THE SPATIAL DISTRIBUTION OF HOUSING-RELATED ORDINARY INCOME TAX BENEFITS

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ABSTRACT

We estimate how tax subsidies to owner-occupied housing are distributed spatially across the United States and find striking skewness. At the state level, the mean tax benefit per owned unit in 1990 ranged from $917 in South Dakota to $10,718 in Hawaii. The dispersion is slightly greater when benefit flows are measured at the metropolitan area level. Even assuming the subsidies are funded in an income progressivity-neutral manner, a relatively few metro areas, primarily in California and the New York-Boston corridor, are shown to gain considerably while the vast majority of areas have relatively small gains or losses.

Introduction

With 65 percent of U.S. households owning their own homes at a given point in time and a higher percentage owning a house at some point during their lifetimes, the tax treatment of owner-occupied housing is one aspect of the tax code that affects many people. Owner-occupied housing is subsidized by the tax code because implicit rental income is untaxed while mortgage interest and property taxes are deductible.

In this paper, we document where the tax benefits from this subsidy flow spatially, both within and across states and within and across metropolitan areas. Despite the considerable attention paid to the tax treatment of owner-occupied housing, little is known about the geographical distribution of this subsidy.[1] Since housing markets are inextricably tied to a physical location, knowing the extent to which the tax subsidy varies across the country is important to determining the potential geographical impact of changing the tax treatment of owner-occupied housing. In places where the tax subsidy is large, it may have a greater effect on house prices, homeownership rates, urban form, and even mobility.[2] Similarly, the impact of a reduction or removal of the subsidy to owner-occupied housing on local housing markets will vary across the country.

Our second goal is to use our knowledge of the geographical distribution to describe the spatial equity of the tax treatment of owner-occupied housing. Just as a public policy can be, and often is, evaluated by the allocation of its benefits across income groups, one can similarly assess the spatial distribution. In addition, the spatial distribution may provide some insight into the political economy of changing the tax treatment of housing. With this in mind, we examine the distribution of the subsidy across the country both by itself and after adjusting it to make it neutral with respect to the income distribution and differences in the cost of living.

We calculate the value of the tax subsidy to owner-occupied housing as the difference in ordinary state and federal income taxes currently paid by home owners and the taxes they would pay if the tax code treated them like landlords. Unlike the current code, such tax treatment would not provide a preference for investing in one's home relative to other assets. In aggregate, the subsidy is quite sizable, totaling $188 billion in 1990 for the U.S. according to our estimate.[3] This translates into $3,231 per owner-occupied unit and $2,092 per household in 1990.

Not surprisingly, the level of the subsidy flow differs substantially across locations, indicating that the potential distortion in incentives for consuming owner-occupied housing varies widely. The state means range from a low of $917 in South Dakota to $10,718 in Hawaii. The dispersion is slightly greater when we measure at the metropolitan area level. There we find a low benefit per owner value of $745 (McAllen-Edinberg, TX) and a high of $12,362 (Honolulu, HI).

While this way of calculating the subsidy also provides a measure of the unequal spatial equity of the tax treatment of housing, it is important to understand that the variation in benefits may be offset by other spatially non-neutral policies. In particular, the financing costs of the program may be assessed differentially, with places that receive greater benefits paying a greater share of the cost. Consequently, we examine the spatial distribution of housing tax benefits after netting out program costs. First, we consider lump sum financing, where each household pays the $2,092 per household average benefit in order to finance the program. The distribution of net benefits under this assumption still exhibits a fairly wide range—from -$1,175 per owner in South Dakota to +$8,626 in Hawaii.

Under the current progressive tax rate system, higher income households receiving more gross benefit from the housing subsidy but also pay more of the program costs. As a way of decomposing which factors determine the distribution of benefits, we examine a progressivity-neutral way of funding the subsidy whereby we scale up each household's average tax rate by the same proportion. This funding assumption reduces the measured skewness in the spatial distribution of net benefits. However, 'proportional' financing still yields a far from uniform spatial distribution. For example, net benefits per owned unit in Hawaii drop to $7,035 while in South Dakota owners are estimated to have mean net benefits of just -$27. Similar patterns appear at the metropolitan area level.

When costs to renter households are included so that net transfers across states and metropolitan areas can be calculated, we find that a relatively few areas receive large positive net inflows, with the bulk of areas either paying out or receiving modest amounts. Once again, this is not simply an artifact of progressive taxation. Even with proportional financing, California is estimated to receive $15 billion in net benefits annually from the rest of the country. Only four other states (Connecticut, Massachusetts, New Jersey, and New York) receive annual net inflows in excess of $1 billion. At the metropolitan area level, the top five areas of Los Angeles-Riverside-Orange County, New York-Northern New Jersey, San Francisco-Oakland-San Jose, Boston-Worcester-Lawrence, and Washington, D.C.-Baltimore received the vast majority of all positive net inflows at the metropolitan area level ($22.7 billion out of $26 billion).

The precise economic implications of these results depend upon whether or not the subsidy is capitalized into land prices. If it is fully capitalized, for example, eliminating the subsidy would not affect the user cost of owning but many owners would experience significant changes in wealth. Our simple calculations suggest that the perpetuity value of the (gross) subsidy amounts to about a fifth of property value on average in the United States. There are over forty metropolitan areas, including many densely populated ones centered around Boston, New York City, Washington, D.C., Los Angeles, and San Francisco for which the present value of the subsidy flow is greater than 25 percent of house values. While the savings associated with eliminating the subsidy would be redistributed back to homeowners, the net wealth effect still is likely to be significant in many areas even with proportional financing.

If the tax subsidy is not capitalized into land prices, the user cost of ownership must reflect it. Our calculations suggest that the subsidy equals between 4 and 6 percent of annual household income in over half of the nation's metropolitan areas. However, in twenty metropolitan areas, including many in California, Hawaii, and Massachusetts, user costs amount to 10 percent of income or more. On the other hand, our analysis indicates that rebating the savings from eliminating the subsidy as a lump sum credit would more than offset the user cost increase in most areas but returning it through the progressive tax system would not.

Lastly, our findings are not merely a reflection of the progressivity of the tax code or spatial differences in house values. Given the progressive rate structure of the current tax code, the benefits of avoiding taxation on housing must be skewed towards high income households. If these households live close to each other, one could imagine that could account for the spatial patterns we identify. However, high income, high tax bracket owners tend to reside in disproportionately valuable homes so that the tax code is interacting with housing consumption to provide an extremely skewed subsidy distribution. Stated differently, while high income owners certainly do pay a large share of taxes, they receive an even larger share of this program's benefit flows.

The remainder of the paper proceeds as follows. In the first section, we describe the tax subsidy to owner-occupied housing and how we measure it. Section two reports our results, beginning with an analysis of how this tax program redistributes income across states and concluding with a description of the distribution within given metropolitan areas. Section three then considers the economic implications of our findings in terms of potential capitalization and user cost effects. Finally, there is a brief conclusion and summary.

Measuring Housing-Related Tax Benefits

Determining the Subsidy Under the Current Tax System

In a perfect housing asset market, the marginal home owner will invest in owner-occupied housing until the point where the annual cost she incurs exactly equals the rent she would have to pay as a tenant in the same property [Hendershott and Slemrod (1983), Poterba (1984)]. That user cost is described in equation (1) and takes into account the fact that implicit rental income is untaxed while mortgage interest and property taxes are deductible for itemizers:

(1) $$R_H = (1-\tau_{ded})\alpha i + (1-\tau_{ded})\tau_p + (1-\tau_{int})(1-\alpha)r + (1-\tau_{int})\beta + M + \delta - \Pi^H.$$

The left-hand side variable, R_H, is the implicit rent per dollar of housing value. In equilibrium, it must equal the cost of owner occupancy per dollar of housing value. These costs include: (a) the after-tax cost of mortgage interest, $(1-\tau_{ded})\alpha i$, where α is the loan-to-value ratio on the house, i is the mortgage interest rate, and τ_{ded} is the owner-occupier's marginal tax rate, equal to her marginal rate (denoted τ_{int}) if she itemizes and zero otherwise; (b) the after-tax cost of property tax payments, $(1-\tau_{ded})\tau_p$, with τ_p the effective property tax rate; (c) the after-tax opportunity cost of investing equity in the house rather than in some other riskless investment at rate of return, r; this is given by $(1-\tau_{int})(1-\alpha)r$ and is a cost to all owners, whether they itemize or not;[4] (d) an after-tax risk premium, $(1-\tau_{int})\beta$, to account for the difference in risk between bonds and housing; this applies to the entire long position in the house and thus is unaffected by the choice of leverage;[5] (e) annual maintenance costs per unit of housing which are given by M; (f) the cost of true economic depreciation per unit of house which is assumed to occur at rate δ; and (g) any annual appreciation in the house value, Π^H, which reduces the carrying cost.[6]

The components of the subsidy to owner-occupied housing can be highlighted by comparing the current tax treatment to one that would not favor owner-occupied housing. Treating the home owner like a landlord, for example, taxes the house like any other asset. Since the home owner essentially rents her house to herself for R_H, neutral tax treatment would require taxing the implicit rental income on one's home. If treated like landlords, owner occupiers also would be able to deduct maintenance expenses and depreciation in addition to the mortgage interest and local property taxes presently allowed. Making these adjustments would yield the different perfectly competitive equilibrium rent given in equation (2):

(2) $R_H' = (1-\tau)\alpha i + (1-\tau)\tau_p + (1-\tau)(1-\alpha)r + (1-\tau)\beta + \tau R_H' + (1-\tau)M + (1-\tau)\delta - (1-\tau)\Pi^H$

where $\tau R_H'$ is the tax due on imputed rent.[7] Grouping the R_H' terms and dividing both sides by $(1-\tau)$, we obtain:

(3) $R_H' = \alpha i + \tau_p + (1-\alpha)r + \beta + M + \delta - \Pi^H$.

Comparing equations (1) and (2) demonstrates that three factors determine the differences in the user costs. As a homeowner, the user cost is higher by the amount of the untaxed imputed rent but would be reduced by the values of the maintenance and depreciation deductions. More formally, the difference between $R_H' - R_H$ represents the ordinary income tax benefits to owner occupancy under the current code and is captured in equation (4):

(4) $R_H' - R_H = \tau_{ded}\alpha i + \tau_{ded}\cdot(\tau_p) + \tau_{int}((1-\alpha)r + \beta)$.

This equation measures the change in user cost that would result in long run equilibrium if the current tax system were modified so that one dollar of investment in owner-occupied housing was not favored over other assets.[8] This tax subsidy to owner-occupancy can be broken down into three components: (a) the tax value of home mortgage interest deductions ($\tau_{ded}\cdot\alpha\cdot i$); (b) the tax value of local property tax deductions ($\tau_{ded}\cdot\tau_p$); and (c) the tax that would have been paid on the equity invested in the home had it been invested elsewhere ($\tau_{int}\cdot((1-\alpha)\cdot r+\beta)$).[9] By estimating these components, we can determine the total subsidy to owner-occupied housing under the current ordinary income tax code.[10]

Data and Estimation Strategy

Census tract level information in the STF3 files of the 1990 decennial census for all fifty states plus the District of Columbia are our primary data. We use census data rather than tax return data because the census reports geocodes at the tract level while we can only obtain state identifiers with the tax data. The added location detail is critical when examining finer spatial distributions across and within individual metropolitan areas. And, the census data report most of the crucial elements – including the distributions of house value and family income, along with certain demographics – needed to compute reasonably accurate estimates of the tax benefit.[11]

We start by computing the distribution of household income among homeowners at the tract level.[12] For each tract, we divide the household income distribution into deciles and assign the median income for each decile to all the households in that category. Thus, the lowest-income one-tenth of the households are assumed to have an income equal to that of the fifth percentile for the tract, the next lowest-income tenth of the households are assigned an income equal to that of the 15th percentile for the tract, and so forth.

We then map tract-level information on the distribution of house values to incomes by assigning to households in each decile of the income distribution the value corresponding to the same decile of the house value distribution. For example, we assume that the household in the 5^{th} percentile of the income distribution for the tract also owns the home in the 5^{th} percentile of the housing price distribution for the same tract.[13]

We estimate the first component of equation (4), the value of the mortgage interest deduction, computing each tract-decile's tax value as the weighted average difference in tax bills with and without it. The mortgage interest deduction itself is defined as $P_H*\alpha*i$. Leverage ratios, α, vary by age and are computed from household data in the 1989 *Survey of Consumer Finances* (*SCF*). A weighted average leverage for each tract was computed based on the tract's age distribution.[14] The mortgage interest rate, *i*, was calculated by taking an average across households in the 1989 *SCF*, and is equal to 9.84 percent.

The tax value of the mortgage interest deduction can differ from mortgage interest paid times the marginal tax rate for three reasons. First, only families that itemize on their tax returns receive any benefit on the margin from the deductibility of mortgage interest. Also, only the excess of the mortgage interest deduction plus other itemized deductions over the standard deduction has value for a taxpayer. Therefore, we would only multiply the portion of mortgage interest in excess of the standard deduction (after itemizing all other non-housing related deductions first) by the tax rate. Additionally, since the tax schedule is nonlinear, taking the mortgage interest deduction may lower the taxpayer's marginal and average tax rates.

The actual value of the tax benefits also depends on certain demographic data that are likely to affect the number of exemptions and the overall amount of deductions. Tract level data that are available include the distribution of whether households are single, married, or single with children; the percentage of households with children; and the percentage of households over

65 years of age.

Unfortunately, the census data lack information on most non-housing categories of potential tax deductions. We compute mortgage interest, state, and property tax deductions, but we do not observe medical expenses, charitable giving, deductible interest (other than for a home mortgage), and several other miscellaneous categories. Charitable giving alone accounted for $55 billion of the $432 billion of total itemized deductions reported on tax returns in 1989, placing it behind only mortgage interest ($169 billion) and state and local taxes ($81 billion). Thus, these omissions potentially are severe.

Two countervailing problems arise from underestimating possible deductions. First, we would be more likely to incorrectly assume the family does not itemize. This error would cause us to underestimate the tax value of the mortgage interest and property tax deductions since less would be deducted at the margin. On the other hand, undercounting deductions for itemizers could increase the tax value we do measure since the remaining deductions are applied against higher marginal tax rates.

Consequently, we impute missing tax deductions to our census data based on data from the Department of the Treasury's *Statistics of Income* (*SOI*) public use tax micro sample. A modified Heckman-style sample selection model is employed to correct for the selective observing of deductions only by itemizers, with the details reported in Appendix 1.[15] Following this imputation, federal and state tax rates and implied tax benefit amounts are computed using the National Bureau of Economic Research's (NBER) TaxSim program.

The second component of equation (4) involves the value of the deduction of local property taxes. Property tax payments themselves are defined as $P_H*\tau_p$, where τ_p is the average effective property tax rate. This variable is allowed to vary by metropolitan area using data generously provided us by Stephen Malpezzi, who has calculated average property tax rates in 1990 for a large number of areas. Census tracts not located within metropolitan areas covered in the Malpezzi data are assigned the average state-level local property tax rate as reported by the Advisory Commission on Intergovernmental Relations (ACIR (1987)).[16] The tax value of the deduction associated with these payments then is computed the same way as for the mortgage interest deduction.

The third term in equation (4) arises from the fact that the government does not tax as income the return home owners could have earned on their equity had they not invested in their homes. The estimates below assume that the expected equivalent-risk opportunity cost of investing in a house was equal to the geometric mean on the S&P500 Index over the last three-quarters of the 20th Century. The average annual return over that period was 10.2 percent.[17]

The value of the non-taxation of the return on equity invested in housing is computed in two steps. First, we calculate the opportunity cost of the equity in one's home, or $P_H*((1-\alpha)*r + \beta)$, where r is the riskless 8.7 percent yield on seven-year Treasuries in 1989 and β is the risk premium for the whole house.[18] We define β to be the 10.2 percent S&P500 return minus the 8.7 percent Treasury yield, for a premium of 1.5 percentage points. We then calculate the difference in tax liabilities between the cases in which the family invested the home equity in taxable form and in which they held untaxed housing. This approach accounts for the possibility that a family might move into a higher marginal tax bracket if the return on its housing equity was taxed.

The procedure for estimating equation (4) is represented graphically in the tax schedule with three marginal tax brackets shown in Figure 1. A home-owning family with no housing-related deductions would have a taxable income (TI) of Y_1. However, if they were not owners, they may have invested their housing equity in a vehicle that yielded a taxable return that would raise their TI to Y_2. Thus, Y_2 is the counterfactual TI for a home-owning family if it were to stop being an owner. Starting with that TI, we can compute the tax value of each of the three aforementioned deductions. With a taxable income of Y_2, this hypothetical family would have a tax liability of T_1. Assume that claiming the home mortgage interest deduction (HMI) would lower TI to Y_2–HMI (presuming for simplicity that all of HMI was above the standard deduction) and the tax liability to T_2. Therefore, the tax savings for this family from the mortgage interest deduction is $T_1 - T_2$.

Although in this example the mortgage interest deduction does not move the family into a lower tax bracket, the property tax deduction does. Beginning with TI equal to Y_2–HMI, we can compute the tax savings from the property tax deduction as the tax bill with only the mortgage interest deduction, T_2, minus the tax bill with both the mortgage interest and property tax deductions, T_3. In this case, T_2 and T_3 span a kink in the tax schedule, but still account for the fact that the average tax rate is less than the marginal tax rate at Y_2–HMI.

Finally, we compute the value of the non-taxation of the return on housing equity. Because the return on housing equity is not included in TI, taxable income is measured at Y_1 instead of the greater amount Y_2. The tax value of not including that income is measured as the change in tax between T_3 (the tax bill corresponding to a TI of Y_2–HMI–T_p) and T_4 (the tax bill corresponding to an TI of Y_1–HMI–T_p).

It is apparent from Figure 1 that the order in which the deductions are taken matters when the tax schedule is not linear. For example, $T_1 - T_2 > T_3 - T_4$, even though HMI < $Y_1 - Y_2$. After adding back the implicit return on housing equity, we compute the deductions in the following order: (a) tax savings from the mortgage interest deduction; (b) the tax savings associated with the property tax deduction; and (c) the savings from the return on housing equity being untaxed. We have repeated the estimation using all six possible sequences in which the deductions can be taken. While the relative magnitudes of the categories change, the differences are minor.

Results

Summary Statistics

There were 90.2 million households in the nation in 1989. Sixty-four percent, or 58.4 million of these households, were owners. Overall, those owners received a substantial tax subsidy. Table 1 reports aggregate, per owner-occupied housing unit, and per household values of the aggregate tax benefit for the U.S. The gross value to owners of housing-related ordinary income tax benefits for the country in 1989 was nearly $188 billion (top panel).[19] Of this total, just over two-thirds ($129 billion) derives from the untaxed return on home equity. Just under one-quarter ($43 billion) is due to mortgage interest.[20] The remaining $15.9 billion in housing-related tax benefits is generated from the deduction of local property taxes.

This subsidy is sizeable, even on a per-household basis. Gross program benefits per owner-occupied housing unit are $3,231 (middle panel). This figure results from dividing the $187.7 billion in aggregate benefits by the 58.4 million owned units nationally. Benefits per household, which amount to $2,092, are reported in the bottom panel.

The subsidy not only is large, but is far from uniformly distributed across owners. Our analysis indicates that the top 10 percent of owners receive 34 percent of all aggregate benefits, the top 25 percent of owners receive 58 percent of the total subsidy, and the top 50 percent of owners reap 79 percent of aggregate program benefit.[21] While the subsidy clearly is skewed in aggregate, the remainder of this section focuses on whether the subsidy also is spatially skewed.

State-Level Results

Table 2 presents data on benefits at the state level. The first column reports the value of total tax code-related benefits per owner-occupied housing unit for the fifty states and the District of Columbia. There is wide variation around the $3,231 average value for the nation, with the state means ranging from a low of $917 in South Dakota to $10,718 in Hawaii. Since these gross subsidy flows reflect the potential distortions to investment in housing relative to other assets, the fact that they are far from uniformly distributed across the country strongly suggests that any economic effects of the tax subsidy are unlikely to be spatially uniform.

While these gross figures also provide an indication of the degree of spatial inequity that, absent any countervailing policies, is inherent in the tax treatment of owner-occupied housing, it should be acknowledged that the financing of the tax subsidy itself is unlikely to be spatially neutral. Thus, it also is useful to examine the distribution of benefits net of their financing costs.

Our first financing assumption is that the program is self-funding on a lump sum basis. This approach helps emphasize the effect of different homeownership rates. Since some locations have more homeowners, they receive a greater subsidy in aggregate than the per-homeowner numbers would indicate. In this case, we assess a lump sum cost per household equal to the $2,092 national average benefit.[22] Net program benefits in the state, which are the sum of net benefits to owner and renter households, are reported in column 2 of Table 2.[23]

A positive number in column two indicates that, after adjusting for homeownership rates, the state would receive a net transfer from other states under the program if we assumed it was lump-sum financed. There are only twelve states (including the District of Columbia) that are net recipients under the program once renter costs are taken into account. Figure 2 plots this state-level net transfer series and highlights how skewed the benefits are even among these dozen areas. California is the biggest recipient in aggregate, receiving $25 billion from the rest of the nation -- more than all the other net positive beneficiaries combined. Even given California's large population, this amounts to $2,434 per household and $4,352 per owner-occupied unit. Owners in Hawaii receive much bigger transfers of $7,045 on average, but the smaller number of owners puts the state's aggregate net benefit at only $1.35 billion. Texas is the biggest loser on a statewide basis under this financing assumption, suffering a negative net transfer of well over $6 billion. This amounts to $1,130 for each of the approximately six million households in the state. Other relatively large aggregate losers include the high population states of Florida, Ohio, and Pennsylvania.

Yet another factor affecting the subsidy's distribution is progressive taxation, as households with a higher average tax rate obtain a higher subsidy. To isolate how much of the skewness in benefits comes from this aspect of the program design, we redid our analysis assuming the tax subsidy is financed by a proportional increase in each household's average tax rate. Thus, the progressivity of the tax code is unchanged, with higher income households paying more of the program costs than lower income households.[24] This has the added benefit of providing an income progressivity neutral measure of the spatial equity of the program.

The last two columns of Table 2 report net benefits per owner and net transfer by state under this 'proportional' financing assumption. The resulting spatial distributions of net benefits and transfers at the state level are less skewed. Figure 3 shows that there are only nine states with negative net benefits per owner values (versus 25 when lump sum financing was assumed), and these values are much less negative than before. In general, the distribution of net benefits is almost uniform among the states with the lowest net benefit per owner values. The distribution also is less skewed among the top 10 states, but it still is quite evident that owners in places such as Hawaii, the District of Columbia, California, Connecticut, New York, and Massachusetts are subsidized relative to other states even when we presume the subsidy is funded proportional to one's average tax rate. Net benefits per owner for the top five states range from $3,079 to $7,035.[25]

Figure 4 shows that net transfers across states also are much lower under the proportional financing system. A comparison with Figure 2 indicates that Californians in particular pay a disproportionate share of taxes nationally, so the net transfer to that state falls from $25 to $15 billion. A similar pattern applies to residents of New York, New Jersey, Connecticut, and Massachusetts. Also, New York still is estimated to receive over $3 billion in net transfers, with Connecticut, Massachusetts, and New Jersey each still benefiting on a net basis by over $1 billion annually.

In sum, even with proportional financing of the tax subsidy, benefits are far from uniformly distributed across the nation. Owners in California in particular, as well as a handful of other states receive a disproportionate share of overall program benefits. All this suggests that the housing tax subsidy program is less progressive than the tax system itself.

Between-Metropolitan Area Results

In this subsection, we disaggregate the data further to examine subsidy flows at the metropolitan area level. Results are computed for 262 areas that were identifiable Metropolitan Statistical Areas (MSAs) or Consolidated Metropolitan Statistical Areas (CMSAs) in 1990. In addition, for each state, we aggregated the census tracts that were not in MSAs or CMSAs and treated them as their own 'area' so that there are 312 total areas examined in our analysis.[26]

Looking at the MSA level further highlights that the benefits of the tax subsidy to owner-occupied housing flow disproportionately to a small number of areas. In Figure 5, the distribution of gross benefit per owner at the metropolitan area level is highly skewed with only 30 MSAs receiving a subsidy in excess of the $3,231 mean for the nation. (Appendix 3 lists in rank order the bottom and top 25 metropolitan areas for each MSA-level figure.)

Under the lump sum financing scenario, shown in Figure 6, the spatial distribution of the aggregate net transfers across areas varies widely and is skewed to a few large recipients. Just 29 of the 312 metro areas have positive net benefits. The average benefit in the top ten MSAs is almost $5 billion, but the highest benefit area, the New York – Northern New Jersey CMSA, receives almost $15 billion.[27] In contrast, the area with the lowest housing net subsidy assuming lump sum financing (the non-MSA portions of Texas) loses just $1.6 billion.[28]

When we net out proportional financing in Figure 7 to eliminate the skewness due to differences in income tax rates, owners in still just a few areas do relatively well under the current system. For example, fully two-thirds of the metro areas (211 out of 312) containing 74 percent of the nation's owners in 1990 have positive net benefits per owner when program financing is via a proportional change in the household's average tax rate (see Appendix 2 for the specifics). Clearly, net benefits must be small in many areas. In 177 of these areas, the net benefit ranges from $1-$1,000 per owner, and only 45 of these have values above $500. Another 15 areas have net benefit per owner values in the $1,001-$2,000 range. Only 11 are in the $2,001-$4,000 range, leaving eight areas with owners receiving net benefits in excess of $4,000 per owner. The top ten metro areas in terms of net benefits per owner contain 9.6 million owners or 16 percent of all owners nationwide.[29] Thus a relatively small number of owners in a very few areas are receiving the bulk of program benefits, even if one assumes a proportional financing scheme.

Concentrated spatial targeting also is clearly evident on the aggregate level in Figure 8, although as was the case at the state level, assuming some type of proportional financing makes the measured net transfer distribution more uniform. Net transfers are even smaller for the vast majority of metropolitan areas and quite large for just three areas. Los Angeles-Riverside-Orange County ($7.6 billion) moves up to first place; New York-Northern New Jersey ($6.8 billion) is second; and San Francisco-Oakland-San Jose ($6.4 billion) is third. The next highest net subsidy area, Boston-Worcester-Lawrence, received just $1.2 billion after proportional financing, with the figure for Washington, D.C.–Baltimore falling to $0.69 billion. While there are 30 other areas receiving positive net transfers from the rest of the country, the total amount transferred to them is only $3.3 billion, or no more than half the amounts flowing to each of the top three areas. Among the 277 areas with negative net transfers, the mean amount is -$0.09 billion and only one area pays out over $1 billion more than it takes in (Detroit-Ann Arbor-Flint).[30]

Another potential source of the skewness in benefits across MSAs is that some locations have high housing costs in particular and high costs-of-living in general. Of course, the fact that some places have amenities which, when combined with scarce land, lead people to pay more for properties is part of what our analysis is trying to capture. Since that kind of consumption is subsidized by the tax treatment of housing, high amenity areas disproportionately benefit. While we certainly do not believe that a dollar of subsidy is worth less to residents in high cost-of-living places, we do think that normalizing by local cost-of-living differences is useful simply because it helps us understand just how much of the skewness is due to differences in the quality or quantity of housing or in the level of locational amenities consumed.[31] If the spatial distribution is not uniform after controlling for these differences, it indicates that the combination of skewness in incomes and housing prices cannot account for all the skewness of the subsidy distribution.

We use cost-of-living data on the consumption basket of a middle manager as reported by the American Chamber of Commerce. Unlike the metropolitan area cost-of-living series calculated by the Bureau of the Census, the Chamber data are specially constructed to allow comparisons across market areas. In addition, the Chamber series also covers many more metropolitan areas than do the local Census series. Even so, cost-of-living data are not available for a number of our more expensive areas such as Boston, New York, and Los Angeles. Hence, our calculations must be viewed as suggestive of the pattern for the nation as a whole.

Figures 9 and 10 replicate Figures 7 and 8, the net benefits per owner and per MSA under proportional financing, but also controlling for cost-of-living differences. In both charts, the local areas are kept in the same order as in the proportional financing figures and the scales are the same. Gaps in Figures 9 and 10 represent metropolitan areas (and all non-metropolitan areas) for which we do not have cost-of-living data. Despite the many gaps, it still is apparent that the distributions are far from uniform.

In conclusion, even when one assumes a financing scheme that reduces the increase in underlying progressivity that occurs in the lump sum case, we find that the current housing tax subsidy program functions so that most households in the country effectively transfer resources to other households in a relatively small number of metropolitan areas. In addition, these transfers are not simply from low cost-of-living areas to high cost-of-living areas. The within-MSA analysis that follows helps to explain why.

Within-Metropolitan Area Results

We now ask whether one sees similar kinds of spatial skewness in the value of the housing subsidy when we focus within metropolitan areas. Besides being of independent interest, by looking within MSAs we abstract from the effects of state tax rates and cost-of-living differences across metropolitan areas. We begin in Figure 11 by plotting the cumulative aggregate gross subsidy against the cumulative percentage of owners for a small sample of metropolitan areas.[32] These charts show what share of the subsidy flow to an area is captured by any given fraction of the owners in the region. If the plot for a metropolitan area were a straight line through the origin, then 25 percent of the owners in the area would receive 25 percent of the subsidy flowing to the area, 50 percent of the owners would receive half the subsidy, and so on. The more outwardly bowed the plot, the more concentrated the region's subsidy flow is among a relatively few owners. The 45-degree line is plotted as a reference and the thick curved line is the actual cumulative distribution of subsidy in the MSA.

It turns out that in some metropolitan areas the distribution of the gross housing subsidy flow is fairly uniform while in others, including many of the largest cities, a small portion of the population captures the bulk of the tax benefits. While no region's plot is a straight line, those for Appleton, WI, and Madison, WI, are closest. In communities like these, the subsidy is not highly concentrated in a relatively few census tracts. The picture is quite different in other metropolitan areas such as Atlanta, Chicago, Dallas, Houston, and Philadelphia. In these areas, typically 70 percent or more of all subsidies flowing to the area accrue to no more than 25 percent of the owners in the metropolitan area. Generally, the less populous metropolitan areas off the two coasts have the least skewed subsidy distributions. Coastal areas and the more populous metropolitan areas tend to have more skewed distributions in the sense that a relatively few owners capture most of the gross subsidy flow to the region.[33]

Implications: Capitalization and User Costs

The impact of any change in the tax treatment of owner-occupied housing depends upon the extent to which the subsidy is capitalized into house prices. In this section, we discuss two polar cases – full capitalization and no capitalization whatsoever -- to illustrate the range of potential outcomes.

To help gauge how large these impacts might be, we create two new variables for each tract in each metropolitan area. The variable CAPSUB provides an upper bound on the possible size of capitalization relative to property value and is defined as the ratio of the perpetuity value of the subsidy (PVSUB) to tract average house value (AVGHV). The variable INCSUB represents how much user costs could change relative to income if there were no capitalization whatsoever and is computed as the ratio of the annual subsidy for 1989 (SUBSIDY) to tract average household income (AVGINC).

The numerator of CAPSUB represents the present value of the annual tax subsidies assuming they are unchanged in perpetuity. The perpetuity value for any tract *i* in metropolitan area *j* is defined as the 1989 subsidy value for the tract divided by the capitalization rate in the metropolitan area ($CAPRATE_j$), or the rent to price ratio. In our context, we employ the user cost divided by house value for each tract as a proxy for the cap rate since rents equal user costs in equilibrium, and take the owner-weighted mean across all tracts in the metropolitan area.[34] The denominator of CAPSUB is the tract average house value. Thus,

(7) $CAPSUB_{ij} = PVSUB_{ij} / AVGHV_{ij} = (SUBSIDY_{ij}/CAPRATE_j)/AVGHV_{ij}$

where all variables are as defined above.

Figure 12 plots the mean CAPSUB for each metropolitan area, from lowest to highest value. In the typical metropolitan area, the capitalized value of the subsidy for a house in a typical census tract is 21 percent of house value. The standard deviation is a modest 3.7 percentage points, with an interquartile range from 19.1 to 23.6 percent. However, there are 46 metropolitan areas in which the mean CAPSUB value exceeds 25 percent. Included in the top 15 of this group are the MSAs or CMSAs centered around Boston, New York City, Washington, D.C., Los Angeles, and San Francisco. Thus, the high end of the list contains some of the largest and most densely populated areas in the country.[35]

Prior to any rebating of program costs, Figure 12 suggests that if the subsidy were fully capitalized and the tax benefits suddenly taken away, house prices in the typical area would fall by around 20 percent, with some places experiencing much larger declines and a few areas being less affected. This reflects the decline in demand due to the substitution effect associated with the change in the relative price of housing. To some extent, there will be a countervailing income effect associated with the redistribution of the savings from eliminating the subsidy. As indicated by the analysis above, the more the actual program financing resembles proportional financing, the lower will be the variation in net changes in house prices.

Regardless of the financing assumption, the very existence of a rebate makes it clear that renters will be better off if the tax subsidy to home ownership is eliminated. The same will be the case for some owners, especially those who do not experience much of a reduction in house price in exchange for the stream of annual payments that equals their program costs.[36] Whether these owners gain on net depends upon other factors such as their expected investment horizons and their discount rates. For owners in relatively high CAPSUB areas, the trade-off very likely will not be worth it.

Because our measure incorporates no general equilibrium effects of a change in policy, precise estimates of the ultimate impacts are not possible. However, our admittedly rough estimate strongly suggests that the wealth effects of eliminating the tax subsidy to owners, if fully capitalized, would be economically meaningful for the average area in America. Research by Tracy et al (1999) shows that, even with the spread of stock ownership, housing wealth still constitutes virtually all of household wealth for the typical owner household. In addition, for those owners with leverage above 80-90 percent such as younger households and many first time owners with very low down payment loans, elimination of the subsidy could wipe out all home equity if the subsidy is capitalized, raising the specter of increased mortgage defaults [Kau et. al. (1992); Deng, Quigley, and Van Order (1996)].

Our second measure, of the proportion of income saved due to the tax subsidy, is simply

(8) $INCSUB_{ij} = SUBSIDY_{ij} / AVGINC_{ij}$.

In this case, SUBSIDY and AVGINC values are available for each tract in each metropolitan area. Mean INCSUB values by metropolitan area are plotted in Figure 13, with individual values listed in the final column of Appendix 2's table. In a typical area, the annual costs of owning would increase by about five percent of annual income if the tax subsidy were eliminated. The mean area has annual costs of 5.6 percent of house value, the median 4.8 percent, with the interquartile range running from 4.1 to 6.1 percent. However, in 20 areas the fraction is more than 10 percent, with almost all of them being in California, Hawaii, or the New York City-Boston corridor.

Absent any capitalization of the subsidy or changes in interest rates, elimination of the tax benefits must lead to an increase in user costs. However, a cash rebate (either lump sum or proportional to the average tax rate) would be received each year to offset the higher cash user costs of ownership. Creating a 'net INCSUB' measure in which the numerator of equation (8) is changed to equal '$SUBSIDY_{ij}$ – Cash Rebate' can help tell us whether owners in the typical metropolitan area are better off from eliminating the tax subsidy if there is no capitalization and there is redistribution of the savings.

In the lump sum financing case, the median metropolitan area has a ‘net INCSUB’ value of -0.012 (the mean is –0.005), indicating that the lump sum transfer exceeds the increase in user costs by 1.2 percent of income each year. In fewer than one-third of the covered areas (95 out of 312) does the lump sum transfer exceed the rise in user costs so that ‘netINCSUB’ is positive. In the top 20 of these areas, ‘netINCSUB’ is at least five percent, so their owners clearly would be made worse off if the tax subsidy were eliminated and the program costs rebated in a lump sum fashion.

In the proportional financing case, the results are different, with the mean value of ‘netINCSUB’ being positive at 0.005 and the median being very slightly negative at -0.001. For the mean area, the +0.005 value indicates that the rebate falls short of the increase in user costs by nearly half a percent per year. The interquartile range is –0.005 to +0.008. As expected, rebating proportional to one’s average tax rate results in lower ‘netINCSUB’ values at the upper end of this distribution. For example, Honolulu’s value falls from 0.182 to 0.129. That said, its ‘netINCSUB’ value still is quite high even with proportional financing assumed. The correlation between the two measures with lump sum and proportional rebates is 0.91. Thus, no matter what the underlying program financing assumption, elimination of the tax subsidy program would make owners in many areas only slightly better off and owners in a few other areas materially worse off.

Conclusion

It comes as no surprise to the readers of this journal that the value of the tax subsidy to owners of homes is very large and that owners with high incomes and high house prices reap most of the benefits. This paper has provided much important detail on the nature of the distribution of the subsidy across places. The benefit distribution is extremely skewed across states and metropolitan areas, with the bulk of places experiencing small to modest negative transfers on average, and a very few (but highly populous) areas receiving very large positive net transfers under the program.

How the subsidy is distributed within individual metropolitan areas varies widely, too. In many smaller MSAs, especially those in the interior of the country, program benefits tend to be distributed fairly evenly across owners. This is not the case in most larger, more populous areas, in which benefits tend to be skewed towards a relatively small fraction of owners.

The implications of our findings are important whether or not the subsidy is capitalized into land values since our calculations on its distribution provide basic evidence about which locations would gain or lose from a tax change. However, if there is full capitalization, the substitution effect arising from elimination of the subsidy will reduce house prices on the order of 20 percent on average in the United States. There will be considerable variation in this fraction across metropolitan areas. The impact is likely to be greatest – 25 percent or more – in the largest coastal areas. While this outcome would be mitigated by an income effect arising from the rebating of program costs, there is no doubt that owners in key coastal population centers would be materially harmed even if program costs are financed proportional to one's average tax rate.

If there is little or no capitalization, user costs of owning must increase. Our calculations indicate that the increase will amount to between 4 and 6 percent of annual income for the typical owner. However, the increase will be much larger for owners in 20 MSAs, with the nation's biggest among them.

These results also help explain why the subsidy to owner-occupied housing is likely to persist. Most of those who are worse off under the program are only slightly so, especially if proportional financing is assumed. Analogously, most of those who benefit from the program do so only slightly. However, the owners in a select set of high house value, high income metropolitan areas benefit relatively greatly even with proportional financing. Between the spatial concentration of the largest program beneficiaries and the fact that almost everybody else gains or loses a relatively small amount, it is difficult to envision any major program changes.

Finally, the spatial distribution of this major subsidy program is not merely a reflection of a rising marginal tax rate structure. While the tax subsidy increases with household income and tax bracket, the program itself is more regressive than the test of tax code is progressive. For example, if we focus on the tracts containing the top ten percent of households by mean income, we still find significant concentration of benefits. The households in these tracts pay 29 percent of all taxes we estimate are paid nationally,[37] yet the owners in these tracts receive 38 percent of the nationwide subsidy.

This, along with the analysis above that controlled for proportional financing and cost-of-living, suggests that house value also plays an important role in accounting for the spatial variance in subsidy flows. Because house value and income are so strongly correlated, it is difficult to establish the precise fraction of variance in subsidy across tracts that each accounts for. However, because we know the subsidy distribution is not merely a reflection of the progressivity in marginal tax rates, it must be the case that higher income, higher tax bracket owners tend to reside in disproportionately valuable houses. As such, the tax code is interacting with housing prices to generate an extremely skewed tax subsidy distribution – both across the income scale and across locations within the country.[38]

Appendix 1: Correcting for Self-Selection in Determining Itemization Status

The SOI data set we use to help deal with self-selection problems contains information from the tax returns of a 96,000 observation, income-stratified sample of all tax filers in 1989. With ideal data, we could assign the mean deduction for each category of taxpayer to the census data. However, administrative data such as that in the SOI only reports deductions if the family actually itemized. If the family had some potentially itemizable deductions, but chose to take the standard deduction instead, we observe none of their potential deductions. Since only families with a lot of deductions itemize, it is unlikely that the mean of the observed deductions, conditional on having any, is the same as the unconditional mean (which is the value we wish to impute).

There are two reasons why we might not observe any deductions in a particular category. The first, which has already been mentioned, is that deductions are observed only if the taxpayer has enough total deductions to make itemization worthwhile. The second is that a taxpayer may not want or have deductions in any one category even if his total deductions across categories are sufficient to make itemization worthwhile. Each factor generates the need for a sample selection correction of its own.

Thus, we would like to estimate the following,

(A.1) $D_{ij} = \alpha_0 + \alpha_1 * f(AGI_i) + \alpha_2 * FSTAT_i + \alpha_3 * CHILD_i + \varepsilon_{ij}$

where D_{ij} are the deductions for family *i* in category *j*, $f(AGI_i)$ is a nonlinear function of adjusted gross income (AGI),[39] FSTAT represents the family's tax filing status, and CHILD corresponds to whether the family has children. However, we do not observe D_j. Instead, we observe D^*_j which equals D_j under the following conditions:

$D^*_j = D_j$ if $\Sigma D_j >$ standard deduction and $D_j > 0$

(A.2) D^*_j = 0 if ΣD_j > standard deduction and $D_j \neq 0$

D^*_j is not observed otherwise ($\Sigma D_j \leq$ standard deduction).

Our imputation problem arises for two reasons. First, $E[D^*_j] \neq E[D_j]$. Second, the sample of families for whom D_j is observed may have a different responsiveness of itemization to AGI, so that we would not be able to extrapolate our imputation out of the sample of itemizers. We, therefore, adopt the following strategy. The first step involves using the SOI data to estimate whether a family itemizes. For the entire U.S., this is done via a probit for the following model,

(A.3) $I_k = \beta_0 + \beta_1 * f(AGI_k) + \beta_2 * FSTAT_k + \beta_3 * CHILD_k + \beta_4 * STATE_k + \eta_k$,

where I_k = 1 if family *k* itemizes and zero otherwise. The variable STATE is an indicator for the state of residence. It is included because state residence affects the probability of itemizing due to differences in state tax rates, but it should not independently affect the likelihood of having deductions in other categories or the amount of those deductions.

The second step in the imputation procedure requires constructing the inverse Mills ratio for each family *k*. For future reference, this is labeled as

(A.4) $\hat{\lambda}(I_k) = \varphi(X_k \hat{\beta})/\Phi(X_k \hat{\beta})$,

where X_k is the vector of right-hand side variables from equation (A.3). The next step involves using a probit with the SOI data to estimate equation (A.5) for the entire U.S.,

(A.5) $C_{jk} = \gamma_0 + \gamma_1 * f(AGI_k) + \gamma_2 * FSTAT_k + \gamma_3 * CHILD_k + \gamma_4 * \hat{\lambda}(I_k) + \varsigma_k$,

where C_{jk}=1 if family k has positive deductions in category *j* and $\hat{\lambda}(I_k)$ is included to correct for sample selection in the pool of itemizers.

From equation (A.5), we can then construct $\hat{\lambda}(C_{jk}) = \varphi(Z_{jk} \hat{\gamma})/\Phi(Z_{jk} \hat{\gamma})$, where Z is the vector of right-hand side variables in (A.5). We estimate equation (A.6) via OLS, (A.6) $D_{jk} = \delta_0 + \delta_1 * f(AGI_k) + \delta_2 * FSTAT_k + \delta_3 * CHILD_k + \delta_4 * \hat{\lambda}(I_k) + \delta_5 * \hat{\lambda}(C_{jk}) + \varepsilon_{jk}$.

In this specification, $\hat{\lambda}$(I) corrects for sample selection due to only observing itemizers and $\hat{\lambda}$(C) corrects for the selection arising from the decision to itemize in a given category.[40]

To impute to the census data, we apply the estimates from the SOI to the census data and construct λ_{Io} and λ_{Co} values for each census family *i*. Next, the value for C_{ji}, the probability of having a deduction in category *j* is imputed, where *j* corresponds to deductible medical expenses, charitable giving, deductible interest expenses, or other deductible expenses. We then pick a random number from the uniform distribution on the interval [0,1] for each family. If that number is less than C_{ji}, we predict the amount D_{ji}, the amount of deductions in category *j*, and impute it to the family. If the random number is greater than C_{ji}, we impute zero as the amount of deductions.

Appendix 2: Value of Housing-Related Tax Benefits, by Metropolitan Area
Gross and Net of Mean Program Costs

	Proportional Financing					
	[1]	*[2]*	*[3]*	*[4]*	*[5]*	*[6]*
MSA Name	*Value of Tax Benefits Per Owner-Occupied Housing Unit*	*Net Transfer by MSA*	*Value of Net Tax Benefits Per Owner-Occupied Housing Unit*	*Net Transfer by MSA*	*Ratio of Perpetuity Value of Tax Benefit to Mean House Price (CAPSUB)*	*Ratio of Tax Benefit to Mean Income (INCSUB)*
Abilene	$1,049	-$60,086,892	-$106	-$20,517,732	0.15	0.03
Albany	$1,705	-$329,695,677	$291	-$106,001,095	0.22	0.05
Albany	$3,208	-$11,171,394	$988	-$16,142,252	0.27	0.08
Albuquerque	$2,381	-$122,027,236	$655	-$41,256,766	0.24	0.07
Alexandria	$1,107	-$60,733,277	-$32	-$17,720,437	0.18	0.04
Allentown	$2,743	-$25,629,208	$664	-$22,610,120	0.22	0.07
Altoona	$1,011	-$68,335,090	-$155	-$21,766,700	0.18	0.04
Anchorage	$2,821	-$47,131,076	$448	-$70,040,829	0.23	0.05
Anniston	$1,158	-$54,246,150	-$81	-$17,883,369	0.19	0.04
Appleton	$1,856	-$91,121,688	-$86	-$73,810,665	0.24	0.05
Asheville	$1,886	-$57,181,870	$200	-$26,079,059	0.24	0.06
Athens	$1,970	-$47,513,454	$596	-$13,805,834	0.22	0.06
Atlanta	$3,254	-$49,602,399	$782	-$467,223,821	0.27	0.07
Austin	$2,005	-$343,482,945	$662	-$100,608,534	0.18	0.05
Bakersfield	$2,396	-$119,152,139	$729	-$42,723,898	0.23	0.06
Bangor	$1,842	-$177,199,101	$143	-$93,034,730	0.24	0.05
Barnstable	$5,907	$169,873,701	$2,948	$103,206,405	0.29	0.15
Baton Rouge	$1,556	-$195,220,977	-$19	-$99,831,346	0.20	0.04
Beaumont	$963	-$190,371,594	-$248	-$72,374,435	0.16	0.03
Bellingham	$2,363	-$27,346,020	$792	-$2,155,007	0.20	0.06
Benton Harbor	$1,681	-$56,794,436	$47	-$28,726,504	0.22	0.05
Billings	$1,629	-$46,020,539	$19	-$24,395,668	0.22	0.05
Biloxi	$1,351	-$129,072,848	$102	-$36,086,470	0.20	0.05
Binghamton	$2,281	-$54,300,094	$316	-$41,541,594	0.24	0.06
Birmingham	$1,818	-$269,818,237	$45	-$168,152,610	0.21	0.05
Bismarck	$1,323	-$37,483,247	$42	-$12,481,900	0.19	0.04
Bloomington	$1,725	-$46,328,650	$340	-$13,404,908	0.19	0.05
Bloomington	$1,829	-$40,913,979	$61	-$28,497,056	0.22	0.05
Boise City	$1,851	-$88,386,545	$40	-$57,936,624	0.24	0.05
Boston-Worcester-Lawrence	$6,101	$3,073,093,452	$3,049	$1,209,587,489	0.28	0.12
Brownsville	$840	-$114,133,158	$105	-$14,482,046	0.14	0.03
Bryan	$1,497	-$60,846,225	$684	-$6,969,221	0.16	0.05
Buffalo	$2,191	-$311,580,608	$378	-$183,341,804	0.24	0.06

Burlington	$3,175	$1,268,855	$892	-$11,052,134	0.27	0.07
Canton	$1,430	-$160,635,084	-$146	-$83,862,866	0.20	0.04
Casper	$1,048	-$32,284,037	-$193	-$12,167,689	0.16	0.03
Cedar Rapids	$1,956	-$45,904,754	-$107	-$44,005,436	0.25	0.05
Champaign	$1,912	-$65,486,148	$442	-$26,222,609	0.20	0.05
Charleston	$2,295	-$46,198,321	$598	-$6,842,495	0.24	0.07
Charleston	$1,423	-$203,551,575	-$122	-$109,139,627	0.21	0.04
Charlotte	$2,515	-$177,424,947	$341	-$213,638,080	0.26	0.06
Charlottesville	$3,280	-$6,890,238	$1,168	-$7,823,371	0.25	0.08
Chattanooga	$1,502	-$167,918,270	$67	-$62,735,043	0.20	0.04
Cheyenne	$1,360	-$34,070,360	$109	-$10,334,131	0.16	0.04
Chicago-Gary-Kenosha	$3,803	$813,917,824	$1,285	-$406,439,424	0.23	0.08
Chico-Paradise	$2,643	-$34,325,553	$1,198	$11,999,147	0.23	0.08
Cincinatti-Hamilton	$2,189	-$445,958,105	$197	-$379,177,346	0.23	0.05
Clarksville-Hopkinsville	$1,171	-$76,579,508	$192	-$15,516,810	0.19	0.04
Cleveland-Akron	$2,116	-$723,822,056	$114	-$625,692,769	0.21	0.05
Colorado Springs	$2,318	-$106,305,763	$635	-$47,540,967	0.21	0.06
Columbia	$1,797	-$147,674,885	$409	-$33,228,882	0.21	0.05
Columbia	$2,278	-$34,877,187	$321	-$29,281,823	0.25	0.06
Columbus	$1,676	-$547,793,103	$309	-$179,880,934	0.22	0.05
Columbus	$2,188	-$74,142,954	$357	-$50,564,887	0.22	0.05
Corpus Christi	$1,210	-$161,566,378	$163	-$38,037,437	0.16	0.04
Cumberland	$1,204	-$48,134,555	-$59	-$15,584,916	0.21	0.04
Dallas-Fort Worth	$2,268	-$1,120,339,576	$531	-$596,457,366	0.19	0.05
Danville	$1,226	-$52,512,089	-$83	-$19,407,039	0.21	0.04
Davenport-Moline	$1,461	-$148,774,436	-$153	-$83,975,632	0.22	0.04
Daytona Beach	$1,602	-$153,337,387	$235	-$34,075,010	0.17	0.05
Dayton-Springfield	$1,846	-$317,646,311	$29	-$217,932,444	0.22	0.05
Decatur	$1,352	-$52,710,036	-$184	-$27,143,216	0.21	0.04
Decatur	$1,274	-$56,459,771	-$360	-$33,940,455	0.20	0.03
Denver-Boulder-Greeley	$2,708	-$321,107,575	$508	-$404,731,490	0.25	0.06
Des Moines	$1,978	-$117,072,482	$13	-$97,768,249	0.26	0.05
Detroit-Ann Arbor-Flint	$2,589	-$552,207,244	$146	-$1,221,994,757	0.25	0.06
Dothan	$1,129	-$21,338,163	-$12	-$6,157,833	0.20	0.04
Dover	$2,363	-$17,727,801	$447	-$10,790,772	0.27	0.07
Dubuque	$1,655	-$27,722,073	-$113	-$17,872,613	0.24	0.05
Duluth-Superior	$1,217	-$111,857,663	-$288	-$56,677,819	0.23	0.04
Eau Claire	$1,248	-$22,267,776	-$233	-$10,597,515	0.21	0.04
El Paso	$1,210	-$238,914,225	$219	-$46,739,984	0.14	0.04
Elkhart-Goshen	$1,572	-$54,238,945	-$282	-$40,805,674	0.21	0.04
Elmira	$1,639	-$34,071,884	$22	-$17,387,639	0.22	0.05
Enid	$1,027	-$31,386,594	-$163	-$10,971,461	0.19	0.03
Erie	$1,359	-$115,521,676	-$103	-$52,242,781	0.19	0.04
Eugene-Springfield	$2,169	-$85,837,693	$628	-$24,755,759	0.25	0.06
Evansville-Springfield	$1,445	-$118,942,083	-$157	-$65,745,668	0.20	0.04
Fargo-Moorhead	$1,604	-$65,323,909	$239	-$23,868,378	0.21	0.05

Fayetteville	$1,710	-$100,457,384	$329	-$35,642,715	0.23	0.05
Fayetteville-Springdale	$1,559	-$84,605,626	$133	-$31,031,011	0.23	0.05
Florence	$1,235	-$59,499,992	-$132	-$22,722,084	0.20	0.04
Florence	$1,488	-$41,369,030	-$62	-$19,770,010	0.22	0.05
Fort Collins-Loveland	$2,306	-$45,079,917	$497	-$25,159,379	0.23	0.06
Fort Myers-Cape Coral	$2,505	-$38,888,725	$686	-$1,547,517	0.19	0.07
Fort Pierce	$2,825	-$2,638,385	$710	-$4,902,192	0.20	0.07
Fort Smith	$1,217	-$83,342,074	-$32	-$27,154,636	0.21	0.04
Fort Walton Beach	$1,676	-$55,416,108	$393	-$12,476,226	0.18	0.05
Fort Wayne	$1,512	-$165,765,480	-$397	-$134,898,155	0.20	0.04
Fresno	$2,551	-$168,098,634	$937	-$49,285,758	0.22	0.07
Gadsden	$1,035	-$50,581,630	-$242	-$19,333,001	0.19	0.04
Gainesville	$1,502	-$87,930,035	$368	-$21,461,952	0.17	0.04
Glens Falls	$2,686	-$7,437,483	$768	$23,898	0.26	0.08
Goldsboro	$1,522	-$41,747,470	$241	-$11,913,596	0.22	0.05
Grand Forks	$1,352	-$46,894,868	$223	-$12,181,571	0.20	0.04
Grand Rapids-Meskegon	$1,989	-$209,796,928	-$72	-$199,192,050	0.24	0.05
Great Falls	$1,520	-$32,976,104	$50	-$14,514,382	0.21	0.05
Green Bay	$1,846	-$62,779,131	-$24	-$46,869,806	0.24	0.05
Greensboro-Winston-Salem	$2,219	-$242,294,445	$187	-$217,661,284	0.25	0.06
Greenville	$1,927	-$39,053,360	$496	-$12,437,920	0.24	0.06
Greenville-Spartenburg	$1,717	-$278,079,747	$15	-$156,149,120	0.23	0.05
Harrisburg-Lebanon-Carlisle	$1,901	-$177,296,029	$127	-$105,423,707	0.21	0.05
Hartford	$5,950	$621,116,725	$2,929	$284,877,466	0.28	0.11
Hickory-Morganton	$1,684	-$92,843,100	-$68	-$54,929,293	0.24	0.05
Honolulu	$12,362	$1,173,325,940	$8,282	$690,969,789	0.36	0.22
Houma	$1,078	-$78,883,360	-$69	-$21,325,678	0.18	0.04
Houston-Galveston	$1,958	-$1,304,692,657	$327	-$692,509,504	0.18	0.04
Huntington-Ashland	$1,126	-$153,132,169	-$157	-$56,518,228	0.19	0.04
Huntsville	$2,000	-$83,077,051	$31	-$69,422,823	0.23	0.05
Indianapolis	$1,859	-$469,569,680	-$48	-$371,941,699	0.21	0.05
Iowa City	$2,569	-$26,111,531	$769	-$15,754,973	0.26	0.06
Jackson	$1,495	-$153,883,437	-$306	-$113,318,409	0.22	0.04
Jackson	$1,681	-$46,281,023	$50	-$21,454,318	0.21	0.05
Jackson	$1,232	-$37,931,177	$84	-$10,039,952	0.18	0.04
Jacksonville	$1,723	-$332,956,805	$228	-$128,904,971	0.18	0.05
Jacksonville	$1,539	-$44,815,643	$402	-$9,128,196	0.22	0.05
Jamestown	$1,416	-$60,117,217	$59	-$20,670,259	0.22	0.05
Janesville-Beloit	$1,529	-$54,835,892	-$238	-$37,896,162	0.23	0.04
Johnston City-Kingsport	$1,154	-$211,390,529	-$18	-$54,876,134	0.18	0.04
Johnstown	$940	-$127,370,178	-$163	-$36,898,384	0.17	0.03
Joplin	$1,065	-$70,393,872	-$79	-$20,180,032	0.20	0.04
Kalamazoo-Battle Creek	$1,670	-$152,572,753	-$98	-$100,431,927	0.23	0.05
Kansas City	$1,954	-$480,891,844	-$9	-$402,845,271	0.23	0.05
Killeen-Temple	$1,183	-$99,876,295	$290	-$18,916,936	0.15	0.04
Knoxville	$1,528	-$239,619,544	$137	-$78,421,738	0.18	0.04

Kokomo	$1,293	-$40,129,785	-$444	-$27,566,890	0.20	0.04
La Crosse	$1,618	-$44,669,650	$44	-$22,172,038	0.23	0.05
Lafayette	$1,110	-$162,517,238	$13	-$42,041,937	0.18	0.04
Lafayette	$1,637	-$59,163,716	$165	-$26,083,558	0.20	0.04
Lake Charles	$1,249	-$72,873,796	-$111	-$28,862,568	0.19	0.04
Lakeland-Winter Haven	$1,335	-$177,389,461	$64	-$50,865,713	0.16	0.04
Lancaster	$2,328	-$72,252,687	$424	-$43,952,306	0.22	0.06
Lansing-E. Lansing	$2,007	-$121,216,151	$71	-$97,026,283	0.24	0.05
Laredo	$1,020	-$50,844,751	$266	-$4,730,668	0.13	0.04
Las Cruces	$1,774	-$41,312,827	$549	-$2,800,297	0.22	0.06
Las Vegas	$2,196	-$285,813,588	$712	-$88,640,597	0.19	0.05
Lawrence	$1,719	-$35,691,496	$500	-$9,519,154	0.20	0.05
Lawton	$1,269	-$49,943,374	$185	-$12,064,014	0.19	0.04
Lewiston-Auburn	$2,255	-$27,876,445	$736	-$4,869,154	0.24	0.07
Lexington	$2,054	-$125,985,074	$519	-$49,171,884	0.23	0.06
Lima	$1,373	-$60,127,175	-$245	-$33,911,010	0.20	0.04
Lincoln	$1,845	-$80,221,084	$248	-$39,395,210	0.22	0.05
Little Rock	$1,754	-$183,848,640	$154	-$88,812,970	0.23	0.05
Longview	$1,018	-$100,226,159	-$89	-$29,088,797	0.15	0.03
L.A.-Riverside-Orange County	$8,810	$13,095,055,748	$5,585	$7,598,213,583	0.31	0.17
Louisville	$1,698	-$335,157,262	-$57	-$216,138,752	0.22	0.05
Lubbock	$1,227	-$111,963,163	$116	-$32,178,967	0.16	0.04
Lynchburg	$1,738	-$59,940,560	$42	-$31,305,364	0.23	0.05
Macon	$1,737	-$104,737,046	$68	-$59,957,967	0.23	0.05
Madison	$2,546	-$90,735,911	$528	-$80,540,255	0.26	0.06
Mansfield	$1,205	-$81,874,326	-$210	-$37,258,739	0.20	0.04
McAllen-Edinburg	$745	-$162,171,978	$32	-$19,594,012	0.13	0.03
Medford-Ashland	$2,560	-$23,066,147	$971	$5,756,185	0.26	0.08
Melbourne-Titusville-Palm Bay	$2,020	-$110,699,327	$349	-$43,091,363	0.19	0.05
Memphis	$1,853	-$342,348,203	$332	-$134,738,741	0.19	0.05
Merced	$2,588	-$38,331,301	$1,223	$2,005,324	0.24	0.08
Miami-Fort Lauderdale	$2,945	-$379,444,718	$1,158	-$10,522,730	0.19	0.07
Milwaukee-Racine	$2,596	-$311,748,993	$494	-$317,941,618	0.24	0.06
Minneapolis-St. Paul	$2,948	-$50,697,278	$246	-$633,344,477	0.28	0.06
Mobile	$1,459	-$187,130,483	$39	-$70,574,625	0.20	0.05
Modesto	$3,883	$32,522,621	$1,950	$52,467,130	0.26	0.10
Monroe	$1,211	-$65,984,101	-$7	-$21,869,474	0.18	0.04
Montgomery	$1,640	-$103,559,553	$41	-$51,835,832	0.22	0.05
Muncie	$1,083	-$60,750,147	-$261	-$27,385,795	0.18	0.03
Myrtle Beach	$2,153	-$33,882,291	$577	-$5,188,109	0.24	0.07
Naples	$5,247	$98,716,987	$2,111	$34,742,442	0.23	0.10
Nashville	$2,177	-$267,405,919	$512	-$107,405,032	0.20	0.05
New London-Norwich	$4,637	$122,694,484	$2,344	$96,499,575	0.26	0.10
New Orleans	$1,781	-$476,123,163	$357	-$167,595,692	0.19	0.05
New York-N. New Jersey	$7,889	$14,897,463,230	$4,567	$6,834,086,427	0.29	0.14
Non-MSA Alabama	$989	-$711,540,393	-$112	-$192,391,234	0.19	0.04

Non-MSA Alaska	$2,055	-$83,528,339	$63	-$73,436,919	0.22	0.04
Non-MSA Arizona	$1,682	-$170,055,425	$398	-$20,769,488	0.21	0.06
Non-MSA Arkansas	$1,029	-$659,878,180	-$42	-$159,786,869	0.21	0.04
Non-MSA California	$3,056	-$40,391,231	$1,402	$111,195,621	0.24	0.09
Non-MSA Colorado	$2,002	-$177,581,228	$545	-$29,568,686	0.21	0.06
Non-MSA Delaware	$2,636	-$319,208	$624	$3,164,663	0.27	0.08
Non-MSA Florida	$1,557	-$315,414,088	$269	-$33,330,139	0.17	0.05
Non-MSA Georgia	$1,394	-$840,061,394	$83	-$247,977,766	0.22	0.05
Non-MSA Hawaii	$6,560	$163,377,688	$3,941	$115,748,281	0.33	0.16
Non-MSA Idaho	$1,585	-$243,125,055	$143	-$80,460,237	0.23	0.05
Non-MSA Illinois	$1,024	-$950,574,525	-$232	-$359,945,739	0.19	0.03
Non-MSA Indiana	$1,175	-$755,152,969	-$362	-$405,152,997	0.19	0.04
Non-MSA Iowa	$1,175	-$737,184,223	-$174	-$296,200,119	0.23	0.04
Non-MSA Kansas	$926	-$607,020,620	-$212	-$203,838,752	0.19	0.03
Non-MSA Kentucky	$981	-$601,031,664	-$70	-$143,862,421	0.20	0.04
Non-MSA Louisiana	$870	-$519,976,356	-$70	-$108,421,623	0.17	0.04
Non-MSA Maine	$2,083	-$110,594,941	$502	-$7,210,198	0.24	0.07
Non-MSA Maryland	$2,897	-$6,052,436	$866	$1,597,478	0.26	0.08
Non-MSA Massachusetts	$10,096	$36,486,514	$6,358	$23,805,219	0.33	0.23
Non-MSA Michigan	$1,281	-$646,671,949	-$106	-$233,860,604	0.21	0.04
Non-MSA Minnesota	$1,254	-$570,329,781	-$191	-$242,658,962	0.23	0.04
Non-MSA Mississippi	$945	-$881,726,487	-$54	-$193,003,036	0.18	0.04
Non-MSA Missouri	$952	-$837,936,480	-$92	-$210,622,761	0.19	0.04
Non-MSA Montana	$1,388	-$265,503,186	$93	-$81,371,091	0.21	0.05
Non-MSA Nebraska	$1,005	-$406,883,986	-$89	-$114,076,992	0.19	0.04
Non-MSA Nevada	$2,022	-$53,077,077	$502	-$13,101,430	0.19	0.05
Non-MSA New Hampshire	$2,954	-$1,316,808	$1,279	$46,698,243	0.23	0.08
Non-MSA New Jersey	$5,286	$166,798,879	$2,081	$36,848,392	0.26	0.10
Non-MSA New Mexico	$1,319	-$265,583,425	$222	-$37,437,292	0.21	0.05
Non-MSA New York	$2,118	-$327,389,103	$470	-$93,483,269	0.24	0.06
Non-MSA North Carolina	$1,565	-$795,461,431	$77	-$285,100,749	0.23	0.05
Non-MSA North Dakota	$889	-$188,082,972	-$99	-$45,732,103	0.18	0.03
Non-MSA Ohio	$1,231	-$861,976,430	-$175	-$361,640,531	0.20	0.04
Non-MSA Oklahoma	$899	-$701,076,377	-$133	-$183,808,893	0.19	0.03
Non-MSA Oregon	$1,905	-$278,841,043	$500	-$49,802,738	0.25	0.06
Non-MSA Pennsylvania	$1,214	-$842,553,420	-$59	-$255,565,251	0.18	0.04
Non-MSA South Carolina	$1,533	-$355,645,462	$76	-$116,737,218	0.22	0.05
Non-MSA South Dakota	$746	-$261,403,870	-$48	-$48,216,811	0.14	0.03
Non-MSA Tennessee	$879	-$852,451,401	-$43	-$156,844,433	0.16	0.03
Non-MSA Texas	$879	-$1,609,393,887	-$81	-$360,969,920	0.15	0.03
Non-MSA Utah	$1,572	-$111,509,613	$58	-$42,560,803	0.22	0.05
Non-MSA Vermont	$2,382	-$61,533,187	$665	-$6,772,255	0.25	0.07
Non-MSA Virginia	$1,567	-$495,305,545	$142	-$143,522,184	0.22	0.05
Non-MSA Washington	$1,435	-$359,475,075	$272	-$64,249,687	0.17	0.05
Non-MSA West Virginia	$954	-$539,317,187	-$107	-$132,854,810	0.18	0.04
Non-MSA Wisconsin	$1,377	-$658,260,432	-$113	-$291,317,337	0.21	0.04

Non-MSA Wyoming	$1,217	-$146,905,395	$18	-$43,012,387	0.16	0.04
Norfolk-Virginia Beach-Newport News	$2,693	-$232,445,002	$852	-$105,953,431	0.24	0.07
Ocala	$1,275	-$88,960,402	$128	-$14,703,557	0.16	0.04
Odessa-Midland	$1,207	-$105,156,303	-$92	-$40,947,468	0.16	0.03
Oklahoma City	$1,490	-$417,772,096	-$9	-$199,462,306	0.20	0.04
Omaha	$1,811	-$218,894,678	$59	-$137,726,078	0.22	0.05
Orlando	$2,129	-$331,612,683	$516	-$111,579,901	0.19	0.05
Owensboro	$1,332	-$38,964,631	-$23	-$14,549,603	0.22	0.04
Panama City	$1,356	-$55,998,552	$182	-$12,360,563	0.16	0.04
Parkersburg-Marietta	$1,208	-$68,981,648	-$220	-$30,746,269	0.20	0.04
Pensacola	$1,322	-$154,161,295	$95	-$43,306,725	0.16	0.04
Peoria-Pekin	$1,475	-$140,343,970	-$191	-$85,485,577	0.21	0.04
Philadelphia-Wilmington-Atlantic City	$3,416	$618,916,778	$873	-$349,775,946	0.24	0.08
Phoenix-Mesa	$2,614	-$369,431,325	$579	-$322,660,027	0.24	0.06
Pine Bluff	$1,186	-$38,351,430	-$81	-$13,891,187	0.22	0.04
Pittsburg	$1,615	-$902,552,674	-$37	-$487,554,831	0.20	0.05
Pittsfield	$3,545	$11,434,763	$1,329	$4,683,541	0.25	0.09
Portland	$4,060	$99,177,896	$1,709	$58,713,295	0.28	0.10
Portland-Salem	$2,493	-$369,268,189	$597	-$235,215,862	0.26	0.06
Providence-Fall River-Warwick	$4,327	$274,770,541	$2,137	$219,712,367	0.26	0.10
Provo-Orem	$1,902	-$59,214,229	$276	-$27,466,864	0.22	0.05
Pueblo	$1,228	-$59,372,369	$3	-$18,625,748	0.19	0.04
Punta Gorda	$1,894	-$28,486,840	$327	-$3,148,842	0.17	0.06
Raleigh-Durham-Chapel Hill	$2,917	-$104,774,286	$747	-$130,673,130	0.27	0.07
Rapid City	$1,193	-$39,826,808	$57	-$11,509,283	0.15	0.04
Reading	$2,148	-$64,727,318	$174	-$49,743,833	0.21	0.05
Redding	$2,525	-$25,803,503	$984	$4,994,728	0.23	0.08
Reno	$3,005	-$46,896,884	$1,250	-$12,705,979	0.20	0.07
Richland-Kennewick-Pasco	$1,399	-$66,672,605	$24	-$27,609,231	0.17	0.04
Richmond-Petersburg	$2,641	-$119,664,986	$344	-$187,385,418	0.25	0.06
Roanoke	$2,033	-$63,962,321	$217	-$39,263,753	0.24	0.06
Rochester	$2,391	-$183,900,073	-$212	-$385,532,457	0.27	0.05
Rochester	$2,756	-$4,048,084	$394	-$14,886,301	0.25	0.06
Rockford	$1,633	-$120,361,572	-$198	-$87,873,897	0.21	0.04
Rocky Mount	$1,549	-$54,828,206	$133	-$21,549,420	0.23	0.05
Sacramento-Yolo	$4,914	$456,818,453	$2,573	$319,555,315	0.28	0.11
Saginaw-Bay City-Midland	$1,517	-$144,290,007	-$349	-$110,742,651	0.22	0.04
Salinas	$8,547	$256,405,058	$5,815	$185,458,483	0.30	0.18
Salt Lake City-Ogden	$2,103	-$228,956,699	$104	-$196,671,882	0.24	0.05
San Angelo	$1,084	-$50,631,530	$51	-$12,914,672	0.15	0.03
San Antonio	$1,467	-$553,806,699	$254	-$152,843,033	0.16	0.04
San Francisco-Oakland-San Jose	$9,888	$11,065,865,390	$6,314	$6,362,559,625	0.33	0.18
San Luis Obispo	$8,175	$223,733,915	$5,536	$180,131,308	0.31	0.20
Santa Barbara-Santa Maria-Lompoc	$10,663	$486,769,913	$7,254	$319,251,415	0.31	0.21
Santa Fe	$4,382	$41,365,969	$1,704	$15,117,494	0.30	0.10
Sarasota-Bradenton	$2,537	-$48,098,671	$640	-$6,297,417	0.19	0.07

Savannah	$2,082	-$73,025,378	$363	-$38,373,544	0.23	0.06
Scranton-Wilkes Barre-Hazleton	$1,524	-$251,808,151	$160	-$73,835,360	0.19	0.05
Seattle-Tacoma-Bremerton	$3,597	$141,768,360	$1,589	$236,942,627	0.22	0.08
Sharon	$1,735	-$33,816,301	-$125	-$24,822,526	0.24	0.05
Sherman-Denison	$1,049	-$50,010,996	-$131	-$16,550,604	0.16	0.03
Shreveport-Bossier City	$1,294	-$169,900,464	$6	-$58,741,459	0.18	0.04
Sioux City	$1,323	-$50,801,176	-$180	-$25,622,257	0.23	0.04
Sioux Falls	$1,322	-$66,180,443	$23	-$24,209,111	0.16	0.04
South Bend	$1,417	-$95,730,698	-$375	-$68,509,773	0.20	0.04
Spokane	$1,347	-$169,120,849	$62	-$57,097,938	0.16	0.04
Springfield	$1,705	-$97,634,315	-$94	-$67,826,547	0.21	0.04
Springfield	$1,495	-$82,230,696	$72	-$31,601,024	0.20	0.05
Springfield	$3,568	$28,723,973	$1,399	$9,710,916	0.25	0.09
St. Cloud	$1,585	-$48,657,807	-$69	-$26,645,847	0.24	0.05
St. Joseph	$1,139	-$48,288,763	-$128	-$17,436,553	0.21	0.04
St. Louis	$2,261	-$485,796,258	$135	-$517,118,545	0.23	0.06
State College	$1,838	-$38,925,625	$382	-$12,883,069	0.20	0.05
Steubenville-Weirton	$1,027	-$72,532,347	-$342	-$32,726,576	0.20	0.03
Stockton-Lodi	$4,030	$35,003,023	$2,102	$61,028,695	0.26	0.10
Sumter	$1,312	-$40,613,898	$72	-$12,672,651	0.20	0.05
Syracuse	$2,330	-$142,147,236	$298	-$125,910,669	0.25	0.06
Tallahassee	$1,616	-$99,528,920	$215	-$38,552,458	0.17	0.04
Tampa-St. Petersburg-Clearwater	$1,829	-$710,333,989	$362	-$174,125,688	0.18	0.05
Terre Haute	$982	-$76,775,031	-$357	-$34,861,948	0.18	0.03
Texarkana	$1,046	-$60,531,482	-$121	-$19,274,331	0.18	0.03
Toledo	$1,776	-$207,893,083	-$48	-$146,189,504	0.21	0.05
Topeka	$1,514	-$68,682,995	-$123	-$39,761,336	0.21	0.04
Tucson	$2,182	-$196,050,947	$568	-$73,584,455	0.21	0.06
Tulsa	$1,603	-$286,242,291	$7	-$149,357,591	0.21	0.04
Tuscaloosa	$1,465	-$64,720,036	$119	-$23,871,057	0.20	0.05
Tyler	$1,390	-$66,299,518	$118	-$19,725,893	0.17	0.04
Utica-Rome	$1,966	-$89,076,345	$334	-$35,788,273	0.23	0.06
Victoria	$1,185	-$34,860,909	-$69	-$12,859,220	0.16	0.03
Visalia-Tulare-Porterville	$2,117	-$79,882,933	$739	-$10,453,019	0.22	0.06
Waco	$1,175	-$98,011,997	$131	-$24,503,111	0.16	0.04
Washington D.C.-Baltimore	$5,773	$3,771,980,936	$2,429	$688,822,621	0.30	0.10
Waterloo-Cedar Falls	$1,438	-$53,129,200	-$115	-$27,765,479	0.23	0.04
Wausau	$1,539	-$39,091,775	-$340	-$30,253,245	0.23	0.04
West Palm Beach-Boca Raton	$3,854	$227,395,246	$1,237	$45,054,788	0.21	0.08
Wheeling	$1,082	-$81,541,059	-$161	-$28,557,530	0.19	0.04
Wichita	$1,557	-$201,804,694	-$121	-$124,491,918	0.21	0.04
Wichita Falls	$1,050	-$68,458,768	$26	-$16,878,231	0.15	0.03
Williamsport	$1,281	-$53,991,484	-$6	-$17,776,216	0.18	0.04
Wilmington	$2,361	-$31,621,226	$479	-$17,468,796	0.25	0.07
Yakima	$1,144	-$90,362,866	$65	-$23,659,669	0.15	0.04
York	$1,963	-$81,479,122	$26	-$61,582,182	0.21	0.05

Youngstown-Warren	$1,246	-$269,329,469	-$224	-$127,683,612	0.19	0.04
Yuba City	$2,319	-$30,585,591	$921	-$2,108,635	0.23	0.07
Yuma	$1,582	-$34,651,928	$193	-$10,462,020	0.21	0.05

Appendix Table 3-A: Selected Rank-Ordered MSA Names for Metropolitan Area Figures (number 312 has the lowest value)

Rank	Figures 5,6	Figures 7,9	Figures 8,10
312	McAllen-Edinburg	Kokomo	Detroit-Ann Arbor-Flint
311	Non-MSA South Dakota	Fort Wayne	Houston-Galveston
310	Brownsville	South Bend	Minneapolis-St. Paul
309	Non-MSA Louisiana	Non-MSA Indiana	Cleveland-Akron
308	Non-MSA Tennessee	Decatur	Dallas-Fort Worth
307	Non-MSA Texas	Terre Haute	St. Louis
306	Non-MSA North Dakota	Saginaw-Bay City-Midland	Pittsburg
305	Non-MSA Oklahoma	Steubenville-Weirton	Atlanta
304	Non-MSA Kansas	Wausau	Chicago-Gary-Kenosha
303	Johnstown	Jackson	Non-MSA Indiana
302	Non-MSA Mississippi	Duluth-Superior	Denver-Boulder-Greeley
301	Non-MSA Missouri	Elkhart-Goshen	Kansas City
300	Non-MSA West Virginia	Muncie	Rochester
299	Beaumont	Beaumont	Cincinnati-Hamilton
298	Non-MSA Kentucky	Lima	Indianapolis
297	Terre Haute	Gadsden	Non-MSA Ohio
296	Non-MSA Alabama	Janesville-Beloit	Non-MSA Texas
295	Non-MSA Nebraska	Eau Claire	Non-MSA Illinois
294	Altoona	Non-MSA Illinois	Philadelphia-Wilmington-Atl. City
293	Longview	Youngstown-Warren	Phoenix-Mesa
292	Laredo	Parkersburg-Marietta	Milwaukee-Racine
291	Non-MSA Illinois	Non-MSA Kansas	Non-MSA Iowa
290	Enid	Rochester	Non-MSA Wisconsin
289	Steubenville-Weirton	Mansfield	Non-MSA North Carolina
288	Non-MSA Arkansas	Rockford	Non-MSA Pennsylvania
…	…	…	…
25	Seattle-Tacoma-Bremerton	Springfield	Non-MSA Massachusetts
24	Chicago-Gary-Kenosha	Non-MSA California	Naples
23	West Palm Beach-Boca Raton	Seattle-Tacoma-Bremerton	Non-MSA New Jersey
22	Modesto	Santa Fe	West Palm Beach-Boca Raton
21	Stockton-Lodi	Portland	Non-MSA New Hampshire
20	Portland	Modesto	Modesto
19	Providence-Fall River-Warwick	Non-MSA New Jersey	Portland
18	Santa Fe	Stockton-Lodi	Stockton-Lodi
17	New London-Norwich	Naples	New London-Norwich
16	Sacramento-Yolo	Providence-Fall River-Warwick	Barnstable
15	Naples	New London-Norwich	Non-MSA California
14	Non-MSA New Jersey	Washington D.C.-Baltimore	Non-MSA Hawaii
13	Washington D.C.-Baltimore	Sacramento-Yolo	San Luis Obispo
12	Barnstable	Hartford	Salinas
11	Hartford	Barnstable	Providence-Fall River-Warwick
10	Boston-Worcester-Lawrence	Boston-Worcester-Lawrence	Seattle-Tacoma-Bremerton
9	Non-MSA Hawaii	Non-MSA Hawaii	Hartford
8	New York-N. New Jersey	New York-N. New Jersey	Santa Barbara-Santa Maria-Lompoc
7	San Luis Obispo	San Luis Obispo	Sacramento-Yolo
6	Salinas	L.A.-Riverside-Orange County	Washington D.C.-Baltimore
5	L.A.-Riverside-Orange County	Salinas	Honolulu
4	San Francisco-Oakland-San Jose	San Francisco-Oakland-San Jose	Boston-Worcester-Lawrence
3	Non-MSA Massachusetts	Non-MSA Massachusetts	San Francisco-Oakland-San Jose
2	Santa Barbara-Santa Maria-Lompoc	Santa Barbara-Santa Maria-Lompoc	New York-N. New Jersey
1	Honolulu	Honolulu	L.A.-Riverside-Orange County

Appendix Table 3-B: Selected Rank-Ordered MSA Names for Metropolitan Area Figures (number 312 has the lowest value)

Rank	Figure 12	Figure 13
312	Laredo	Non-MSA South Dakota
311	McAllen-Edinburg	Beaumont
310	Brownsville	Casper
309	El Paso	Abilene
308	Non-MSA South Dakota	McAllen-Edinburg
307	Rapid City	Non-MSA Texas
306	Killeen-Temple	Terre Haute
305	Wichita Falls	Non-MSA Kansas
304	Abilene	Sherman-Denison
303	Non-MSA Texas	Muncie
302	San Angelo	Non-MSA North Dakota
301	Longview	Longview
300	Yakima	Non-MSA Tennessee
299	Panama City	Brownsville
298	Waco	Victoria
297	Beaumont	Johnstown
296	Lubbock	Wichita Falls
295	Victoria	Steubenville-Weirton
294	Bryan	Non-MSA Oklahoma
293	Non-MSA Tennessee	Non-MSA Illinois
292	San Antonio	Decatur
291	Corpus Christi	Texarkana
290	Sioux Falls	Odessa-Midland
289	Odessa-Midland	San Angelo
288	Sherman-Denison	Enid
…	…	…
25	Madison	Springfield
24	Atlanta	Pittsfield
23	Burlington	Non-MSA California
22	Dover	Non-MSA New Jersey
21	Albany	Portland
20	Raleigh-Durham-Chapel Hill	Santa Fe
19	Rochester	Modesto
18	Non-MSA Delaware	Stockton-Lodi
17	Minneapolis-St. Paul	Naples
16	Hartford	Providence-Fall River-Warwick
15	Sacramento-Yolo	New London-Norwich
14	Portland	Washington D.C.-Baltimore
13	Boston-Worcester-Lawrence	Hartford
12	Barnstable	Sacramento-Yolo
11	New York-N. New Jersey	Boston-Worcester-Lawrence
10	Santa Fe	New York-N. New Jersey
9	Washington D.C.-Baltimore	Barnstable
8	Salinas	Non-MSA Hawaii
7	San Luis Obispo	L.A.-Riverside-Orange County
6	L.A.-Riverside-Orange County	Salinas
5	Santa Barbara-Santa Maria-Lompoc	San Francisco-Oakland-San Jose
4	San Francisco-Oakland-San Jose	San Luis Obispo
3	Non-MSA Massachusetts	Santa Barbara-Santa Maria-Lompoc
2	Non-MSA Hawaii	Honolulu
1	Honolulu	Non-MSA Massachusetts

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[1] A number of papers compute the distribution of the subsidy across income categories. Follain, Ling, and McGill (1993) and Poterba (1992) compare the distributions of the subsidy to the tax burden by income class using U.S. data, while Bourassa and Hendershott (1994) conduct a similar exercise for Australia. Follain and Ling (1991) and Follain and Melamed (1998) examine the distributional effect of eliminating the deductibility of mortgage interest.

[22] The mortgage interest and property tax deductions, in conjunction with the non-taxation of imputed rent, reduce the cost of owner-occupied housing relative to other investments [Hendershott and Slemrod (1983), Poterba (1984)], encourage home ownership and higher housing consumption [Rosen (1979), King (1980), Henderson and Ioannides (1989)], and perhaps even lead to overinvestment in the asset class [Mills (1987), Feldstein (1982), Hendershott and Hu (1983)]. The subsidy may raise house prices [Capozza, Green, and Hendershott (1996), Bruce and Holtz-Eakin (1998), Sinai (1998)] and encourage suburbanization [Gyourko and Voith (2002)]. The tax treatment of owner-occupied housing also favors high-income people or those who own expensive houses [Poterba (1992)]

[3] Our estimate is higher than others in the literature. See below for the details on what accounts for the differences.

[4] This notation assumes that the opportunity cost of tying up equity in a house is foregoing taxable returns. If the home owner were to invest in a tax-exempt asset instead, we assume the return would be $(1-\tau)r$ rather than r, yielding the same after-tax return. To the extent that the home owner has a lower tax rate than the marginal investor in municipal bonds, her opportunity cost of equity would be less than $(1-\tau)r$.

[5] The homeowner's financial position can be thought of as being long one house and short one bond (the mortgage). Thus, we can decompose the opportunity cost of being long the house as the riskless rate of return plus a premium that reflects the difference in risk between a bond position and an equivalent risk alternative to investing in housing. The difference between the mortgage interest rate and the equivalent duration riskless rate is reflected in the options to default on or prepay the mortgage. These options have value to the owner, so the premium above the riskless rate for borrowing is rolled into the mortgage rate as a cost.

[6] This specification treats capital gains on housing as untaxed and realized every year. Given that there now is a $250,000 capital gains exclusion ($500,000 for married couples filing jointly) that can be applied every other year, this is not unrealistic. Even in 1989, the assumption of no capital gains taxation on housing was valid for the vast majority of households.

[7] This also assumes accrual taxation of capital gains which when combined with statutory ordinary income and capital gains rates being equal (which was the case for top bracket households in 1989) allows us to focus on program benefits arising from differential tax treatment of ordinary income. As is made clear immediately below in the text, in this setting a dollar of house price appreciation has the same value to owner-occupiers and landlords, so there is no differential impact on user costs. For owner-occupiers, a dollar of capital gains reduces user costs by a dollar. For landlords, it may at first appear the benefit is less than a dollar because the gain is subject to tax. However, the assumption implicit in grouping the R_H' terms in equation (3) below is that rents fall commensurately with capital gains. This results in a lower tax on imputed rent that is just sufficient to make a dollar of gain for the landlord of equal value to that for an owner.

The problem becomes more complicated when taxation is upon realization and/or when statutory capital gains rates are less than ordinary income tax rates. In that case, it is straightforward to show that the tax benefit to a landlord of a dollar of capital gains is greater than for a homeowner despite the landlord facing a capital gains tax and the homeowner facing none. This somewhat counterintuitive conclusion arises because greater housing appreciation allows landlords to shift higher-taxed income (in the form of imputed rents) into lower-taxed capital gains. It is noteworthy that this capital gains result is driven by the equilibrium assumption that rents are determined such that landlords receive zero profit. If imputed rents do not adjust to fully reflect expected capital gains, the subsidy to landlords is reduced and, above some threshold, turns into a subsidy for homeowners. This would occur in areas with lower elasticities of supply of land, such as those with stringent development restrictions. Beyond the ambiguity about the direction of the subsidy, a number of the underlying parameters are difficult to estimate, including the effective tax rate on capital gains. For this latter reason, most papers in this literature avoid estimating this term [e.g., Follain and Ling (1991)]. While we think this capital gains issue is interesting and merits further study, it is beyond the scope of this paper, and we limit our attention to the ordinary income tax code's contribution to housing subsidies.

[8]We have abstracted from *how many* housing dollars on which a home owning family receives a subsidy. A change in the tax treatment of owner-occupied housing might affect house values, but because we measure the subsidy on a per dollar basis, we abstract from the possibility that there is a second order effect through changes in house prices. This is done for two reasons. First, determining precisely how a change in the subsidy would be capitalized into house values is beyond the scope of this paper. While we do provide an upper-bound estimate of the extent of capitalization, our primary goal is to measure the spatial distribution of the benefit flow from the tax preference afforded owner-occupied housing. Second, any change in house price would only increase the magnitudes of our estimates. For example, if the benefit to owner-occupied housing were reduced, house prices might also fall, further decreasing the subsidy.

[9]The depreciation term nets out because we have assumed landlords can deduct economic depreciation. This is a conservative assumption and, in 1989, probably not far from the truth. Since the allowable depreciation lifetime after the Tax Reform Act of 1986 is most likely slower than true economic depreciation, we have underestimated the subsidy to owner-occupiers. While one could argue that the statutory depreciable life in 1981 (of 15 years) was shorter than true economic depreciation, Deloitte and Touche (2000) and Gravelle (2001) conclude that economic lifetimes for rental properties in 1989 (and now) are shorter than the statutory lifetimes.

[10]We do not intend to imply that the mortgage interest or local property tax deductions themselves create subsidies to owner occupiers. The subsidy arises from the non-taxation of imputed rent in conjunction with those deductions. However, mathematically the subsidy can be represented by the three terms in equation (4).

[11]Another possible data source is the *American Housing Survey* (*AHS*). Unlike the Census tract-level data, the *AHS* reports income and house value for individual houses. Unfortunately, the national files of the *AHS* do not contain state-level identifiers and the metropolitan area files only label central city status, making the *Survey* a poor choice for our application.

[12]All tax benefit figures reported in this paper are based on tract-level data that aggregates household income across its various sources. Tract-level data also are available on seven components of income (wages and salary, interest and dividends, social security, public assistance, farm and non-farm self employment income, retirement income, and "other"). Experimentation showed that our estimates of the value of tax benefits are not sensitive to whether aggregate or disaggregate income data are employed. In both series, capital gains information is missing. Hence, the data almost certainly underreport income at the upper end of the distribution. We do not believe this is an especially serious problem for 1989 because the top tax bracket is reached before one gets too far up the income distribution. Thus, we probably do not underestimate the tax bracket of most of the households for which income is most likely underreported.

[13]This matching process presumes that owners and renters in a tract have identical income distributions. Fortunately, our results are robust to alternative assumptions. For example, if we assume an extreme case in which all the owners in a tract have a higher income than any of the renters, and houses are matched to owners so that the highest income owner owns the highest value house, the next highest income owner occupies the next highest valued house, and so forth, none of our spatial results at the national, state, or metropolitan levels change in a material way. The spatial distributions are slightly more skewed than those reported below in the text and the estimated aggregate subsidy is about 25 percent higher. This latter result is to be expected given that in this matching scheme owners

always have the highest tax rates in each tract since they have the highest incomes.

[14]Loan-to-value ratios by age are as follows: 20-24 year olds – 53.6 percent; 25-29 year olds – 70.2 percent; 30-34 year olds – 66.1 percent; 35-39 year olds – 54.7 percent; 40-44 year olds – 48.9 percent; 45-49 year olds – 41.5 percent; 50-54 year olds – 31.0 percent; 55-59 year olds – 24.0 percent; 60-64 year olds – 20.4 percent; 65-69 year olds – 10.3 percent; 70-74 year olds – 10.3 percent; and 75+ year olds – 2.4 percent. In addition, our findings are not sensitive to assuming 35 percent leverage, the national average in 1989 according to *American Housing Survey* data, for all tracts.

[15]The imputation results indicate that absent the correction we would have underestimated deductions and therefore the number of itemizers. This turns out to be important because the underestimation of itemizers was not random across space. In high house value and high income tax states such as California, not observing non-housing deductions only infrequently caused us to miscategorize an owner family as a non-itemizer. Home mortgage interest, local property taxes, and state income taxes generally were sufficient to make California residents itemizers. This was not the case in many states with lower house values and lower state taxes. Hence, the imputation has an important effect on the measured spatial distribution of program benefits.

[16] The ACIR did not report state-by-state breakdowns for 1989, so we use the 1987 data. We have also experimented with assuming a 1 percent and 1.5 percent national average effective rate. Our findings are not sensitive to these changes.

[17] See Jeremy J. Siegel's *Stocks for the Long Run* (2002), p. 13, for the details.

[18] The risk adjustment follows from Poterba (1991), with the calculation effectively assuming that the mortgage rate would be the yield on seven-year Treasuries in the absence of the options to prepay or default. Other assumptions regarding the relative risk of owner-occupied housing obviously could be made, as there is no clear agreement on this issue. However, we have repeated all the analyses reported in the paper under widely varying assumptions about the relative risk of owner-occupied housing. While the aggregate subsidy certainly does vary with the presumed opportunity cost of equity in the home, the nature of the spatial distribution of the subsidy across states and metropolitan areas largely is unaffected. For example, if one presumes that the alternative to home equity is a relatively safe investment with a duration similar to mortgages (i.e., we used the 8.7 percent yield on seven year Treasuries in 1989 to represent the foregone interest that could have been earned on home equity), the estimated aggregate tax subsidy estimate falls by about 15 percent to $164 billion. However, the spatial distribution of the subsidy flow is very similar to what is reported below.

[19]For comparison, Follain, Ling, and McGill (1993) estimate this subsidy to be just $109 billion. Roughly half the gap in our two estimates can be attributed to differences in the underlying data used and in certain estimation strategies. Their use of the 1989 AHS accounts for some of these differences. For example, our average tax rate of 25.8 percent is higher than their 16.6 rate; the mean house value in our sample is about $106,000 versus $95,000 in their study; our adjusted gross incomes are slightly different; our mean leverage is marginally higher than theirs (35 versus 33 percent at the mean); they do not use property tax rates that vary across metropolitan areas; and they use a different tax calculation and imputation procedure. Our assumption of a 50 basis point higher opportunity cost of home equity plays a meaningful role, given the high fraction of housing value that is not leveraged. All that said, these factors only account for about $40 billion of the $79 billion difference in our estimates. About 95 percent of the remaining gap, approximately $36 billion, is due to our incorporation of state taxes into the analysis. State taxes account for about 19 percent of our aggregate subsidy estimate, which amounts to 45 percent of the overall difference in estimates. It turns out that state taxes also influence the spatial analysis as high tax states also tend to have high incomes and high house values.

[20]Our $43 billion estimate of the value of mortgage interest deductions overstates the value based on computations using the SOI by about $6 billion. One reason is that the SOI calculation underestimates the true subsidy value since the SOI lacks the data to add back foregone equity as income. In addition, we suspect that some of the discrepancy is due to the fact that our deduction imputation procedure does not take account of the possibility that taxpayers who itemize tend to have deductions in multiple categories. Hence, we probably underestimate the total amount of

deductions and therefore apply a higher tax rate to housing deductions than we do with the SOI, where we observe each taxpayer's actual deductions.

[21]Because our underlying data are at the tract level, we ranked tracts in order of gross subsidy flow and summed across the number of owners in those tracts.

[22]This approach assumes that the housing subsidy is funded at the national level even if the size of the subsidy is partially determined at the state level. The 'proportional' financing scheme analyzed below takes differences in state tax rates into account when calculating the local program cost.

[23]Aggregate net benefits to a state's owners are the product of the per-owner net benefit times the number of owners in a state. All renter households suffer a net outflow in the amount of the $2,092 mean program cost since their tax treatment is the same under the current code and the one that taxes owner-occupiers like landlords. One might be tempted to argue that the current code subsidizes renters because landlords are able to deduct various expenses and competition may force them to pass along some of the tax code-related benefit to their tenants. However, comparing the current tax system to our neutral one nets out any subsidy to renters. Since the taxation of landlords is unchanged across the two tax systems, eliminating the subsidy for owner-occupiers will not affect renters, other than by saving them the $2,092 mean program cost in the lump sum case. Hence, aggregate net benefits to a state's renter households are strictly negative and equal to -$2,092 times the number of renter households in the state.

[24] Specifically, we compute the proportional change in the average tax rate (excluding housing subsidies from the tax base) that would fully fund the subsidy program. We apply that scaling factor to the taxes paid by each tract-decile observation. The program cost is the change in tax liability. Because our tax system is progressive with higher income households having higher tax rates, the proportional change means that the rich pay a greater fraction of the program costs. This approach is similar to that used by Follain, Ling, and McGill (1993) and Bourassa and Hendershott (1994).

[25] To put these numbers into some perspective, the mean annual benefit paid to poor families nationwide on AFDC in 1990 was $4,468 according to the *1998 Green Book Overview of Entitlement Programs*.

[26]For example, in Alaska these tracts are termed the 'Non-MSA Alaska' area, with all other states treated analogously.

[27]The top five areas in terms of annual net transfers are: (1) New York-Northern New Jersey ($14.9 billion); (2) Los Angeles-Riverside-Orange County ($13.1 billion); (3) San Francisco-Oakland-San Jose ($11.1 billion); (4) Washington, D.C.-Baltimore ($3.8 billion); and (5) Boston-Worcester-Lawrence ($3.1 billion). These are among the largest metropolises in the nation and contained 10.8 million owners in 1990, or 18 percent of the national total.

[28]The largest net outflow from a well-defined metropolitan area also comes from Texas: Houston-Galveston, at negative $1.3 billion. See column 2 of the table in Appendix 2 for individual area results on net transfers assuming lump sum financing.

[29]These ten areas are (in descending order by net benefit): Honolulu, Santa Barbara-Santa Maria-Lompoc, Non-MSA Massachusetts, San Francisco-Oakland-San Jose, Salinas, Los Angeles-Riverside-Orange County, San Luis Obispo, New York-Northern New Jersey, Non-MSA Hawaii, and Boston-Worcester-Lawrence.

[30] See columns 3 and 4 of the table in Appendix 2 for these details.

[31] Dating at least to Rosen (1979) and Roback (1982), urban economists have viewed the local cost-of-living as a choice variable. As noted, high cost-of-living places typically possess superior amenity packages so that, in equilibrium, residents receive something of equal value for their higher expenses. Hence, any implication that cost-of-living differences (which are driven primarily by housing cost differences) influence the relative value of a dollar of subsidy ignores the amenity or benefit side of Rosen's compensating differential model.

[32]The plots for all areas tracked are available upon request.

[33] In order to see whether the small fraction of tracts that receive most of the benefit flows in some metropolitan

areas tend to live together in a spatially concentrated way, we also mapped the housing subsidy per household in every tract for a small sample of areas. That analysis showed that there are few generalizations one can make about the intra-metropolitan area spatial distribution of subsidies. See our 2001 working paper for those details. Unfortunately, the intra-metropolitan area distribution of net subsidy flows cannot be examined as in Figure 11 since those subsidies can be negative and most measures of inequality would be undefined.

[34]To better understand this, it is useful to rewrite Equation (1) more simply as USER COSTS=$(1-\tau)$SUBSIDY + M + $\delta - \Pi^H$. The variable SUBSIDY is computed for each tract as described in equation (4). We use the average tax rate defined as subsidy per owner in the tract divided by the mean housing deductions in the tract to proxy for τ. Values for maintenance, economic depreciation, and housing price inflation are taken from Poterba (1992). These three measures are the same across all tracts, so that the variance in capitalization rates across metropolitan areas is due solely to the spatial variance in SUBSIDY values. The mean capitalization rate across metropolitan areas is 10.6 percent with a fairly tight interquartile range of 10.2-10.9 percent. Ten percent of the areas have cap rates below 10.0 percent, while another ten percent have cap rates above 11.3 percent. Our examination found the variance to be sensible with the larger, more densely populated areas having the lower cap rates and the smaller and more rural areas tending to have the highest cap rates.

[35] Values for individual metropolitan areas are reported in the fifth column of the table in Appendix 2.

[36] In the lump sum case, this reflects an annual payment of $2,092. For the proportional financing case, the number is larger the higher one's income and average tax rate.

[37]The estimate of taxes paid is an output from the NBER's TAXSIM program. The calculation is made at the tract level analogously to how subsidy estimates are made. See the discussion at the beginning of the previous section for the details.

[38]For example, a plot of INCSUB against the fitted values from a regression of INCSUB on the log of mean house value in the tract shows that high house value owners receive relatively large subsidy flows under the current code even relative to income. Stated differently, those tracts with high average house values are predicted to have greater subsidies relative to income. Moreover, if INCSUB then is plotted against the fitted values from the regression of INCSUB on the log of mean household income in the tract, we find that higher income tracts (which are high tax bracket tracts) have higher INSCUB ratios. The analogous regressions and plots using CAPSUB indicate that high income tracts have high subsidies even relative to house value and that the perpetuity value of the subsidy is an increasing function of house value as house value increases.

[39]We use a set of indicator variables for ranges of adjusted gross income.

[40]It bears mentioning that the SOI only reports state of residence for families with AGI under $200,000. However, more than 98 percent of families with AGI above that level itemize, whereas only 28% of families below that threshold do. Thus, we assume that there is no sample selection problem for families with AGI over $200,000 and estimate the last three steps only, leaving $\hat{\lambda}(I_k)$ out of the regression for these families.

**Table 1: The Value of Housing-Related Tax Benefits–
Aggregate, Per Owner-Occupied Housing Unit, and Per Household**

	Aggregate ($billions)		
Total	Untaxed Equity Return	Home Mortgage Interest	Local Property Tax
$187.7	$128.7	$43.1	$15.9
	Per Owner-Occupied Housing Unit		
Total	Untaxed Equity Return	Home Mortgage Interest	Local Property Tax
$3,231	$2,204	$738	$272
	Per Household		
Total	Untaxed Equity Return	Home Mortgage Interest	Local Property Tax
$2,092	$1,427	$478	$176

Table 2: Value of Housing-Related Tax Benefits by State, Gross and Net of Program Costs

	Lump-Sum Financing		Proportional Financing	
	[1]	[2]	[3]	[4]
	Value of Tax Benefits: Per Owner-Occupied Housing Unit	*Net Transfer by State*	*Value of Net Tax Benefits: Per Owner-Occupied Housing Unit*	*Net Transfer By State*
State				
ALABAMA	$1,370	-$1,684,411,927	-$49	-$675,400,646
ALASKA	$2,372	-$130,659,415	$210	-$143,477,756
ARIZONA	$2,350	-$790,411,761	$531	-$426,434,736
ARKANSAS	$1,252	-$882,748,745	$7	-$215,421,567
CALIFORNIA	$8,092	$25,068,526,808	$5,026	$15,035,292,688
COLORADO	$2,448	-$709,446,867	$501	-$525,626,247
CONNECTICUT	$7,168	$3,206,046,117	$3,690	$1,513,386,793
DELAWARE	$3,454	$84,022,126	$811	-$51,878,710
DIST. COLUMBIA	$8,728	$335,500,249	$6,370	$270,699,902
FLORIDA	$2,277	-$2,845,184,165	$615	-$665,455,491
GEORGIA	$2,316	-$1,369,136,495	$408	-$938,026,307
HAWAII	$10,718	$1,336,703,665	$7,035	$806,718,121
IDAHO	$1,664	-$331,511,602	$110	-$138,396,888
ILLINOIS	$2,946	-$741,917,579	$767	-$1,102,240,437
INDIANA	$1,441	-$2,206,947,541	-$253	-$1,389,895,339
IOWA	$1,444	-$1,133,901,159	-$112	-$571,764,539
KANSAS	$1,449	-$1,024,592,668	-$140	-$558,420,147
KENTUCKY	$1,432	-$1,199,056,511	$14	-$470,363,928
LOUISIANA	$1,314	-$1,802,212,718	$58	-$566,410,228
MAINE	$2,699	-$88,279,179	$864	$31,403,843
MARYLAND	$4,611	$1,610,479,092	$1,566	-$39,017,979
MASSACHUSETTS	$5,885	$3,186,496,622	$2,946	$1,308,465,152
MICHIGAN	$2,137	-$1,937,183,957	$18	-$2,029,909,597
MINNESOTA	$2,227	-$798,201,217	$21	-$984,968,375
MISSISSIPPI	$1,120	-$1,163,246,259	-$32	-$314,220,045
MISSOURI	$1,723	-$1,738,130,719	$50	-$928,514,647
MONTANA	$1,435	-$344,499,819	$77	-$120,281,124
NEBRASKA	$1,408	-$680,383,661	-$2	-$278,209,115
NEVADA	$2,348	-$124,555,059	$800	-$2,781,558
NEW HAMPSHIRE	$3,764	$194,732,077	$1,545	$142,615,989
NEW JERSEY	$5,915	$4,828,432,702	$2,636	$1,574,644,354
NEW MEXICO	$2,029	-$387,557,509	$533	-$66,376,871
NEW YORK	$5,745	$6,786,504,636	$3,079	$3,284,215,232
NORTH CAROLINA	$2,031	-$1,762,971,170	$238	-$1,015,801,730
NORTH DAKOTA	$1,115	-$304,722,962	$25	-$80,661,313
OHIO	$1,792	-$3,561,262,217	$23	-$2,248,120,598
OKLAHOMA	$1,236	-$1,505,148,896	-$70	-$559,156,551
OREGON	$2,343	-$669,592,484	$617	-$267,421,890
PENNSYLVANIA	$2,181	-$2,444,927,569	$317	-$1,426,805,566
RHODE ISLAND	$4,442	$211,837,397	$2,229	$166,322,936
SOUTH CAROLINA	$1,823	-$1,014,669,177	$162	-$475,577,653
SOUTH DAKOTA	$917	-$367,411,121	-$27	-$83,935,207
TENNESSEE	$1,441	-$2,042,996,710	$148	-$568,557,153
TEXAS	$1,568	-$6,797,998,922	$213	-$2,364,963,007
UTAH	$1,951	-$399,680,539	$109	-$266,699,569
VERMONT	$2,617	-$60,264,337	$726	-$17,824,402
VIRGINIA	$3,624	$739,856,173	$1,165	-$94,306,596
WASHINGTON	$2,755	-$658,629,653	$1,032	$25,574,809
WEST VIRGINIA	$1,116	-$866,648,649	-$122	-$281,440,085
WISCONSIN	$1,916	-$1,472,673,537	$94	-$982,063,330
WYOMING	$1,216	-$213,259,800	$2	-$65,514,207

Figure 1

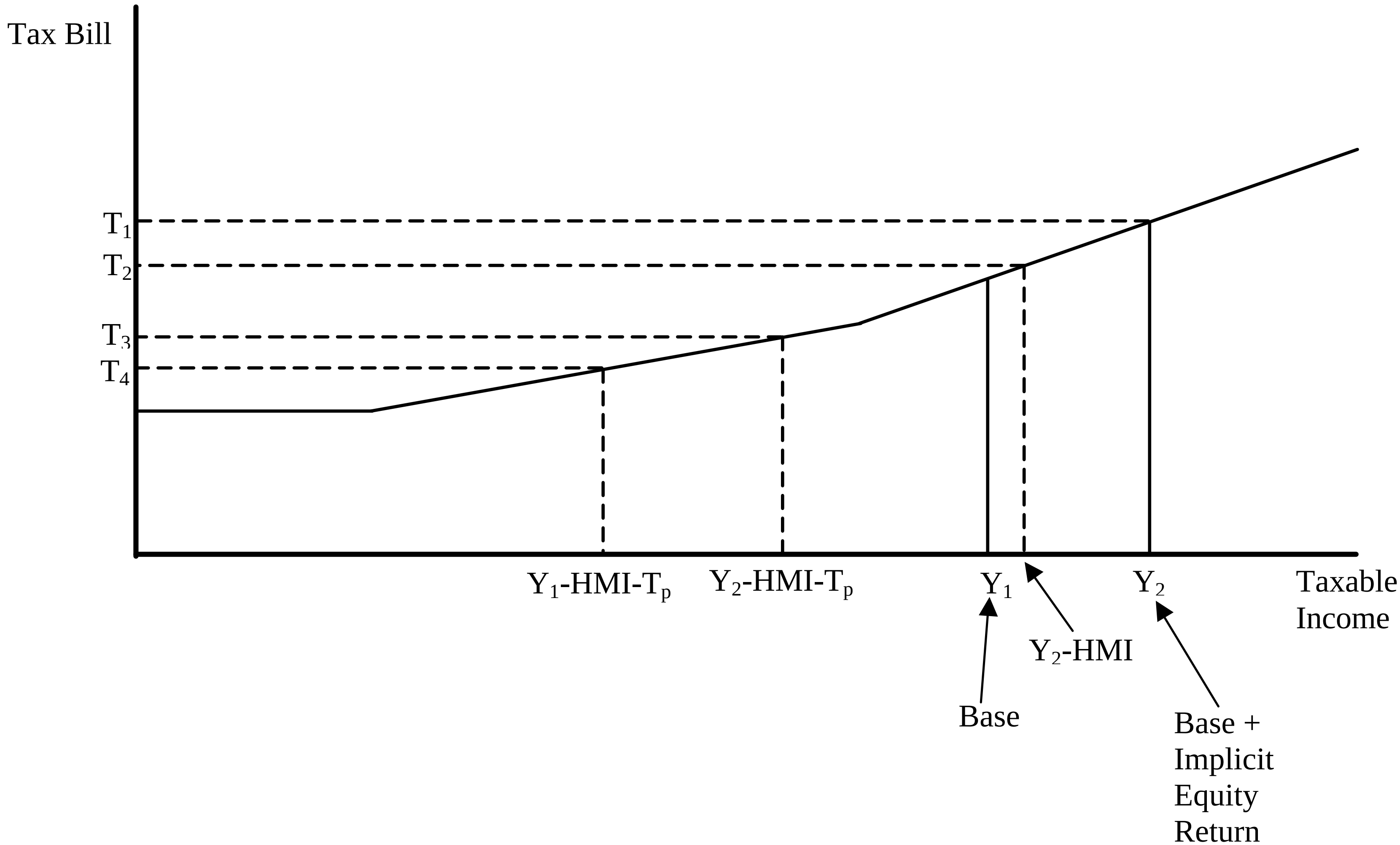

Tax Bill
T1
T2
T3
T4
Y1-HMI-Tp
Y2-HMI-Tp
Y1
Y2
Taxable Income
Y2-HMI
Base
Base + Implicit Equity Return

Figure 2: Net Transfer by State
(Lump Sum Financing)

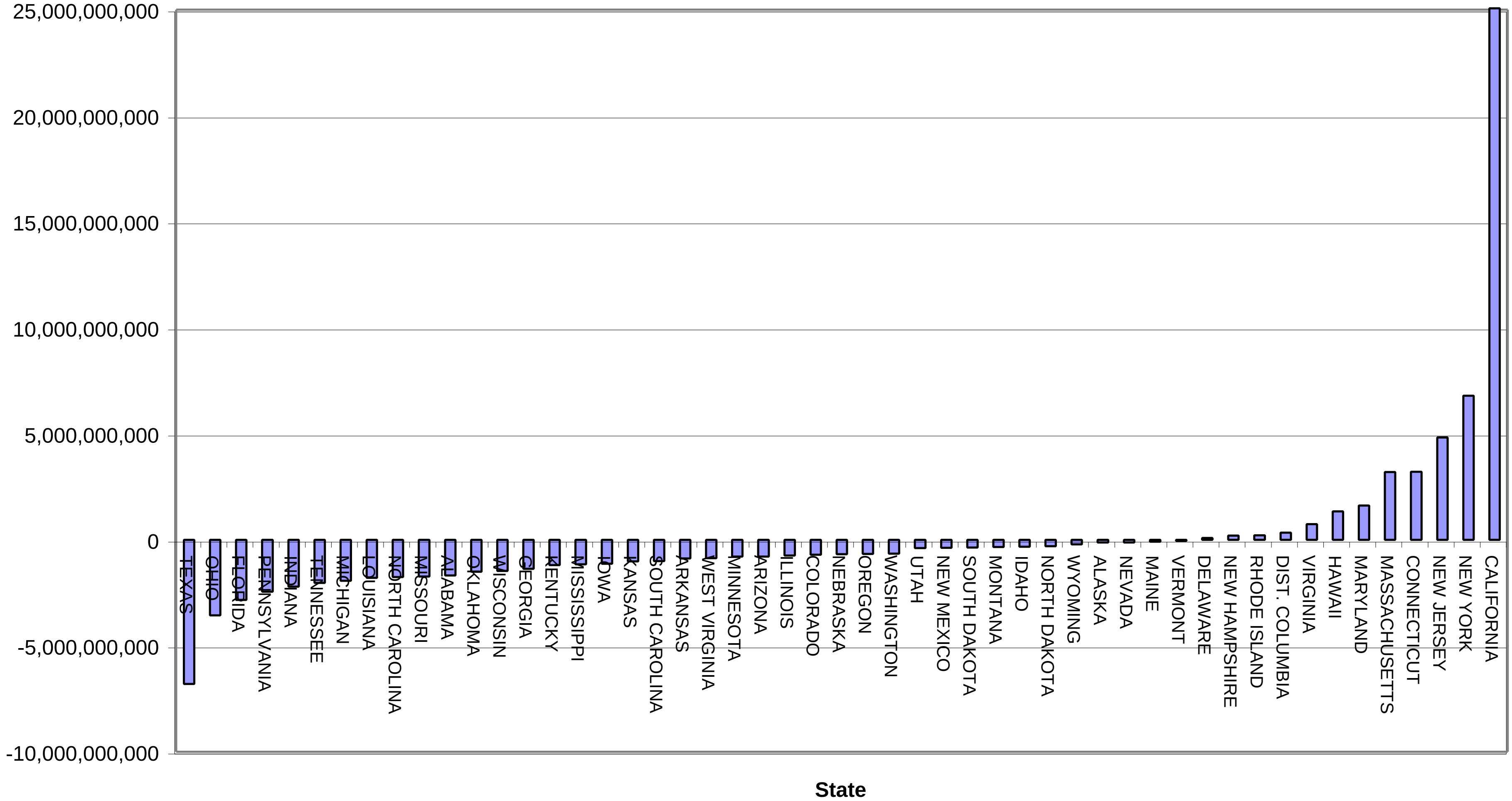


Figure 3: Value of Net Tax Benefits per Owner-Occupied Housing Unit (Proportional Financing)

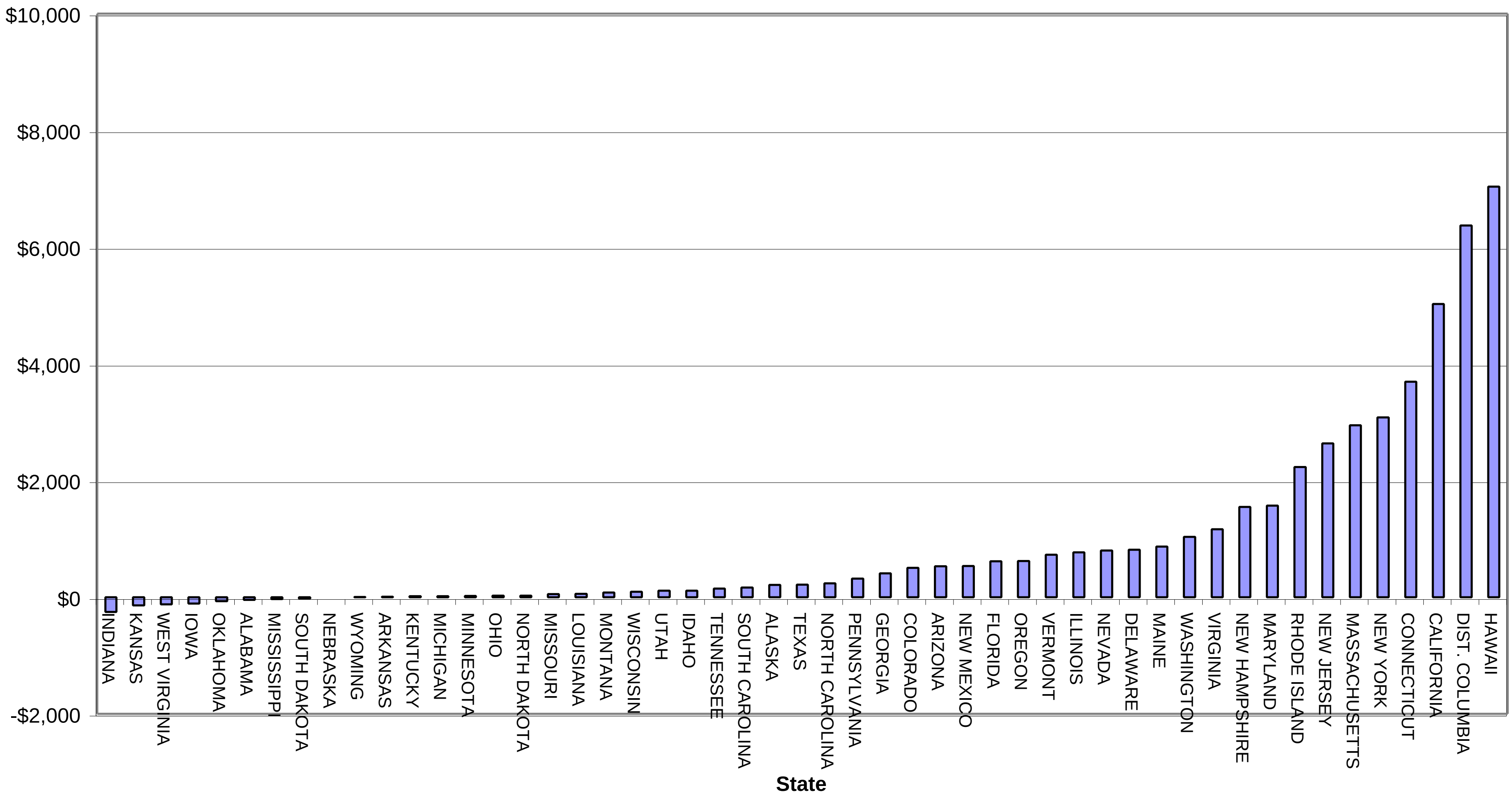


Figure 4: Net Transfer by State
(Proportional Financing)

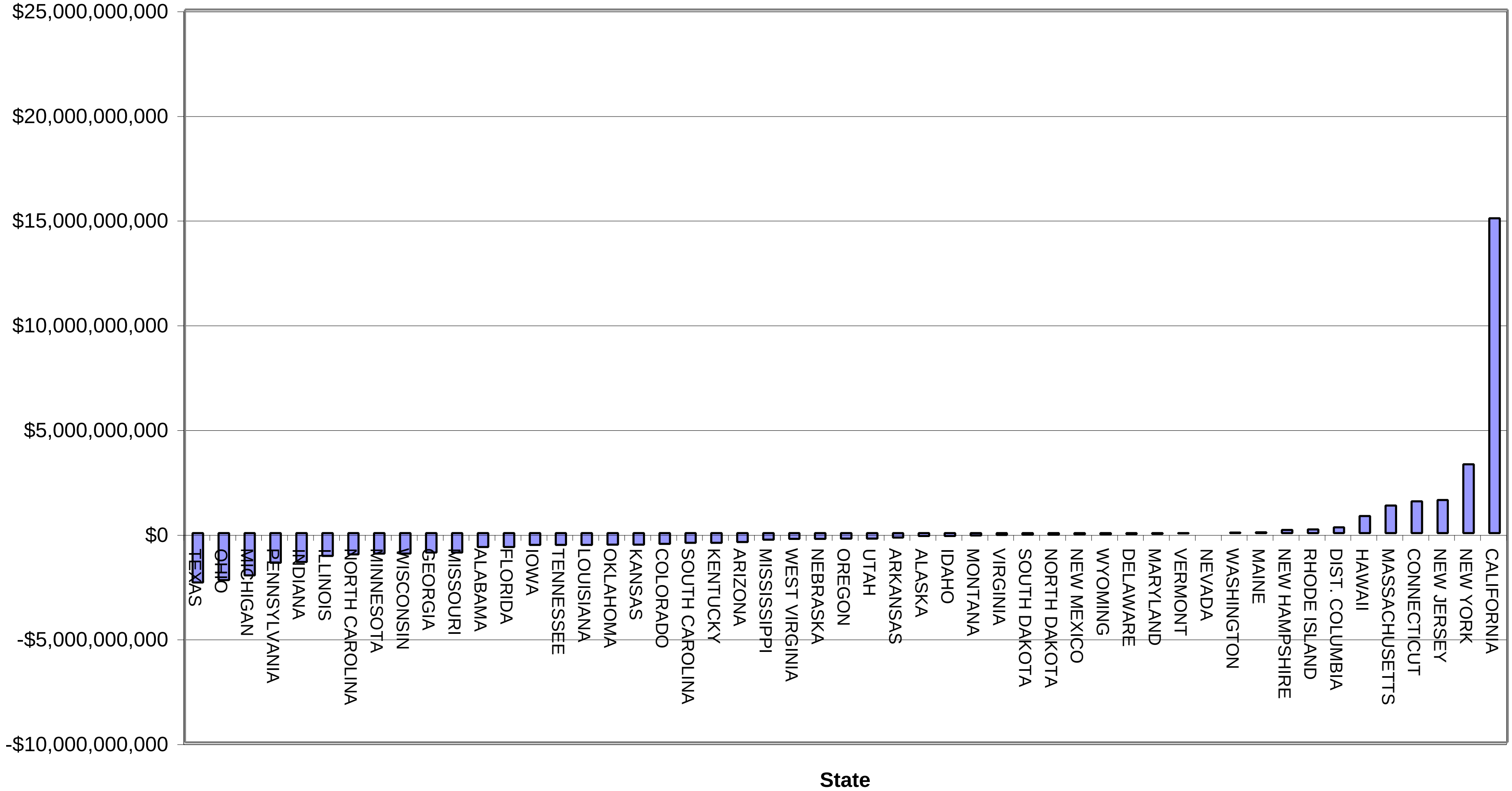


Figure 5: Gross Benefits Per Owner, by Metropolitan Area

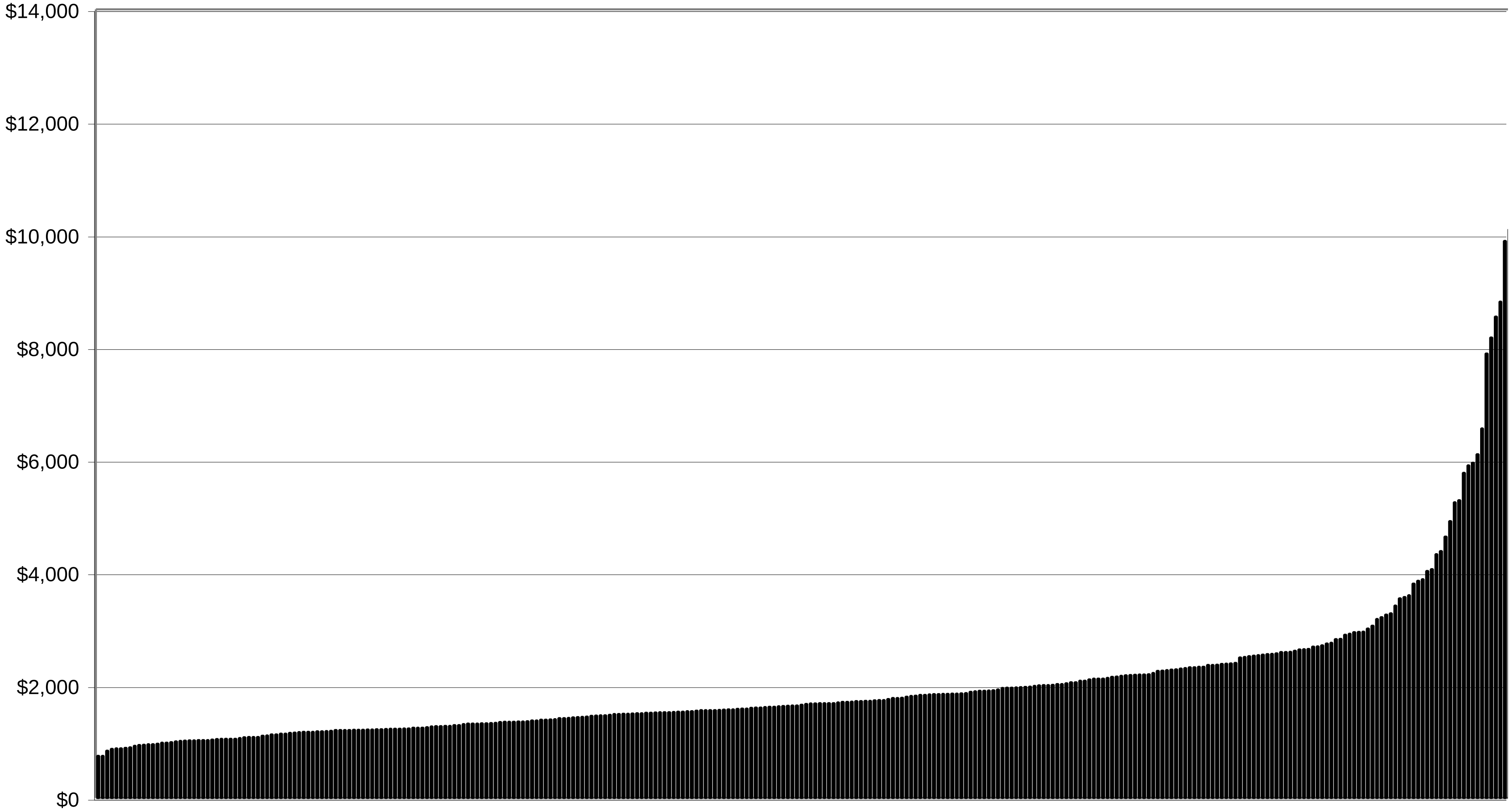


Figure 6: Net Transfers, by Metropolitan Area
(Lump Sum Financing)

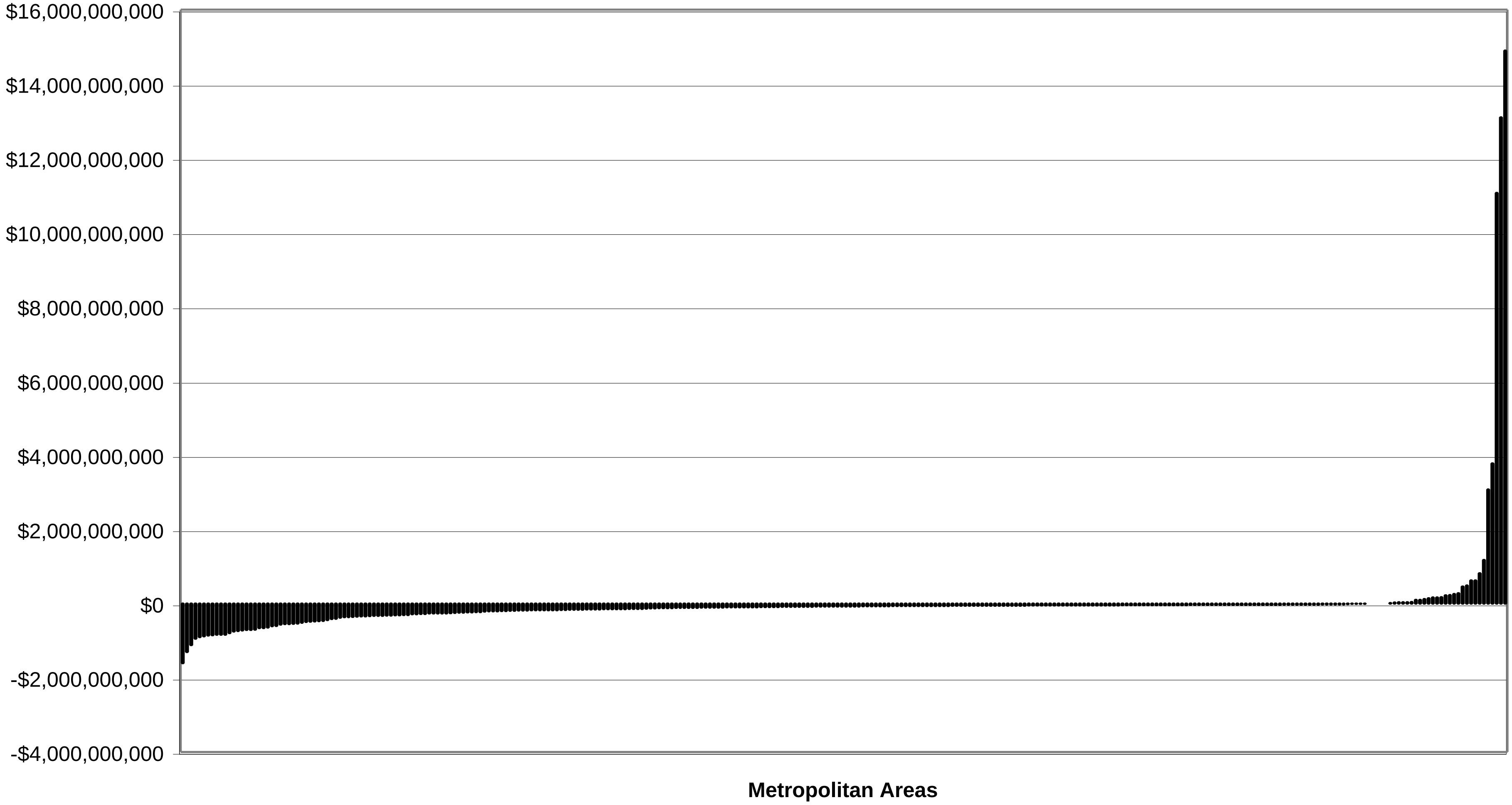


Figure 7: Value of Net Tax Benefits Per Owner-Occupied Housing Unit, by Metropolitan Area (Proportional Financing)

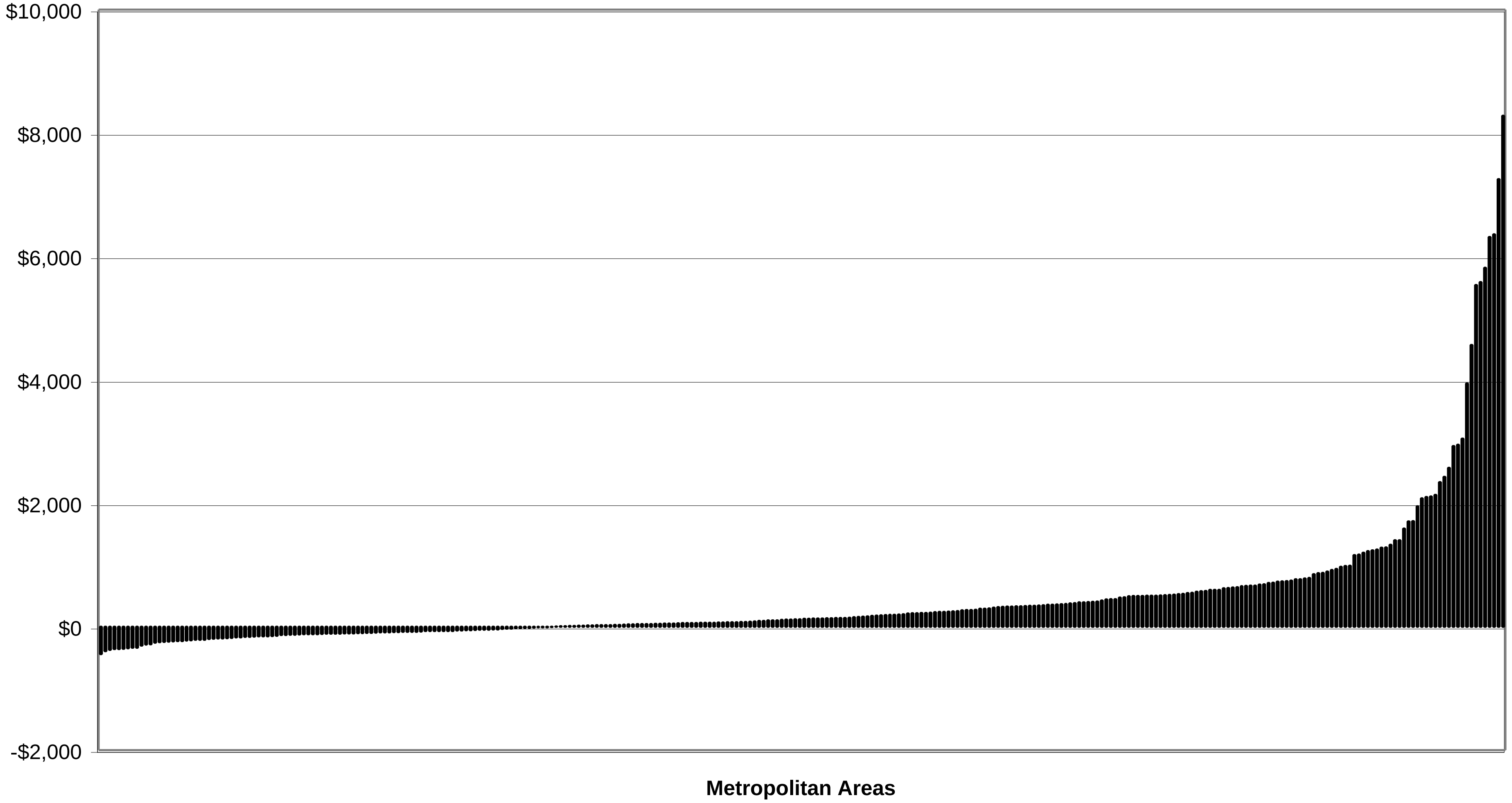


Figure 8: Net Transfers, by Metropolitan Area (Proportional Financing)

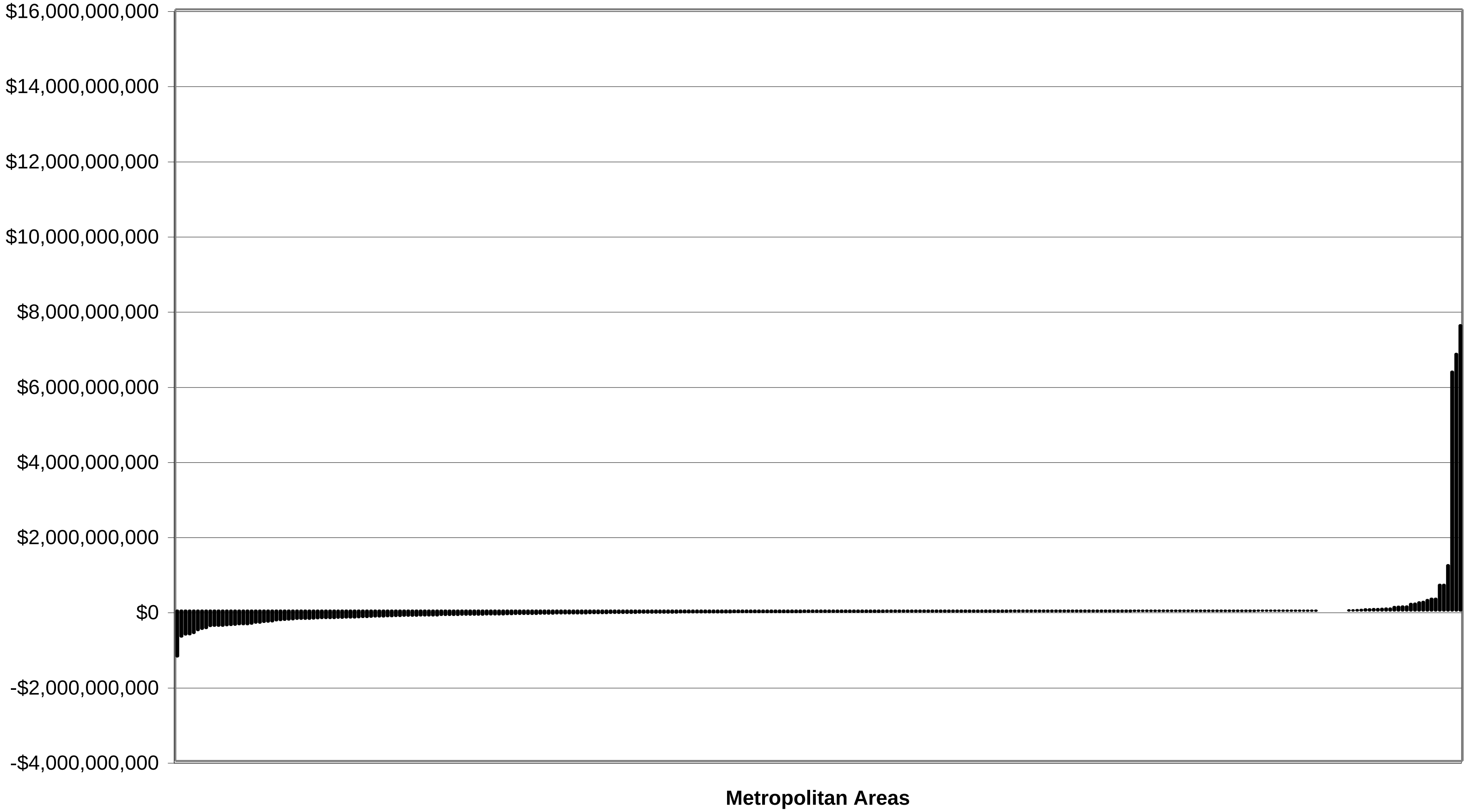


Figure 9: Net Benefits Per Owned Unit by Metropolitan Area, Adjusting for Local Cost of Living (Proportional Financing)

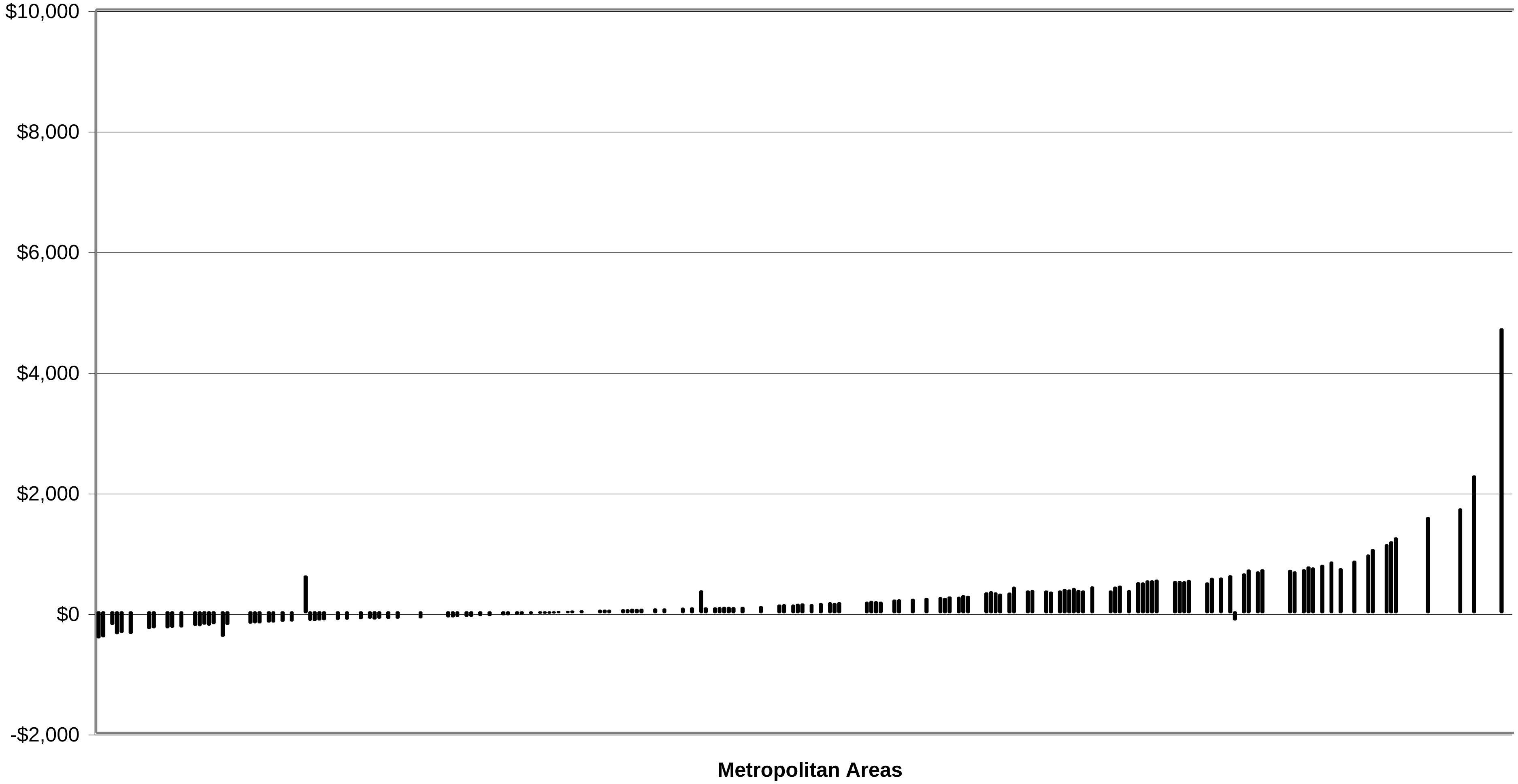
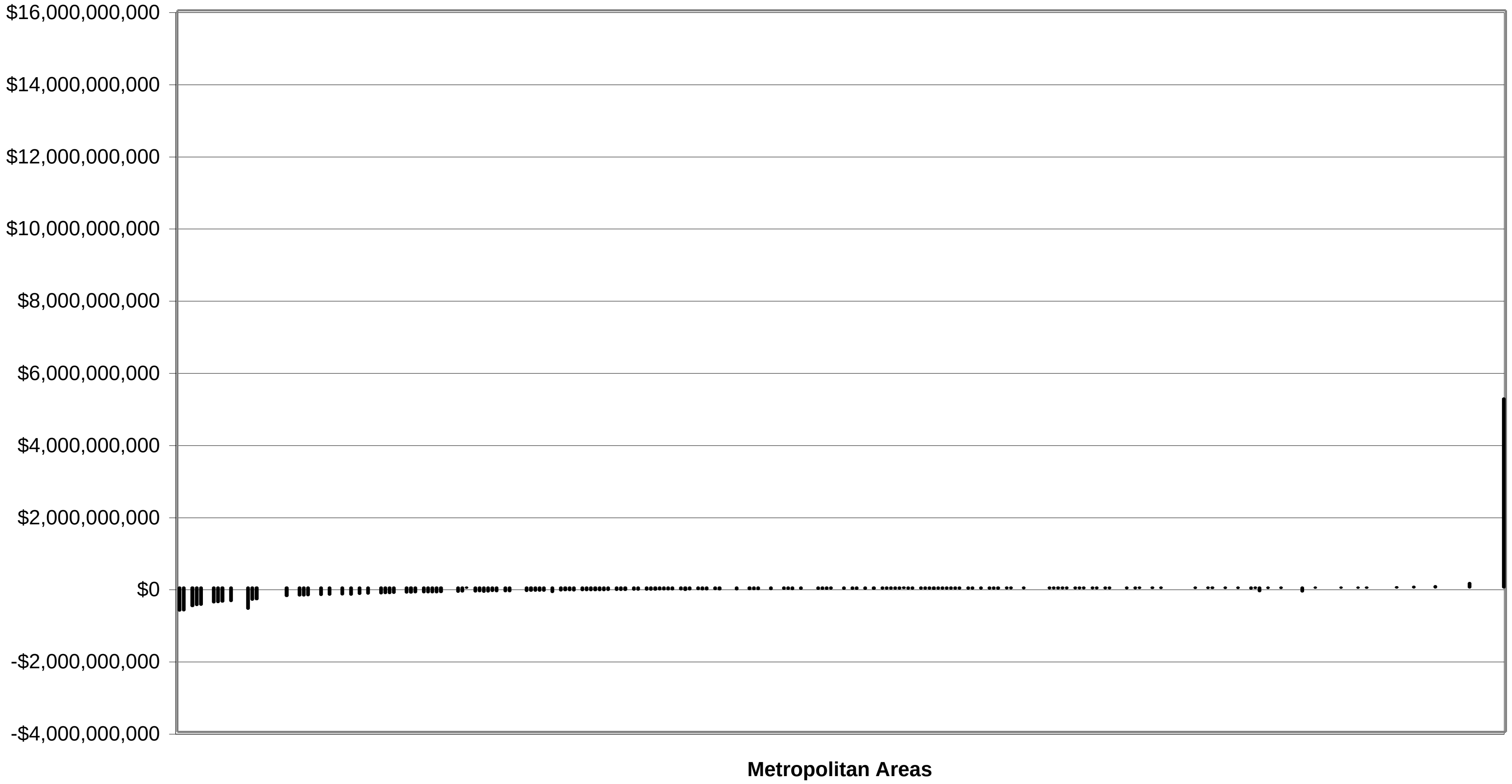


Figure 10: Net Transfers by Metropolitan Area, Adjusting for Local Cost of Living (Proportional Financing)



Cumulative Pct of Subsidy vs. Cumulative Pct of Owners, Select MSAs

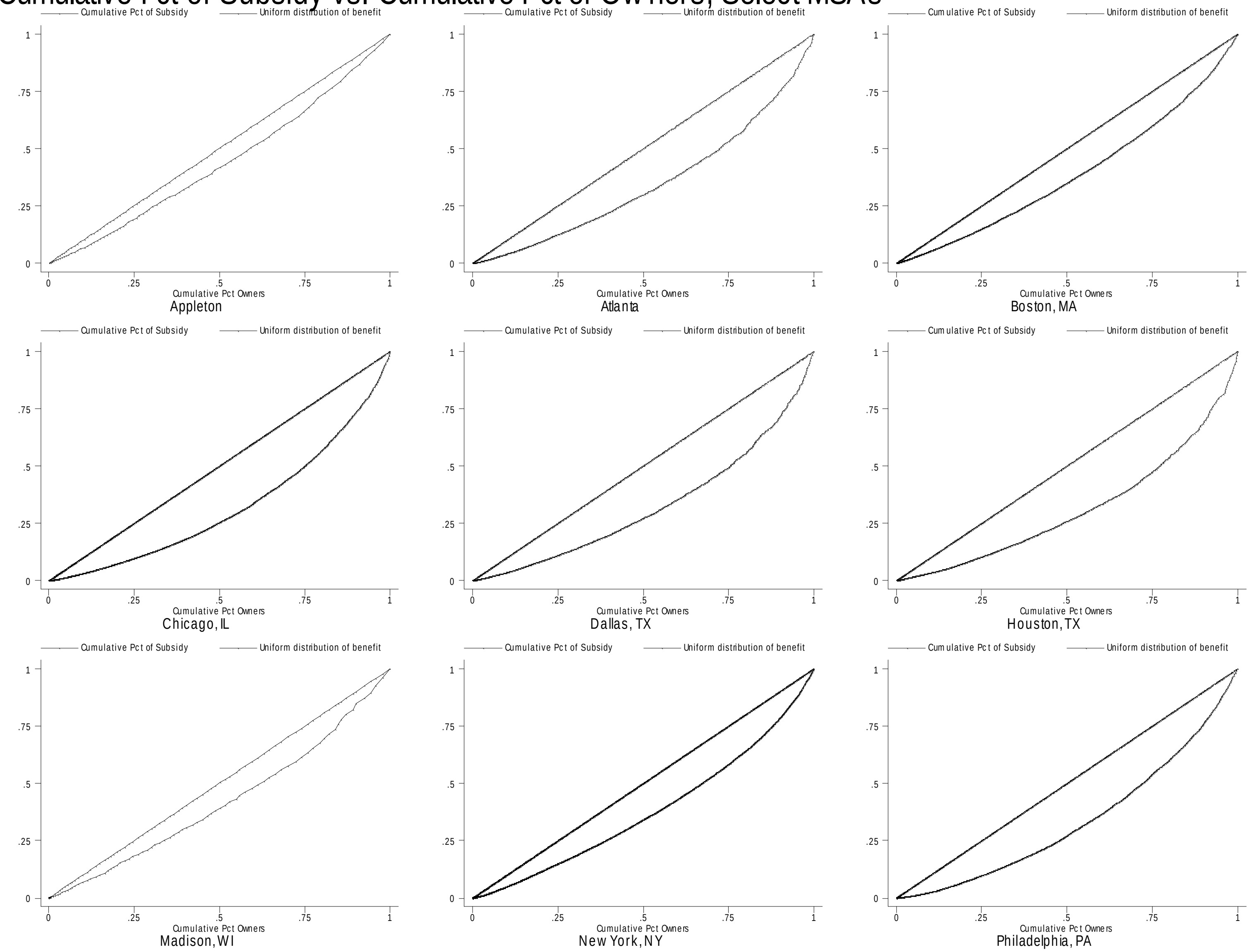


Figure 11

Figure 12: PV of Annual Housing Tax Benefits/Mean House Price (CAPSUB), by Metropolitan Area

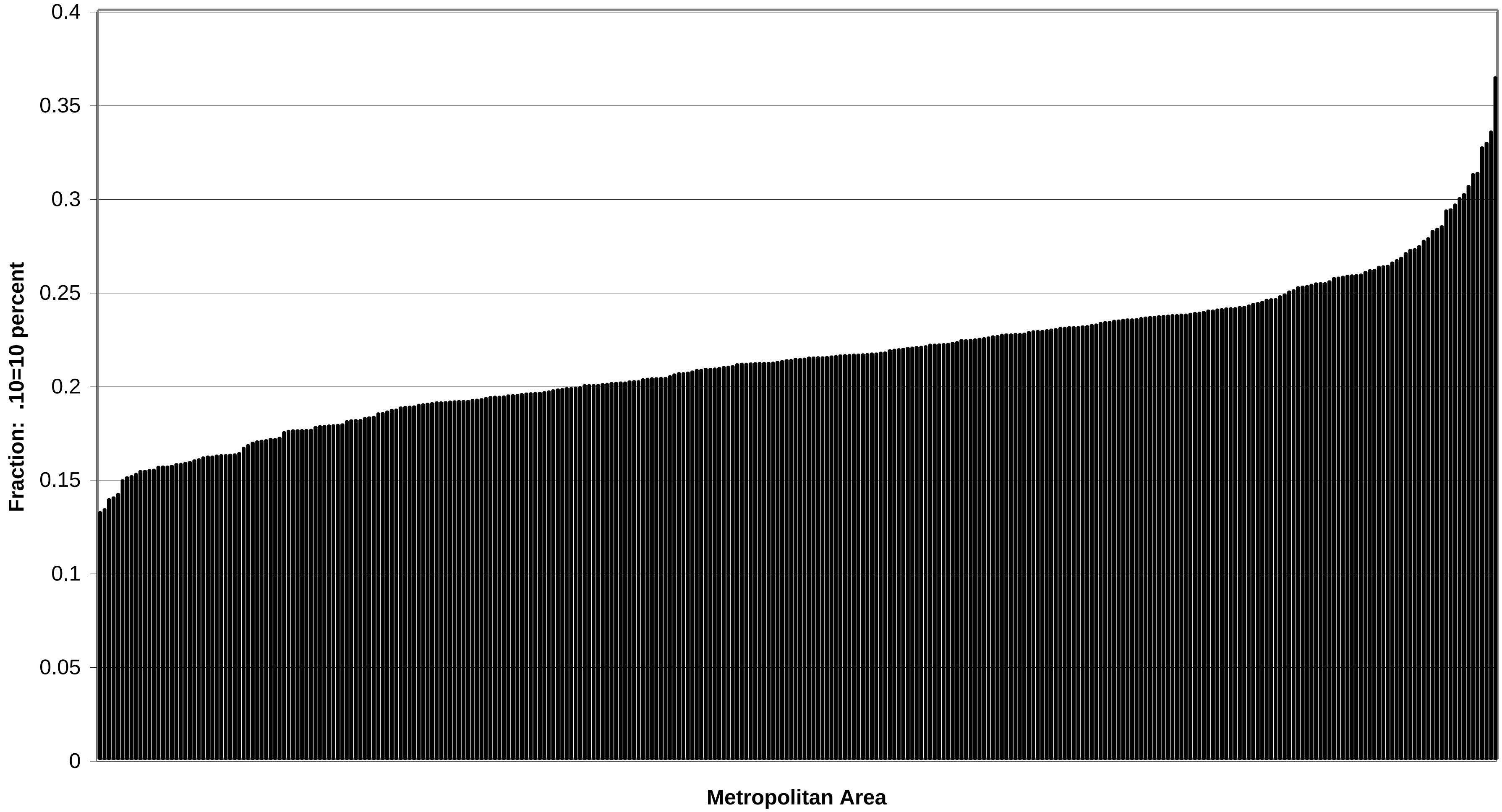


Figure 13: Annual Housing Tax Benefits/Mean Income (INCSUB), by Metropolitan Area