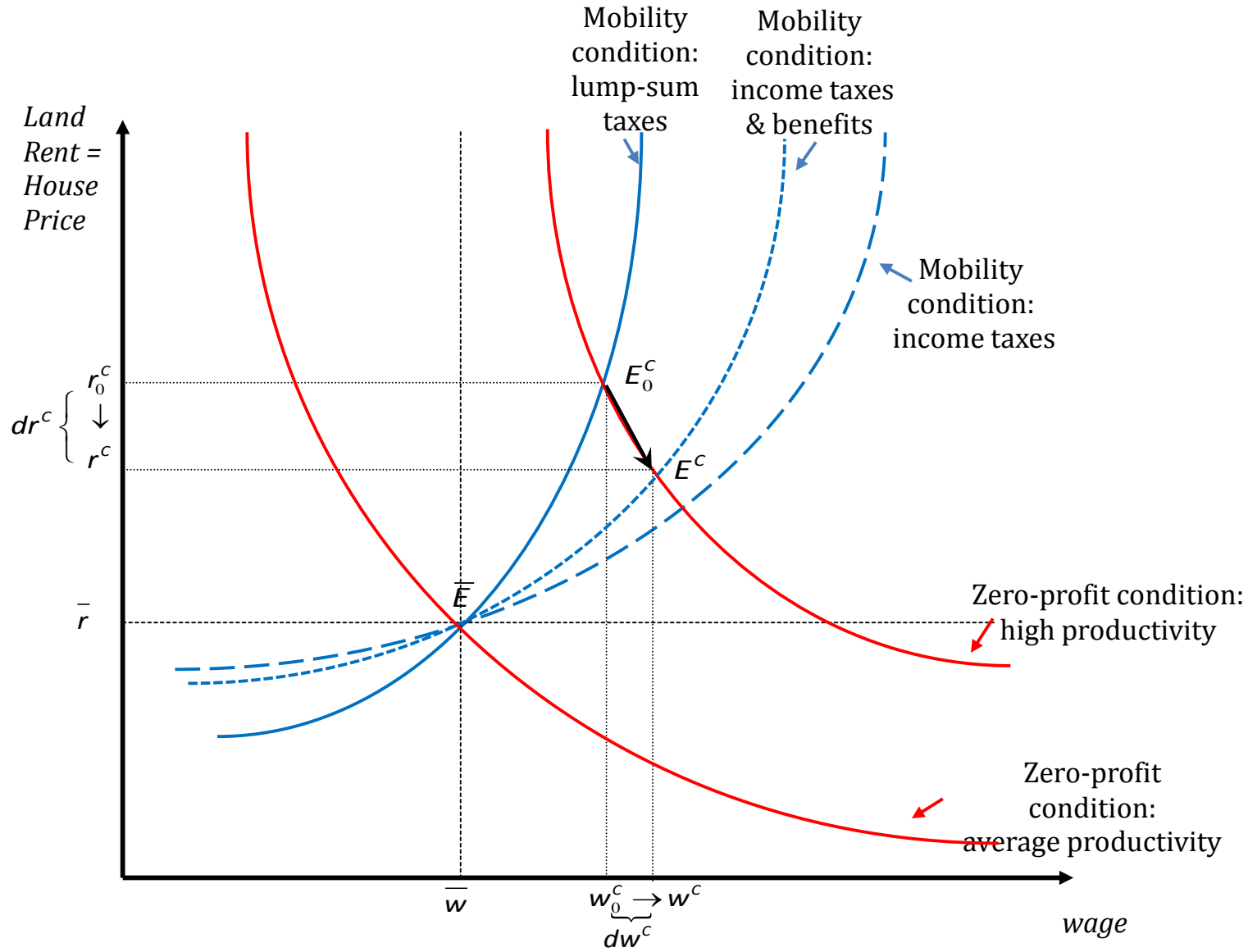
$w_0^c \rightarrow w^c$

dw^c

wage

Figure 2: Equilibrium Prices and Wages in Cities that Vary in Quality of Life with Income Taxes and Housing Benefits: Nashville and Miami
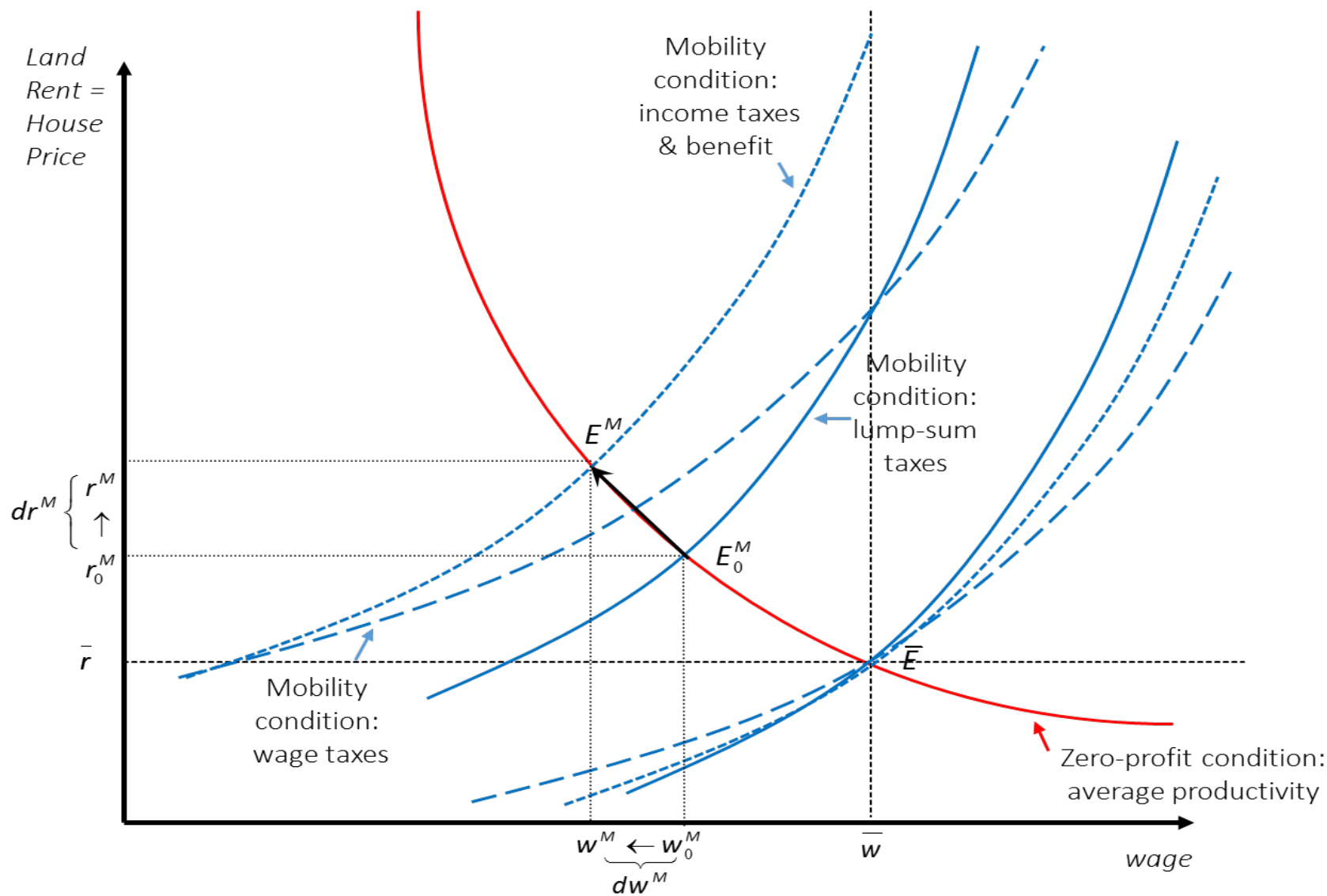
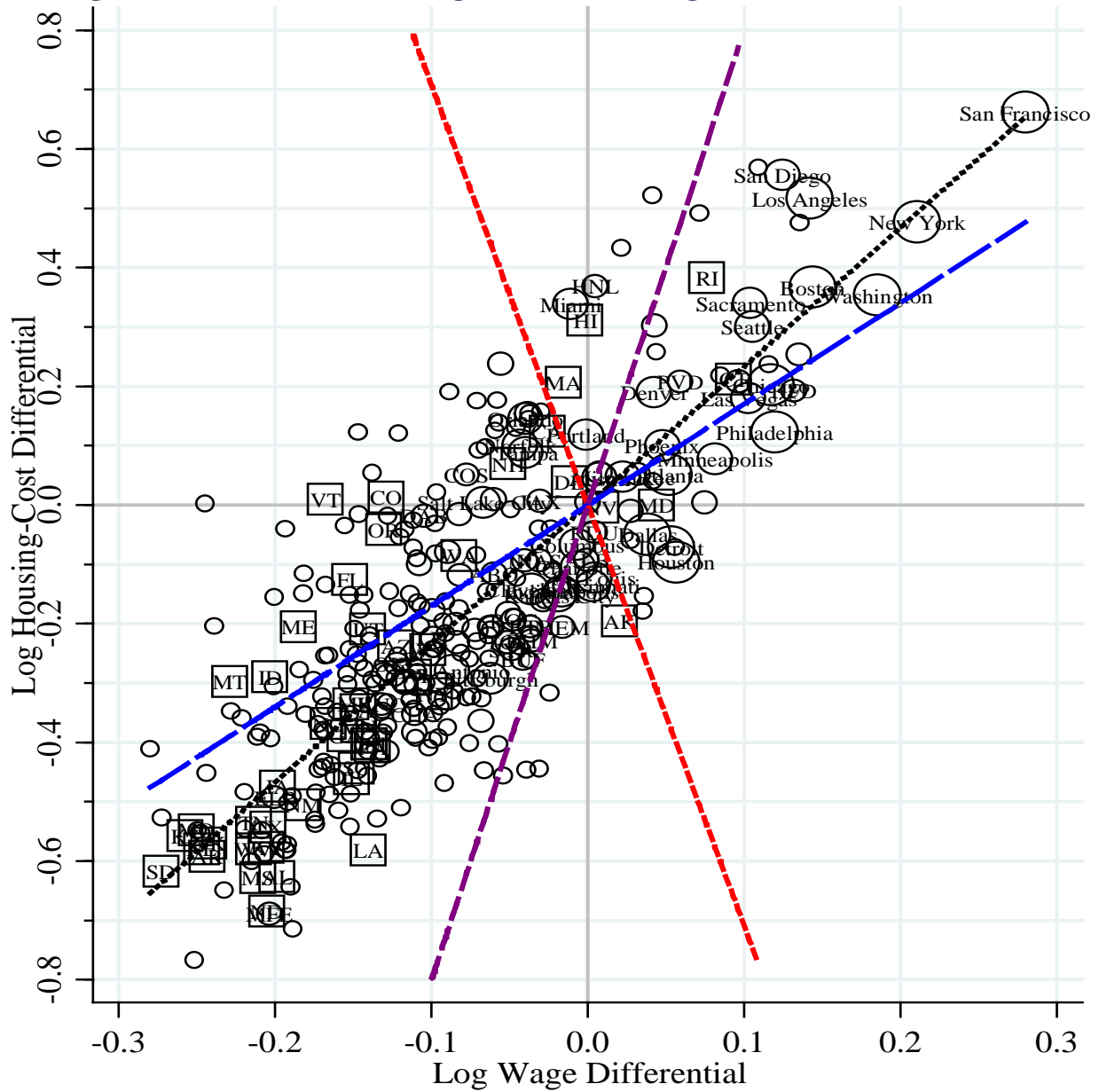Figure 3: Locational Wage and Housing Costs across Areas: 2007

Figure 4: Calibrated Tax and Deduction Differentials

METRO POP

- o <0.5 Million
- O 0.5-1.5 Million
- O 1.5-5 Million
- O >5.0 Million
- □ Non-Metro Areas of State

━━━ Total Offset: slope = -1.0

┅┅┅ Linear Fit: slope = -0.140 (0.005)

Figure A1: Compositional Wage and Housing Costs across Areas: 200′

METRO POP

○ <0.5 Million

○ 0.5-1.5 Million

○ 1.5-5 Million

○ >5.0 Million

□ Non-Metro Areas of State

------ Linear Fit: slope = 0.32 (0.08)