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Where to Work and Where to Live for Movers**

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Is the Grass Greener on the Other Side of the River?: The Choice of Where to Work and Where to Live for Movers

Abstract

This analysis examines how differences in state income tax rates, as well as other state and local taxes and public service expenditures, influence the choice of state of residence for households (federal tax filers) moving into multistate metropolitan statistical areas (MSA) using data from the one in twenty sample of the 2000 Census of Population and Housing microdata. MSAs that are on state borders provide a spatial discontinuity – discrete differences in tax rates within a single labor market. These MSAs allow residents to live in one state and work in another state. After controlling for other factors believed to affect household location, differences in state income tax rates have a statistically significant impact on the probability a household locates in the low tax state within an MSA. Complicating the analysis of location choice is the presence of state reciprocity agreements. These bilateral agreements between state governments allow taxpayers to pay income tax based on place of residence rather than their place of work. The theoretical roles of these agreements are discussed and the impacts of these laws are tested. The results suggest that reciprocity agreements alter the role that taxes play in location.

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1. Introduction

There are forty-four metropolitan areas in the US that cross state borders. Approximately twenty four percent of the entire U.S. population resides in these multistate MSA's, which exist predominantly in the Eastern portion of the U.S.(figure 1)¹ These urban areas provide members of households the unique opportunity of residing and working in different states and provide different combinations of taxes and amenities. Households moving to one these areas can 'shop' for their optimal bundle of taxes and amenities with respect to both where they reside and where they work. The discontinuity caused by state borders provides an ideal situation to investigate how tax and amenity differences influence where to live and where to work.

While state borders provide stark differences in both state and local taxes and amenities, the analysis concentrates primarily on the effects of different state income tax laws. From a policy perspective, state personal income tax levels are often identified as a signal of state 'competitiveness' and are available to state lawmakers as policy instruments. State governments seem to be aware of the competitive pressures created from these border cities. In several of the markets under study, states have entered into bilateral tax reciprocity agreements that allow a household the option to pay income tax according to state of residence rather than state of work. In reciprocity markets, holding place of work constant, the effect of location based on tax liability differences is may be more pronounced as residential choice allows taxes to be avoided. The effects of these agreements are examined within the context of location choice.

Generally, the empirical results follow theoretical predictions. The results indicate a statistically significant negative effect of income tax differences on location choice. Households choosing to own property have stronger locational tax effects than renters. Perhaps this reflects a longer commitment to a specific state. The analysis suggests some evidence that state reciprocity agreements tend to increase the effects that state taxes have on location, as the agreements increase the reward for locating in the low tax state.

In the next section discusses the relevant literature concerning the empirical modeling and testing of location choice. *Section 3* provides a simple theoretical framework intended to highlight factors influencing the decision of where to reside in an *MSA*. In *Section 4* describes the data and examines measurement issues confronted. *Section 5* provides the basic structure for the empirical model. *Section 6* examines the results of the estimation and, finally, *Section 7* concludes.

2. Literature Review

A model of location choice based on tax and amenity bundles can be sourced to Tiebout (1956). Tiebout's model suggested that different local tax and amenity bundles will lead to an efficient sorting of households if transactions costs are sufficiently low. Models predicting stratification into homogeneous groups have been examined

¹ 2000 Census of Population and Housing.

empirically by Eberts and Gronberg (1981). These tests of Tiebout Sorting rely on examinations of static equilibrium and low transactions costs. This analysis follows a different path in search of support of Tiebout sorting. That is, do migrants reveal tendencies to migrate to low tax areas, *ceteris paribus*? The sample, which consists solely of recent movers is particularly adept at answering this question.

Several works have used a sample comprised only of movers to test 'Tiebout' type predictions. These works can be traced to Reschovsky, (1979) who examines new movers to various communities in the Minneapolis-St. Paul MSA. In this study he considers whether migrants consider both taxes and amenities in their decision to locate? He finds some evidence that migrants are sensitive to differences in local taxes and services. The author employs a strategy of comparing the tax and amenity sensitivity of current residents to recent movers and finds existing residents less responsive than recent movers. Work by Nechyba and Strauss (1997) use data on recent movers to New Jersey municipalities to examine local public service and tax effects on location decisions. Employing a multinomial logit specification, they find that high levels of local education funding increases the likelihood of locating and that higher crime rates reduce the likelihood of household location. Taxes are controlled for with an after tax income figure. Unlike the analysis the effects of differing taxes is not explicitly controlled for. The use of data from a single state does not allow for the effects of state tax law to be examined.

Recent work to focus specifically on state tax law examines the elderly and the wealthy. Conway and Houtenville (1998) examine aggregate elderly migration rates using 1990 Census data, and find that high taxes increase out-migration, but also increase in-migration. They are unable to reconcile these effects. Bakija and Slemrod (2004) examine the location behavior of the wealthy with respect to changes in tax policy using federal estate tax filings. They find some evidence that state tax policy negatively affects the probability a person files an estate tax return in a state. Again, the focus on these specific cohorts provides little information on the location responses by a more representative sample of the population.

Coomes and Hoyt (2007) specifically examine the effects of state tax differences on location using state border MSA's. Rather than using data on individual movers, they use a panel on the total share of in-movers to each state in the MSA. They find statistically significant effects of income taxes on location for non-reciprocity markets. The authors calculate the taxes in both cases based on the state of residence, which overstates income tax liabilities for non-reciprocity markets. Income earned in non-reciprocity markets is taxed according to the schedule in the state where the income is earned. The absence of variation which will result from the tax adjustments may reverse their counterintuitive findings. The Coomes and Hoyt study does not consider federal income taxes as a relevant factor in the location decision. This analysis introduces the important role of interactions of federal and state taxes in for homebuyers.

Without including federal tax differences, the state-to-state differences are exaggerated for homeowners. Ultimately, while the question addressed here is essentially the same, the household data provide the opportunity to address several questions Coomes and Hoyt could not. First, property value differences between states are explicitly controlled for. This contrasts with the Coomes and Hoyt assumption of constant property value differences across MSA's over time. The effects of property values are captured by MSA fixed effects. This is particularly important as property values should, themselves, reflect differences in tax policies in the metropolis. Second, the analysis addresses the simultaneous decisions of where to live and where to work as it is possible to determine whether the members of the household work in the same state in which they live. Finally, the sensitivity to taxes by household type can be examined.

The microdata and geographies under consideration allow for accurate measurement of the tax and amenity bundles, provide a more representative sample of movers to examine the household location decision and contribute to the literature on location choice in the presence of tax differences.

3. Model of Location Choice with Fixed Work Location

The problem for the household is presented as a random utility model of discrete residential location similar to Nechyba and Strauss (1998). The analysis assumes that the residential and work location of the household reflects only the head of household's situation. The setup assumes that a working household is willing to commute across states, thus making the work location exogenous. The household has a choice over two or more locational substitutes (1,2) which possess different bundles of location specific public goods and differing employment options (1,2). The state location options 1,2 are arbitrarily assigned. The additively separable utility function of the household expressed in indirect form,

$$V_j^i = u_x^i(x_j^i) + u_s^i(g_j^s) + u_l^i(g_j^l) + a^i + \varepsilon_j^i, \quad j = 1,2$$

where x refers to private consumption in state j , g^s and g^l refer to the local and state services that are consumed by the household residing in state j , and a refers to the household's utility from living in the MSA. The term ε_j refers to an idiosyncratic preference for one state.

The amount of private consumption x that is available to household i depends on the state of residence according to the following equation.

$$x_j^i = \text{Max}(W_j^i) - IT_j^i - LT_j^i - H_j^i, \quad j = 1,2$$

where W refers to the householder's wage in state 1 or 2 net of commuting costs, IT refers to the state income taxes paid by the household locating in state j , LT refers to the local taxes paid by a resident of state j , and H refers to the price of housing in state j .

The household's decision to locate in state j of the MSA depends on the comparison of the levels of utility in either state. Formally, the household chooses to live in state 1 over state 2 if

$$V_1^i - V_2^i = u_x^i(x_1^i) + u_s^i(g_1^s) + u_l^i(g_1^l) + a^i + \varepsilon_1^i - (u_x^i(x_2^i) + u_s^i(g_2^s) + u_l^i(g_2^l) + a^i + \varepsilon_2^i) > 0$$

This equation indicates that it is the difference in state and local fiscal policy variables that determine household location. A discussion of the measurement of those variables follows in the data section.

State Income Tax Reciprocity Agreements

As previously mentioned, some states have entered into reciprocity agreements which allow for income to be taxed in the state of residence rather than state of work. This contrasts with non-reciprocity markets in which income is taxed based on the laws present in the state where the income is earned. Approximately half of the markets included in this analysis have these income tax agreements in place. Not surprisingly, tax liability differences are larger in markets without reciprocity agreements. States appear to be less willing to enter into these agreements in markets where more tax revenue may leak out. Rork and Wagner (2007) examine these agreements from the perspective of competition between states and find that reciprocity agreements appear to reduce competition in other forms of taxation, such as cigarette and fuel taxes. These markets are treated separately in most instances.

Economic theory suggests that the locational impact of tax differences may indeed depend on the reciprocity status of the MSA. In markets with reciprocity agreements in place, a household can reduce its state income tax liability by choosing to locate in their "low tax state." Conversely, tax differences in non-reciprocity markets are posited to have small or minimal effects. In these markets, a household cannot locate to avoid state taxes. Rather, their tax burden is determined by their work location decision. The effect of state income taxes on residential location decisions should be negative for working households in markets with reciprocity agreements and zero for working households in markets without such agreements.

4. Data

The data on households used here are from the one in twenty sample of the 2000 Census of Population and Housing. The data extract was generated from the Integrated Public Use Microdata Series (IPUMS) web site at the Minnesota Population Center.

The sample consists entirely of migrants to metropolitan areas on state borders. Migrants are identified by their self-reported location five years prior. If the head of household reported that she resided in a different state five years ago the household is considered a migrant household. Also, in order to isolate the decision of where to locate within an MSA, the analysis concentrates on movers who have relocated to a metro area from neither border state. A mover to a metropolitan area from within the same state may have ties to that state that extend beyond measurement

capabilities. For example, the presence of extended family within a state might lead one to rule out moving to a portion of a metropolitan area in another state and instead choose the fringe area of a metropolitan area within their original state. For example, a household moving from Seattle to the Portland metropolitan area might be more inclined to locate in Vancouver, WA than a household moving from Salem, OR to the Portland area. Movers relocating from nearby geographies are therefore removed from the analysis.

One may also interpret the choice to examine geographically removed migrants or households moving from great distances as an attempt to isolate movers whose act of moving can be considered exogenous to the tax differences between the states under examination. For example, by choosing to examine a household locating to the Louisville MSA (IN-KY) from say, Louisiana, an attempt is made to capture households transferred by their employer. It seems unlikely that these households have moved to this MSA as a result of tax differences between their new state and their state of origin. This analysis assumes the migrant household weighs the costs and benefits of locating in Kentucky and Indiana after their long riverboat voyage.

One should note that the model is limited to estimating the tax effects on location in a partial equilibrium setting only, that is, it is assumed that the location choice of migrants have no feedback into property values. As the majority of new MSA residents come from geographically neighboring counties or perhaps the neighboring state(s), the movers under consideration are believed have little effect on land prices. A general equilibrium feedback approach in which property values rise in response to location decisions is left for future work.

After eliminating these movers, the sample consists of approximately 50,000 households that moved into the two-state *MSAs* from other states between the years 1995 and 2000.

Identifying MSA's

An important convention used throughout this paper which deserves explicit explanation is the determination of metropolitan areas from the PUMS data. For the purposes of maintaining the confidentiality of the respondents, the U.S. Census does not produce geographic identifiers allowing a household's Metropolitan Statistical Area (MSA) to be explicitly identified for all respondents. Instead, the Census identifies the Public Use Microdata Area (PUMA) for all households. A PUMA is an area containing approximately 100,000 individuals. Importantly, PUMA's do not cross state lines and are relatively small in geographic terms around MSA's. A PUMA or collection of PUMA's is used to approximate an MSA. A PUMA is considered to belong to an MSA if that PUMA has any land area within that MSA. Figure 2 provides an example of the procedure for the Louisville, KY-IN MSA.

Land areas of PUMA's vary considerably throughout the sample. This geographic size varies inversely with the density of the PUMA as PUMA lines are drawn for areas of approximately 100,000 residents. The city center often sits

near the state border and is often the most population dense. PUMA's near city centers are relatively small and get larger farther from the city. By weighting the estimates by the inverse of the land area, the influence of observations locating far from the border are lessened.

State Income Tax Liability

The *Taxsim* tax calculator at the National Bureau of Economic Research is used to simulate a tax liability faced by a household within their state of residence. Information such as the number of dependents, taxable and non-taxable income and homeowner costs is entered into a tax calculation which determines the federal and state tax liability faced by the household in their state of residence. A federal and state tax rate is constructed in the same manner by predicting the tax for the household if they had chosen to move to the other state in that MSA. These two simulated tax measures are believed to capture the potential tax liability situation faced by the migrant household. The analysis assumes migration occurs in the 1998 calendar year, the middle of the five year period for which the Census asks about mobility, and apply tax laws from that year.

The mean difference in total state and federal income tax rates and fraction locating to each state by MSA is shown in *Table 1*. The table also indicates the reciprocity status of each market. In some cases the state tax rates are similar inside the multistate metropolis. But there are some interesting contrasts. For example, the Clarksville, Kingsport, and Chattanooga *MSAs* contain counties in relatively high tax states (Georgia, Kentucky, and Virginia) as well as in Tennessee, where the state does not tax wages and salaries. Similarly, the Portland *MSA* provides a stark choice between Oregon's high income tax and Washington state's zero rate, However, in all five of these cases there is no reciprocity, and hence the income tax cannot be avoided by choosing to live in the low tax state while working in the high tax state.

Housing Prices

Replace this section with hedonic discussion [The PUMS data are used to conduct housing price simulations for the mover sample. Rather than force a household to fix its chosen housing attributes (demand) (Nechyba and Strauss, 1998), which would occur with a hedonic analysis of housing price attributes, this method allows residential sorting based on income levels, marital status and presence of children within a specific MSA. First, a household is categorized by its income quintile within the entire MSA. Then, cell means for both rental price and home value is calculated for the income quintiles, marital and children status for each state in the MSA's. These averages are then applied to the sample movers. The cell means are then included as explanatory variables in the location regression. I believe this method better captures the tradeoffs a household makes when locating to an area and implicitly allows the household to sort into a specific submarket within a state which the PUMA identification does not allow us to identify.]

Government Expenditures and Revenues

The Census of Governments (COG) data is used to measure local taxes and expenditures by function. There are three measures of local taxation (income, property, sales) and two measures of expenditure per capita (primary and secondary education spending, higher education spending and highway spending per capita). For primary and secondary school spending, district-level data is aggregated to metropolitan areas. The local tax measures are “rates,” revenues divided by personal income. Highway expenditures are on a per capita basis and primary and secondary educational spending is on a per student basis. With the exception of education spending, these data are available at the county level, but only every five years. Values from the 1997 COG are use for all state and local government variables. State property and sales taxes are also computed as total revenue divided by total person income. State government services are controlled for by including higher education spending per student. Total highway spending is also included as an additional control of state and local government services.

5. Empirical Equation

Following the location decision equation in the theory section, a discrete choice Probit model will be estimated. The decision making unit is the household with household attributes reflecting the head of household’s attributes. A success is defined by whether the household chooses to move to state 1 over state 2 of the MSA. The naming of the states is an arbitrary convention of the authors with the order reflecting state codes (FIPS) in descending alphabetical order. The model to be estimated is as follows.

$$\Pr(\text{State 1 in MSA } j = 1) = \Phi(\beta_{\tau}\Delta IT_{ij} + \beta_s\Delta ST_j + \beta_L\Delta LT_j + \beta_g\Delta G_j + \beta_h\Delta \hat{P}_{ij} + \beta_w W_1 + \beta_x X)$$

All variables included in the location decision equation are entered as differences between states 1 and state 2 unless otherwise stated. Differences in income taxes (IT) are controlled by the simulating the tax liability difference faced in state 1 over state 2. These level differences are then divided by total household income to create an average tax rate difference. The income tax value includes both the difference in Federal and State income taxes. Including federal tax liability differences between states is necessary as higher state taxes are itemized as higher expenses on federal tax returns for itemizing tax payers. Therefore, it is the sum of the state and federal tax differences that households consider when locating. Other state taxes (ST) are controlled for by including state property tax rate differences and sales tax rate differences. Local tax differences (LT) are controlled for by including local sales tax rates, local property taxes and local income taxes. All taxes other than state and federal income taxes are represented as fractions of total personal income in the specific state of the MSA.

State and local government services (G) are measured by including primary and secondary education expenditures per student, higher education spending per student, and spending by governments on roads. The difference in housing price included as a ratio of state 1 average price to state 2 by cohort is controlled for with P . The work location decision (which only applies to equations with a working head of household) (W), takes on a value of 1 if the head of household works in state 1. Finally, various socio-economic demographic differences interacted with individual characteristics are included to control explicitly for aspects of sorting which may be correlated with household location choice and taxes. Among these are income interactions and race interactions.

Estimates which include MSA fixed effects to control a number of unobservable differences across MSA's are also carried out. Although control variables which only vary across markets fall out of these regressions, including these effects speak to the robustness of the results. Where possible, the interactions of tax and amenity variables with household level demographics are included. These interactions provide key insights into the sorting behavior of households. For example, education spending by governments is likely to be most important for households with children. Those households with higher household incomes may prefer to locate among those with high incomes. In most cases estimates are presented without including MSA fixed effects and then include a set of estimates with the FE. The presence of such effects rarely changes the effects that taxes have on location.

Buyers and renters are treated separately throughout the analysis. There are several reasons to believe owners will act differently from renters. Owners, through their home purchase, indicate their longer tenure in the area. This length of tenure difference may allow buyers to capitalize on the relatively low tax rates for longer periods. Another reason why buyers and renters are treated differently arises from the treatment of taxable income. Current tax law allows buyers with mortgage interest to deduct that interest on their federal tax return. This form also allows for the deduction of state and local income taxes. For households choosing to itemize (which is identified by mortgage status), the increased cost of moving to a high state income tax area is mitigated by a reduction in federal income tax paid. For these reasons this analysis analyzes these groups separately.

Evidence of the differences between buyers and renters can be found in table 2. Not surprisingly, buying households are more likely to be married, have kids and have higher income than their renting counterparts. Also, income tax rate differences for buyers are less than the differences for renters. This observance is in-line with the discussion of how taxable income is calculated for the different groups. Recall that state tax rate differences between states for buyers is lessened by the likelihood of itemizing expenses which leads to state tax increases leading to lower federal tax liabilities.

6. Results

The estimates line up remarkably well with theoretical predictions. Differences in income tax rates have statistically significant effects on the location decision of buyer households. Renters seem less likely to be aware of their state tax liability differences or ignore those differences, when locating within a multi-state MSA. Households locating in markets with tax reciprocity agreements in place are likely to choose the low tax state. Recall that reciprocity agreements allow taxes to be calculated by place of residence rather than place of work. Theory predicts tax differences should matter more for these markets, and evidence largely confirms this. Caution should be used when comparing coefficients both within models and especially across specifications as the results are presented only as coefficients and not response probabilities.

Table 3 contains Probit coefficient estimates for movers choosing to buy a home upon relocation. Column 1 presents results for all movers. The effect of income tax rate differences is not statistically significant in this first specification as the tax situation of non-working households does not differ substantially across states. Evidence of ethnic, racial and income sorting is prevalent in this specification, as evidenced by the positive and statistically significant coefficients on the interaction of household level demographics and area demographic differences. Column 2 provides the first evidence that migrants are aware of and sensitive to differences in tax liabilities generated by choosing between states.

The estimates in column 3, in which the sample is comprised solely of households with working heads of household, also provide evidence that state income taxes affect location choice. Here the analysis suggests that differences in income taxes have approximately no effect on location, though the sorting effects are still present. The estimates in column 4 consist of working households in reciprocity markets. Tax rate differences appear to have theoretically consistent effects in these reciprocity markets.

Column 5 presents perhaps the most compelling initial evidence of tax sensitivity. In this specification, the head of household's work location decision is fixed. By fixing the head of households' work location decision, the following question can be investigated: Conditional on work location in state 2, do households with larger tax liabilities in state 2 choose state 1 instead? It appears that commuters in the sample have lower tax liabilities in their chosen home state than in their state of work. The fixed work location analyzes the potential tax liabilities for commuting and non-commuting workers. These estimates suggest larger tax differences encourage commuting, with the household living in the low tax state. Finally, column 6 provides a specification which includes MSA-level fixed effects. While the coefficient on the tax rate difference variable is quantitatively smaller than column 2, the sign is consistent with previous results suggesting that tax differences affect location decision in theoretically consistent ways.

Table 4 provides similar tests of the influence of state and federal income tax differences for migrants who rent upon locating in an MSA. Columns 2 and 3 present a similar story as the situation portrayed in the buyer sample. Working renters appear to prefer lower taxes whereas non-working renters show little effects of tax differences on location. Results which include an MSA-level fixed effect indicate little effect of taxes on location choice for renters. This result of “no effect” is not unexpected as renters are less likely to be concerned with tax differences as they can easily adjust their location to reduce their taxes in the future.

Effects of Equalizing Income Tax Differences

Rather than interpreting the size of the coefficients in Tables 3-5, a more informative approach may be to look at the difference in the number of residents choosing certain markets as a result of a tax policy change that leaves no tax difference between state 1 and state 2. Specifically, this exercise uses the coefficients from a previous set of estimates and zero-out the tax rate differences that currently exist. This method compares the current incomes and new mover breakdown to the predicted situation if tax differences did not exist. The coefficients in column 4 of table 3 are used in these predictions. This is the home buying, head of household worker sample locating in reciprocity markets. Table 6 provides the current and predicted breakdowns of both new movers and new mover income. Several outcomes can arise due to these changes. As the model is based on microdata, composition changes resulting from differing location choices of “marginal” migrants may alter average income of the state without changing the fraction of new movers to that state. Obviously, if tax rate differences are large enough, the rate of movers to a certain state in the MSA may change.

The results suggest changes that alter both averages and the rate of new movers. Both the Minneapolis-St. Paul and the Davenport-Moline-Rock Island MSA’s are predicted to have large differences in the state mover breakdown. In the Minneapolis-St. Paul MSA, an elimination of tax rate differences between Minnesota and Wisconsin is predicted to shift new movers to Minnesota. There appears to be very little impact on the average income differences of these new movers. The Davenport-Moline-Rock Island MSA is predicted to have changes in the number of new movers to the Iowa portion of the MSA and a change in the average incomes of the movers. Specifically, a policy difference eliminating the tax rate difference between states is predicted to take from Illinois the movers with the highest incomes, leaving Iowa with a higher fraction of the new movers, albeit with lower incomes.

Endogenous Workplace (very preliminary)

Table 5 provides very preliminary evidence on the endogeneity of the workplace location choice. All specifications are estimated with instrumental variables. The instruments excluded from the location decision are the interaction of head of household working and share of total MSA employment in state 1. Of the three columns

presented, only column 3, which includes the MSA FE in the estimation provides an overidentifying test statistic that suggests the instruments are exogenous and the equation, identified. This particular specification also indicates that household location is affected by tax differences.

7. Conclusions

Based on very preliminary analysis, there is some evidence suggesting that households consider income tax differences when choosing residential location. Consistent with economic theory, larger tax rate differences are associated with larger differences in location probabilities. This study has also provided results consistent with priors about which households are likely to consider tax differences. Specifically, movers that choose to buy homes appear to be more concerned with lowering their income tax burden than do renters. Working households appear more likely than non-working households to move to the low tax states. These results are suggestive that migrants do consider tax differences when choosing their location.

Changes in the tax liability differences within a market leads to differences in the aggregate number of movers within a state in certain MSA's. The sophisticated nature of the tax rate calculation opens the possibility for new movers to re-sort in complicated ways when income taxes are equalized across states. Further work must be done to improve the method of how these changes are presented.

These preliminary results suggest the method of simulated tax and amenity differences may be a fruitful path of research. One immediate extension to this work is to simulate and re-estimate the models used here on a sample of non-movers. The use of the existing population in the MSA as a comparison group to shed light on the tax effects for movers as compared to the existing population may also provide a nice comparison to the recent mover sample. Another interesting sample might be intra-MSA movers. Similar analysis based on intra-metropolitan movers might also provide some evidence as to the sensitivity of these short-range movers to tax differences.

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Figure 1: Border Metropolitan Statistical Areas

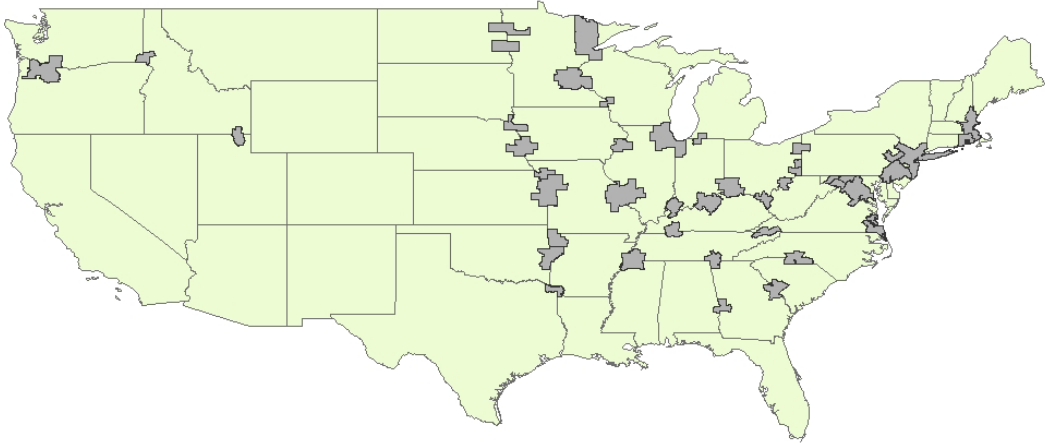


Figure 2: Louisville, KY-IN MSA



	State	Fraction of New Movers	Average Total Tax Rate	Reciprocity	Metropolitan Area	State	Fraction of New Movers	Average Total Tax Rate	Reciprocity
Allentown-Bethlehem	NJ	21.67%	9.01%	0	Kingsport-Bristol-Bristol	TN	63.68%	6.66%	0
-Easton	PA	78.33%	9.82%			VA	36.32%	8.72%	
Augusta-Richmond	GA	62.25%	9.70%	0	La Crosse	MN	65.88%	9.14%	1
County	SC	37.75%	9.75%			WI	34.12%	9.51%	
Boston-Cambridge	MA	90.79%	13.47%	0	Lewiston	ID	39.17%	7.10%	0
-Quincy	NH	9.21%	10.39%			WA	60.83%	5.06%	
Charlotte-Gastonia	NC	91.30%	14.10%	0	Logan	ID	37.83%	7.77%	0
-Concord	SC	8.70%	13.63%			UT	62.17%	7.73%	
Chattanooga	GA	18.85%	9.02%	0	Louisville	IN	16.14%	10.51%	1
	TN	81.15%	7.08%			KY	83.86%	11.37%	
	KY	25.55%	12.36%	1		MN	84.63%	10.06%	1
Cincinnati-Middletown	OH	74.45%	11.47%		Minneapolis-St. Paul-Bloomington	WI	15.37%	10.39%	
Clarksville	KY	26.32%	9.87%	0		Omaha-Council Bluffs	IA	19.79%	11.06%
	TN	73.68%	6.83%		NE		80.21%	10.12%	
Columbus	AL	24.26%	8.42%	0	Parkersburg-Marietta-Vienna		OH	30.77%	6.47%
	GA	75.74%	8.48%			WV	69.23%	6.99%	
Cumberland	MD	37.00%	8.49%	1	Portland-Vancouver-Beaverton	OR	80.51%	12.15%	0
	WV	63.00%	8.62%			WA	19.49%	8.29%	
Davenport-Moline	IL	68.74%	7.94%	1	Providence-New Bedford	MA	23.22%	10.79%	0
-Rock Island	IA	31.26%	8.71%			RI	76.78%	10.00%	
Duluth	MN	58.10%	8.16%	1	St. Joseph	KS	38.83%	6.86%	0
	WI	41.90%	8.58%			MO	61.17%	7.75%	
Evansville	IN	79.81%	8.73%	1	St. Louis	IL	30.32%	9.75%	0
	KY	20.19%	9.44%			MO	69.68%	9.91%	
Fargo	MN	60.96%	5.92%	1	South Bend-Mishawaka	IN	62.54%	8.80%	1
	ND	39.04%	6.58%			MI	37.46%	4.82%	
Fayetteville-Springdale	AR	71.66%	8.22%	0	Texarkana TX-Texarkana	AR	44.84%	6.91%	0
-Rogers	MO	28.34%	7.77%			TX	55.16%	4.88%	
Fort Smith	AR	35.81%	6.10%	0	Virginia Beach-Norfolk-Newport News	NC	6.68%	10.75%	0
	OK	64.19%	5.89%			VA	93.32%	10.32%	
Grand Forks	MN	53.45%	6.53%	1	Wheeling	OH	39.36%	6.67%	1
	ND	46.55%	6.69%			WV	60.64%	7.16%	
Hagerstown-Martinsburg	MD	48.13%	9.51%	1	Winchester	VA	42.51%	9.07%	1
	WV	51.87%	9.41%			WV	57.49%	9.24%	
Kansas City	KS	45.47%	8.85%	0	Youngstown-Warren-Boardman	OH	74.32%	7.31%	1
	MO	54.53%	10.01%			PA	25.68%	7.29%	

Table 2A: Buyer Sample Stats	Obs	Mean	Std. Dev.
Percent Married	26979	.6135513	.4869444
Percent w/ kids	26979	.2919678	.454676
Percent HOH black	26979	.059639	.2368211
HH income (000's)	26979	78.00637	68.3274
Percent with HOH emp	26979	.7213388	.4483487
Income tax rate diff	26979	-.0068072	.0238652
Income tax liability diff	26979	-666.7334	2156.392
Average home value	26979	160391.9	138649.1
Table 2B: Renter Sample Stats	Obs	Mean	Std. Dev.
Percent Married	30101	.3564333	.4789533
Percent w/ kids	30101	.2067373	.4049722
Percent HOH black	30101	.1188333	.3235976
HH income (000's)	30101	42.34683	39.72677
Percent with HOH emp	30101	.7392113	.4390721
Income tax rate diff	30101	-.0104055	.0497662
Income tax liability diff	30101	-636.5547	1752.289
Annual rent	30101	8301.591	4898.444

Table 3: Buyer Models

	(1)	(2)	(3)	(4)	(5)	(6)
	All Buyers	Working Buyers	Non-working Buyers	Reciprocity Markets Buyers	Potential Commuters: buyers	Working Buyers: MSA FE
Δ Income Tax	-0.233 (0.49)	-2.145 (3.51)***	0.216 (0.32)	-1.221 (1.76)*	-3.506 (4.46)***	-1.211 (2.07)**
Δ State Sales Tax	4.407 (2.54)**	15.422 (6.45)***	-1.541 (0.55)	167.971 (3.73)***	18.513 (5.71)***	
Δ State Property Tax	-30.634 (3.50)***	-79.677 (6.62)***	-13.140 (0.95)	-425.649 (3.22)***	-63.414 (4.06)***	
Housing Price Index	0.064 (0.85)	0.113 (1.07)	0.037 (0.32)	0.575 (2.12)**	0.357 (2.66)***	0.569 (3.89)***
Δ Local Income Tax	-21.592 (4.33)***	-15.938 (2.37)**	-9.234 (1.18)	37.743 (2.19)**	-28.369 (3.19)***	
Δ Local Property Tax	-2.910 (1.37)	-10.302 (3.58)***	-3.123 (0.97)	26.253 (1.65)*	6.489 (1.85)*	
Δ Local Sales Tax	-7.390 (2.15)**	8.331 (1.75)*	-1.260 (0.24)	-222.464 (3.21)***	12.610 (1.86)*	
Δ Other State Taxes	26.208 (5.92)***	1.651 (0.27)	51.408 (7.62)***	-115.334 (2.17)**	41.043 (4.98)***	
Δ Education	-0.000 (4.65)***	-0.000 (2.62)***	-0.000 (1.44)	-0.001 (2.51)**	-0.000 (3.59)***	-0.000 (5.31)***
Δ Education X Children	0.000 (1.05)	0.000 (0.44)	0.000 (0.80)	0.000 (1.69)*	-0.000 (0.35)	-0.000 (0.07)
Δ Higher Education	0.000 (3.75)***	-0.000 (1.66)*	0.000 (3.22)***	0.001 (2.03)**	0.000 (2.33)**	0.000 (4.86)***
Δ Higher Education X Children	-0.000 (0.60)	-0.000 (1.40)	-0.000 (0.92)	-0.000 (0.79)	-0.000 (1.46)	-0.000 (2.12)**
Δ Median Income	-0.000 (2.22)**	-0.000 (0.08)	-0.000 (3.16)***	0.000 (0.81)	-0.000 (3.90)***	-0.000 (2.17)**
Δ Median Income X Household Income	0.000 (9.12)***	0.000 (5.35)***	0.000 (5.90)***	0.000 (1.79)*	0.000 (2.18)**	0.000 (4.49)***
Δ Black	0.359 (1.31)	-0.458 (1.23)	1.605 (3.71)***	-10.423 (1.99)**	1.179 (2.39)**	
Δ Black X Black HOH	3.801 (7.65)***	3.619 (4.73)***	3.188 (4.81)***	7.147 (3.88)***	3.362 (3.21)***	3.324 (3.84)***
Δ Hispanic	9.991 (10.10)***	10.678 (7.87)***	10.748 (6.73)***	28.383 (2.32)**	10.499 (6.01)***	
Δ Hispanic X Hispanic HOH	11.755 (3.96)***	9.110 (2.13)**	16.649 (3.80)***	25.479 (1.96)*	8.517 (1.60)	8.477 (2.19)**
Work in State 1	1.701 (69.60)***	2.304 (80.08)***		2.356 (41.24)***		2.345 (78.24)***
Population Share of State in MSA	0.991 (10.64)***	0.387 (3.00)***	0.914 (5.92)***	1.159 (1.08)	0.617 (3.89)***	0.075 (0.46)
Δ Unemployment	0.028 (2.21)**	0.032 (1.74)*	0.007 (0.38)	0.118 (0.64)	0.028 (1.22)	0.095 (2.43)**
Δ Poverty	0.025 (2.43)**	0.068 (4.57)***	-0.030 (1.89)*	-0.066 (0.83)	-0.019 (1.16)	-0.032 (0.83)
Δ Highway	-0.000 (0.44)	-0.001 (2.25)**	-0.000 (0.28)	-0.008 (2.04)**	0.000 (0.80)	0.005 (7.20)***
Constant	-0.956 (10.82)***	-1.299 (10.47)***	-0.425 (3.10)***	-0.852 (2.80)***	-1.679 (10.99)***	-1.268 (6.48)***
Observations	26979	19461	7518	5638	11113	19461

Robust z statistics in parentheses

* significant at 10%; ** significant at 5%;

*** significant at 1%

Table 4: Renters

	(1) All renters	(2) Working Renters	(3) Non-working Renters	(4) Working Renters: FE
Average tax rate (Fed & State) difference between state 1 and state 2	0.486	-0.466	0.293	0.240
	(2.22)**	(1.56)	(1.40)	(0.69)
st. sales tax (POI)	2.090	9.670	0.925	
	(1.13)	(3.80)***	(0.31)	
st. prop. tax (POI)	-11.872	-48.525	-1.360	
	(1.26)	(3.72)***	(0.09)	
Rental Index	0.165	0.164	-0.039	0.072
	(2.30)**	(1.64)	(0.35)	(0.67)
local inc. tax (POI)	-6.266	-6.630	-3.427	
	(1.17)	(0.93)	(0.40)	
local prop. tax (POI)	-1.673	-3.470	-2.797	
	(0.68)	(1.00)	(0.75)	
local sales tax (POI)	-12.108	0.509	-12.864	
	(3.15)***	(0.10)	(2.06)**	
other state taxes (POI)	24.268	4.807	32.730	
	(4.84)***	(0.69)	(4.27)***	
P&S spending per student	-0.000	-0.000	0.000	-0.000
	(3.30)***	(4.98)***	(0.42)	(0.54)
Primary & Secondary Schooling (PS) X HH has kids	-0.000	-0.000	-0.000	-0.000
	(2.20)**	(1.31)	(2.85)***	(1.71)*
higher ed spending per student	0.000	0.000	0.000	0.000
	(3.26)***	(0.89)	(2.33)**	(0.94)
Higher Ed spending (PS) X HH has kids	-0.000	-0.000	0.000	-0.000
	(0.66)	(0.74)	(1.38)	(0.19)
Median Income	-0.000	-0.000	-0.000	-0.000
	(0.99)	(0.76)	(1.34)	(3.00)***
Median Income X HH income	0.000	0.000	0.000	0.000
	(5.54)***	(4.20)***	(2.76)***	(3.46)***
% black	1.104	0.707	1.795	
	(3.57)***	(1.63)	(3.70)***	
% black X HOH is black	4.409	2.719	3.402	2.871
	(10.46)***	(4.75)***	(5.29)***	(4.17)***
% hispanic	13.535	15.521	10.837	
	(12.82)***	(10.44)***	(6.48)***	
% hispanic X HOH is hispanic	15.533	11.218	18.277	10.864
	(7.37)***	(3.78)***	(5.66)***	(3.93)***
work_state1	1.864	2.532		2.577
	(69.20)***	(82.16)***		(80.80)***
Population Share of State in MSA	1.047	0.318	1.493	0.470
	(9.80)***	(2.11)**	(8.63)***	(2.32)**
Difference in uerate	0.014	0.023	-0.010	0.018
	(1.06)	(1.15)	(0.48)	(0.65)
Difference in povper	0.018	0.015	0.011	0.032
	(1.55)	(0.95)	(0.63)	(1.49)
Difference in shighwaypcr	0.000	-0.000	0.000	0.001
	(1.08)	(0.05)	(0.71)	(0.77)
Constant	-1.159	-1.415	-0.667	-1.746
	(14.75)***	(13.01)***	(5.35)***	(11.54)***
Observations	30101	22251	7850	22251

Robust z statistics in parentheses

* significant at 10%; ** significant at 5%;

*** significant at 1%

Table 5: Endogenous Workplace: Buyers

	(1) Endogenous Work State: all markets	(2) Endogenous Work State: rec markets	(3) Endogenous Work State: reciprocity markets:FE
HOH works in state 1	2.224 (4.49)***	0.897 (6.39)***	0.732 (14.81)***
Average tax rate (Fed & State) difference between state 1 and state 2	0.336 (0.85)	-0.191 (0.90)	-0.230 (1.70)*
st. sales tax (POI)	10.892 (3.86)***	41.364 (7.62)***	
st. prop. tax (POI)	-37.117 (4.14)***	-45.494 (3.51)***	
Housing Index	-0.170 (2.22)**	0.073 (1.25)	0.101 (3.94)***
local inc. tax (POI)	-5.502 (1.71)*	5.578 (1.49)	
local prop. tax (POI)	-4.219 (2.84)***	0.109 (0.06)	
local sales tax (POI)	8.648 (3.28)***		
other state taxes (POI)	-11.773 (2.08)**	-31.523 (7.10)***	
P&S spending per student	-0.000 (1.02)	0.000 (0.03)	0.000 (11.94)***
Primary & Secondary Schooling (PS) X HH has kids	0.000 (0.44)	0.000 (1.61)	-0.000 (0.05)
higher ed spending per student	-0.000 (3.04)***	-0.000 (0.61)	-0.000 (6.95)***
Higher Ed spending (PS) X HH has kids	0.000 (0.62)	-0.000 (0.01)	-0.000 (1.48)
Median Income	0.000 (0.52)	0.000 (1.74)*	0.000 (0.26)
Median Income X HH income	-0.000 (1.39)	0.000 (0.73)	0.000 (4.49)***
% black	-1.006 (2.94)***	-0.486 (0.57)	
% black X HOH is black	-0.064 (0.31)	0.582 (2.64)***	0.266 (4.21)***
% hispanic	0.608 (0.79)	7.667 (2.73)***	
% hispanic X HOH is hispanic	-1.133 (0.90)	5.680 (2.40)**	1.096 (2.44)**
Population Share of State in MSA	-0.823 (2.79)***	-0.289 (2.68)***	
Difference in povper	0.015 (2.47)**	-0.002 (0.11)	0.040 (7.76)***
Difference in shighwayper	-0.000 (2.70)***	-0.002 (6.40)***	-0.000 (0.07)
Constant	0.033 (0.60)	0.210 (3.00)***	0.062 (2.36)**
Observations	19461	5638	19461
Robust z statistics in parentheses			
Hansen test p-value	0.000	0.1576	0.0712

* significant at 10%; ** significant at 5%;

*** significant at 1%

Metropolitan Area	State	With Tax Differences		No Tax Differences	
		% of total migrants	Avg. HH Income	% of total migrants	Avg. HH Income
Cincinnati-Middletown	KY	24.49%	\$83,276	23.95%	\$89,352
	OH	75.51%	\$106,982	76.05%	\$104,901
Cumberland	MD	35.66%	\$61,205	34.88%	\$42,067
	WV	64.34%	\$65,977	65.12%	\$76,172
<i>Davenport-Moline -Rock Island</i>	IL	70.56%	\$67,700	64.07%	\$71,644
	IA	29.44%	\$66,189	35.93%	\$59,429
Duluth	MN	60.90%	\$65,085	63.58%	\$64,098
	WI	39.10%	\$52,763	36.42%	\$53,578
Evansville	IN	85.65%	\$68,625	85.65%	\$70,223
	KY	14.35%	\$68,893	14.35%	\$59,355
Fargo	MN	73.21%	\$50,557	58.93%	\$46,596
	ND	26.79%	\$72,386	41.07%	\$70,477
<i>Grand Forks</i>	MN	66.67%	\$50,557	47.15%	\$46,835
	ND	33.33%	\$46,640	52.85%	\$51,408
Hagerstown-Martinsburg	MD	43.48%	\$82,021	75.78%	\$77,745
	WV	56.52%	\$64,662	24.22%	\$54,892
La Crosse	MN	64.52%	\$67,481	58.87%	\$66,837
	WI	35.48%	\$81,769	41.13%	\$80,728
Louisville	IN	17.99%	\$63,429	18.22%	\$72,562
	KY	82.01%	\$91,454	81.78%	\$89,499
Minneapolis-St. Paul- Bloomington	MN	84.29%	\$97,511	87.76%	\$96,363
	WI	15.71%	\$60,159	12.24%	\$57,819
Parkersburg-Marietta- Vienna	OH	26.61%	\$47,521	30.28%	\$55,424
	WV	73.39%	\$67,617	69.72%	\$65,243
<i>South Bend-Mishawaka</i>	IN	61.84%	\$74,642	67.98%	\$68,357
	MI	38.16%	\$71,022	32.02%	\$83,673
<i>Wheeling</i>	OH	30.17%	\$60,741	50.00%	\$53,643
	WV	69.83%	\$58,914	50.00%	\$65,287
<i>Winchester</i>	VA	45.02%	\$79,862	74.41%	\$82,688
	WV	54.98%	\$68,353	25.59%	\$46,923
Youngstown-Warren- Boardman	OH	71.34%	\$81,751	71.97%	\$80,542
	PA	28.66%	\$68,251	28.03%	\$71,049

Markets with a mover ratio change of more than 25% are bolded
Markets with a mover HH income ratio change of more than 15% are bolded

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