ARE THE HIGH FLIERS PRICING THEMSELVES OUT OF THE MARKET? THE IMPACT OF HOUSING COST ON DOMESTIC MIGRATION RATES IN U.S. METROPOLITAN AREAS

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Abstract

What factors affect net domestic migration across metropolitan areas? In a general equilibrium model, the amenities-neutral real cost of living should equalize across regions. However, barriers to migration may prevent rapid market adjustment. Using data for 347 U.S. metropolitan areas and controlling for employment growth, climate, and crime, we find that the impact of housing costs on net domestic migration is non-linear. Net domestic migration rates are positively correlated with housing costs for 90 percent of these metropolitan areas but negatively correlated for the 10 percent with the highest housing costs. We find that an extraordinarily high cost housing market has a substantial adverse effect on a region's ability to retain population and attract new residents, even where there is employment growth.

Introduction

Households move from one metropolitan area to another for a variety of reasons. Some might be seeking better job opportunities; others might want to be closer to friends and family. While motivations might vary among households, standard economic theory tells us that price differences will adjust to compensate for differences in the overall desirability of areas. A similar line of reasoning has long been used to explain the consequences of labor force migration: if workers are attracted to some areas by high wages and leave others because of low wages, the flow of workers will increase labor supply in the former and decrease it in the latter. The result will be wage convergence across the areas, until workers no longer have an incentive to move from one place to another.

Such equilibrating mechanisms are believed to exist for cost of living differences across metropolitan areas as well. Following this logic, as population increases in some areas and declines in others, eventually the cost of living between areas would also

converge. If the advent of air conditioning made the South more attractive in the latter half of the 20th century, lower land values there would rise; if deindustrialization in the Rustbelt caused massive job loss, higher land values there would fall and again we would see a movement toward convergence. A more sophisticated version of the equilibration mechanism argues that to the extent that housing prices vary across metropolitan areas, higher housing prices will offset higher wages and/or better amenities [Rosen 1979; Roback 1982]. Following this line of reasoning and using more precise cost-of-living measures, Albouy [2008] finds that higher incomes in big cities are remuneration for a higher cost of living rather than compensation for a poorer quality of life, as some previous studies have claimed.

However, the problem inherent in these equilibrating models is that processes of adjustment can take a very long time, perhaps even generations. There are barriers that prevent a rapid market adjustment. Households might remain in a declining area because of deep family roots; households might not be able to move to a growing area because zoning restrictions limit new home construction. These market immobilities (in this case, we are indeed speaking literally of physical immobility) will, at the very least, slow down any equilibration we might otherwise expect.

Therefore, it is reasonable to ask, first, what factors affect net domestic migration across metropolitan areas and second, among these factors, what is the impact of persistent differences in cost of living? In particular, does the cost of housing affect domestic migration rates and, if so, are some metro areas "pricing themselves out of the market." While prices have fallen by an average of thirty percent across major metropolitan areas since early 2006, according to the Case- Shiller Home Price Index,

they still remain very high in some areas, and there are still substantial differences in home prices across metropolitan areas. Thus, even considering the recent experience in housing markets, housing prices still may affect migration patterns and employment growth.

What factors affect internal migration?

According to Greenwood and Hunt [2003], early work on internal migration such as that of E. G. Ravenstein in the 1880s U.K. focused on the negative effect of distance and the positive effect of city size and economic vibrancy. Along with this "gravity" model, Ravenstein also discussed the massive rural-to urban shifts of the time using the "pull" of growing economic opportunity in the cities and the "push" of stagnating economic conditions on the farm.

In their own work on internal migration, Greenwood and Hunt, along with co-authors Rickman and Treyz [1991] argue that models of internal migration should account for regional differences in amenities as well as regional differences in wages and prices. In subsequent work examining migration patterns across the 50 states and the District of Columbia, these authors conclude that domestic migration among those under age 65 (excluding military personnel and their dependents because civilian employment opportunities are not relevant for this group) is a function of employment opportunities, real wages, and industry mix relative to other areas as well as the value of an area's amenities relative to amenities elsewhere [Treyz, Rickman, Hunt, and Greenwood 1993].

Researchers who analyze survey data on individuals and households find that the likelihood of moving varies across several demographic dimensions. Schacter [2001]

uses March 2000 CPS data to examine within-county (short-distance) and across county (long distance) moves. He finds that long distance moves are more likely to be work-related, while short-distance moves are more likely to be housing-related. Those who are highly educated are more likely to move for work-related reasons, and this is found to be especially true for long distance moves. Similarly, higher income groups are also more likely than those with lower income to move. Surprisingly, the unemployed are not more likely than the employed to move for work-related reasons. He cites previous research that shows the likelihood of moving declines with age, until retirement age.

Examining recent college graduates, Kodrzycki [2001] finds that those who move from one state to another are likely to have moved before (either as children or to attend college), and are also more likely to move from states with low employment growth, high unemployment, or low pay for college graduates. Similarly, Sasser [2008] finds that young people with B.A. degrees (ages 22-27) leave New England primarily in response to job opportunities elsewhere.

Like others, Bishop [2008] notes that young people move more than older people, but he emphasizes that highly educated young people are more likely to move than the less educated. Moreover, they are likely to move farther and more often.

Bishop also notes that domestic migration patterns are different for whites and blacks. Whites moved from the old factory towns of the northeast and Midwest and they also moved away from some of the very largest metropolitan areas; they moved to high tech cities and to recreation and retirement areas. Blacks moved to cities in which there were already-vibrant black communities. Using a Tiebout-inspired residential sorting

model, Bishop argues that like will seek like, and to a much higher degree than in the past.

These crosscurrents affecting domestic migration are also reflected in the work of Richard Florida [2008]. He ranks the desirability of 167 metropolitan areas with populations greater than 250,000 for people at different stages of the life cycle: recent college graduates, young professionals, married couples with children, empty nesters, and the elderly.

While Florida emphasizes an area's amenities, Glaeser and Saiz [2003] argue that ceteris paribus, U.S. metro areas with a more highly educated population grow more quickly than those with less human capital, and that this effect partially offsets the adverse impact on population growth posed by cold or wet climates, or a lack of foreign immigrants. They argue that such areas grow because they are more productive and more able to "reinvent themselves" (i.e., more able to adapt and shift from one export base to another), and not because they offer better amenities. Nevertheless, a recent paper by Carlino and Saiz [2008] finds that attractive metropolitan areas, as measured by the number of leisure trips taken there, grow faster than less-attractive areas.

What is the impact on domestic migration of persistent cost of living differences?

While the preponderance of economic research focuses on factors that reinforce convergence, a number of newer studies reveal that barriers to mobility and various forms of land use restriction prevent equalization of unemployment rates, wages or housing values. Oswald [1996] argues that homeownership is an impediment to mobility. He provides evidence from European countries and from the United States showing that an increase in homeownership rates is associated with a rise in unemployment. His work

has been cited by Tim Harford (The Undercover Economist) to explain why Detroit has not lost even more population….those who are optimistic about finding work will move to places that might be more expensive, but those who are less optimistic would rather be unemployed where housing is cheap than where housing is expensive [Harford 2007].

Ferreira, Gyourko, and Tracy [2008] have recently contributed to this body of research on the relationship between mobility and homeownership. Using national data from the biannual *American Housing Survey* over the period 1985-2005, and restricting their sample to single detached homes owned by a household head between the ages of 21 and 59, they measure the impact of negative home equity on the likelihood that a household will move, and find that it reduces the likelihood by half. They note that "lower mobility is likely to result in more inefficient matching in labor markets, as some households will not be able to move to access better jobs in alternative labor markets." [p.18]

Gyourko, Mayer, and Sinai [2006] argue that between 1950 and 2000, the gap in housing values and incomes between the highest-priced locations (the places they refer to as "superstar cities") and all others actually increased. They explain that land use restrictions in these cities have made the housing supply highly inelastic, and that growing demand for housing in these cities on the part of the extremely wealthy has bid up prices, causing higher price-to-rent ratios in these areas than elsewhere, and driving out households with lower incomes who find these areas increasingly unaffordable.

Johnes and Hyclak attempt to relate regional labor markets with regional housing markets in selected areas of the U.K. [1994] and the U.S. [1999]. They argue that interactions between the labor market and the housing market can disrupt the standard

convergence mechanisms, leading to instances of prolonged disequilibrium. Similarly, in a study that asks whether disparities in housing prices and rates of appreciation in housing values affected labor mobility across the nine U.S. census regions during the 1980s, Gabriel, Schack-Marquez, and Wascher [1993] present findings consistent with gravity models in which there is a positive influence for population size and a negative influence for distance. Education levels matters but age distribution does not. They find that the "push" economic conditions in origin regions are stronger than the "pull" economic conditions in destination regions. Most importantly, they find that destination house prices in regions that have high price levels and high rates of appreciation are a deterrent to in-migration and a spur to out-migration.

Finally, a recent study examining the challenges facing middle class households in the five boroughs of New York City focuses on the high cost of living there [Bowles, Kotkin, and Giles 2009]. In 2006, the net domestic outmigration rate from New York City, 18.7 per thousand, was more than double the 7.6 per thousand net domestic outmigration rate of severely economically troubled Buffalo/Niagara Falls. The authors acknowledge other factors causing outmigration like the paucity of middle income jobs, the poor quality of many of the city's public schools, and the inadequacy of public transportation from the farther reaches of the outer boroughs where many of the city's middle class households live. However, they calculate that it would take an income of $123,322 in Manhattan ($85,918 in Queens) to achieve the standard of living attainable at an income of $50,000 in Houston and emphasize the role of high housing costs in driving people out of the city. They warn that an "hour-glass" city comprised primarily of the

rich and the poor and lacking a substantial middle class will have difficulty maintaining its vibrancy.

Our Model

In contrast to models examining the equilibrating forces that would ultimately reduce incentives to migrate from one metropolitan area to another, our study posits a disequilibrium model and relates to much of the recent work linking a high cost of living to net outmigration. We want to investigate whether differences among metropolitan areas in the cost of living, especially differences in housing costs, have an independent and significant effect on net domestic migration flows. In particular, we test to see whether there are non-linearities in the relationship between housing cost and net domestic migration.

Methodology

Our analysis is based on cross-sectional multiple regression, using data for 347 metropolitan statistical areas. The dependent variable in our regressions is Net Domestic Migration Rate between 2000 and 2007 for each metropolitan area This variable is regressed against housing costs, employment growth, climate, and crime rates in each metro area. Additional regressors that we explore include non-housing costs and ordinal rankings from Sperling's *Best Places to Live*. The results allow us to assess the impact of housing costs on net domestic migration rates controlling for these other factors.

Data

Throughout this analysis, we used the most current definitions of metropolitan areas provided by the U.S. Census Bureau. Because of 2003 Census revisions in the counties included in some metro areas in response to findings from the 2000 decennial

census, the set of metro areas -- and the counties contained in these metro areas -- after 2003 are not identical to those that existed in 2000. To insure that each variable represents geographically consistent areas, we used data from individual counties (the building blocks from which the Census creates metro areas) to adjust 2000 base year variables wherever necessary.

The Net Domestic Migration Rate was calculated using data from the U.S. Bureau of the Census on domestic (internal) migration (total net migration minus migration from international sources), obtained from the Census webpage (U.S. Census 2007). We created the net domestic migration rate by dividing the sum of internal migration for the years 2000 through 2007 by the base-year (2000) population.

The variable for employment growth was constructed using census data on employment levels in 2000 and 2006 for each metropolitan area (U.S. Census 2006). We examined the list of counties in metro areas in each year between 2000 and 2006, and then adjusted the base-year (2000) metro area employment figures, adding or subtracting pertinent employment data from the counties, to fit the current metro area's geography. The county data used in the adjustments were obtained from a third Census source (U.S. Census 2008).

Cost of living data, including monthly housing costs and monthly total living cost were obtained from data used in the Basic Family Budget Calculator published by the Economic Policy Institute (EPI 2008). EPI's basic family budget calculations constitute "the income required to adequately afford a safe and decent standard of living for one of six family types living in any of 400 specific U.S. communities." These budgets are calculated for six different family types (one or two parents with one to three children)

and incorporate regional, state, or local variations in prices (depending on item). For the purposes of our research, we used the calculations for 4-person families with two adults and two children. These basic budgets are relative measures of what incomes are necessary to attain the same standard of living in each metropolitan area. The budget items that are included in the basic family budgets are: housing, food, child care, transportation, health care, other necessities, and taxes. The housing item we use in our analysis is based on the Department of Housing and Urban Development's fair market rents (FMRs). FMRs represent 40th percentile rents (shelter rent plus utilities) for privately owned, decent, structurally safe, and sanitary rental housing of a modest (non-luxury) nature with suitable amenities. Rents for two-bedroom apartments were used for families with one or two children.

The source for the crime variables is the Federal Bureau of Investigation's annual reports "Crime in the United States" (FBI 2006, 2005, 2004, 2003). Using the data from these annual reports we calculated the average violent crime rate and the average property crime rates for each metropolitan area over the four years from 2003 to 2006. The crime data for metro areas from 2002, 2001, and 2000 was not included in our averages because in many cases, as noted earlier, the metro area boundaries changed in 2003; thus crime information gathered earlier than 2003 was for a somewhat different geographic contour.

Climate data in this study consists of "days over 90 degrees" and "days under 32 degrees" available from the National Oceanic and Atmospheric Administration (NOAA 2007). To match this city-based data with our metropolitan areas, we identified cities within or near each metropolitan area and used the corresponding data.

Finally, we included ordinal rankings from Sperling's *Best Places to Live* in order to capture something about urban amenities across metro regions (Sperling and Sander 2004). While some of the inputs used by Sperling to create the rankings are similar to our regressors (e.g. job growth, climate, crime), the inputs also include measures of amenities including such quality of life indicators as education levels, health and health care, transportation options, local leisure activities, and arts and cultural institutions. Sperling rankings exist for 285 of our 347 metropolitan areas.

The Findings – An Analysis of Housing Costs by Decile

Before advancing to the regression analysis, it is useful to review data on housing costs across MSAs. Not surprisingly, we find housing costs vary substantially from one metropolitan area to another. **Figure 1** arrays the housing cost data for the 347 metro areas in the EPI dataset by deciles. The median monthly housing cost (for a typical 4-person family) is $687 per month (with a mean of $739). The least costly decile of metro areas has a mean value of $548, twenty percent (20%) lower than the all-MSA median and 26 percent below the all-MSA mean. Most of these 1st decile metro areas are found in the south and the southwest along with a few highly deindustrialized mid-western communities. Those in the bottom decile include such communities as Morristown, Tennessee; Las Cruces, New Mexico; Johnstown, Pennsylvania; Odessa Texas; Dubuque, Iowa; and Sumter, South Carolina.

In contrast, the 9th decile has a mean housing cost of $895, about 30 percent higher than the median but just 21 percent higher than the all-MSA mean. Included in these relatively more expensive housing markets are such metro areas as Tallahassee,

Florida; Minneapolis, Minnesota; Denver, Colorado; Santa Fe, New Mexico; Ann Arbor, Michigan; and Sacramento, California.

The top decile, however, appears to be quite unique. Its mean housing cost of $1,175 is 71 percent higher than the all-MSA median and, as **Figure 2** reveals, 31 percent higher than the mean for the 9th decile communities just below it. Note that the percentage increase in the interdecile means, excluding the top decile, is never greater than 12.2 percent and for the bottom 8 deciles lie between 4.0 and 7.6 percent. Hence, housing costs in the top decile metro areas are well above those everywhere else in the nation. Honolulu, Hawaii is the most expensive of all 347 communities followed by four MSAs in California (San Francisco, Santa Cruz, Oxnard, and San Diego) followed by Boston (#6), Santa Barbara (#7), Washington, D.C. (#8), the New York metro area (#9), and Los Angeles (#10).

Figure 1

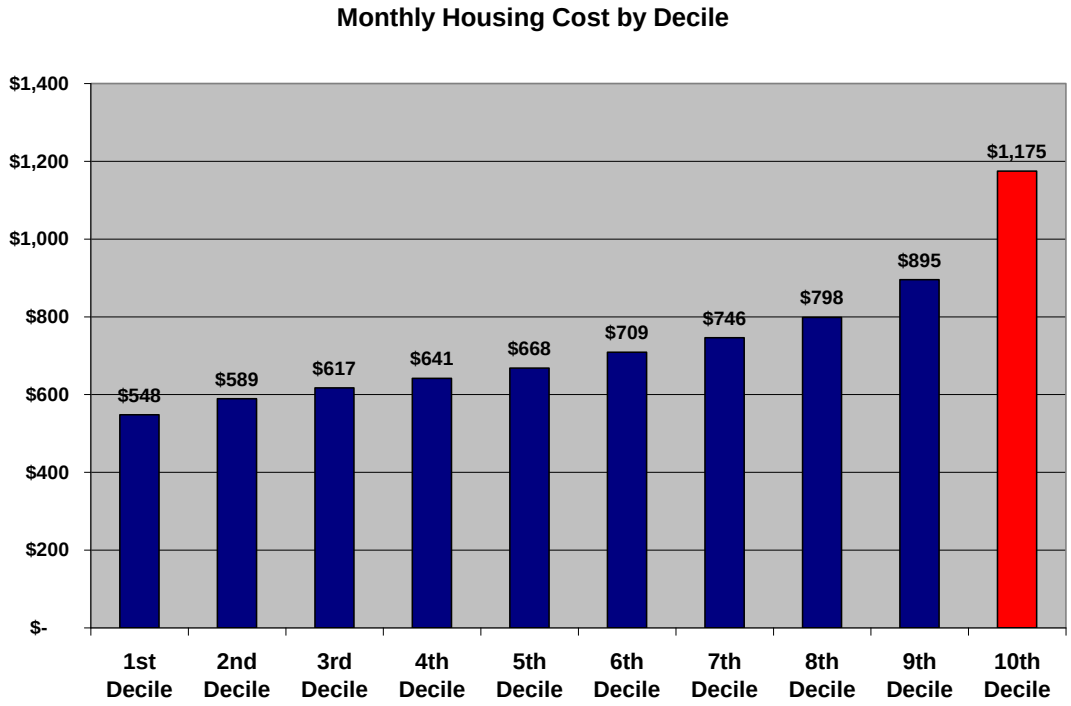
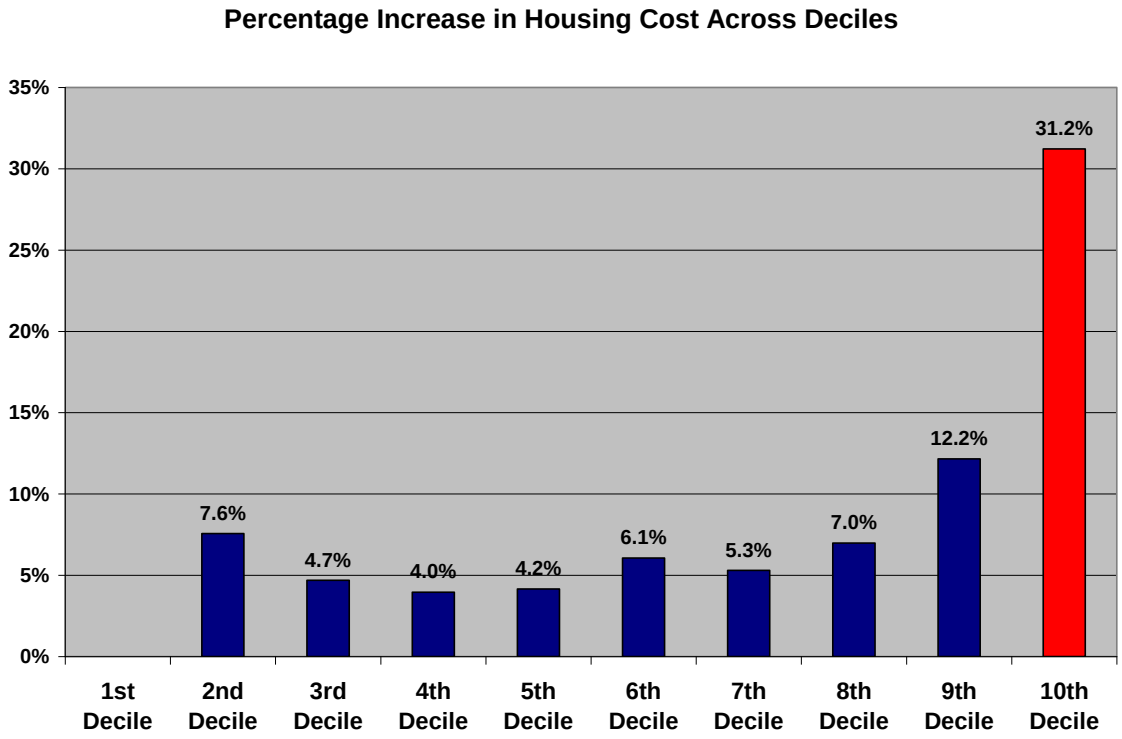
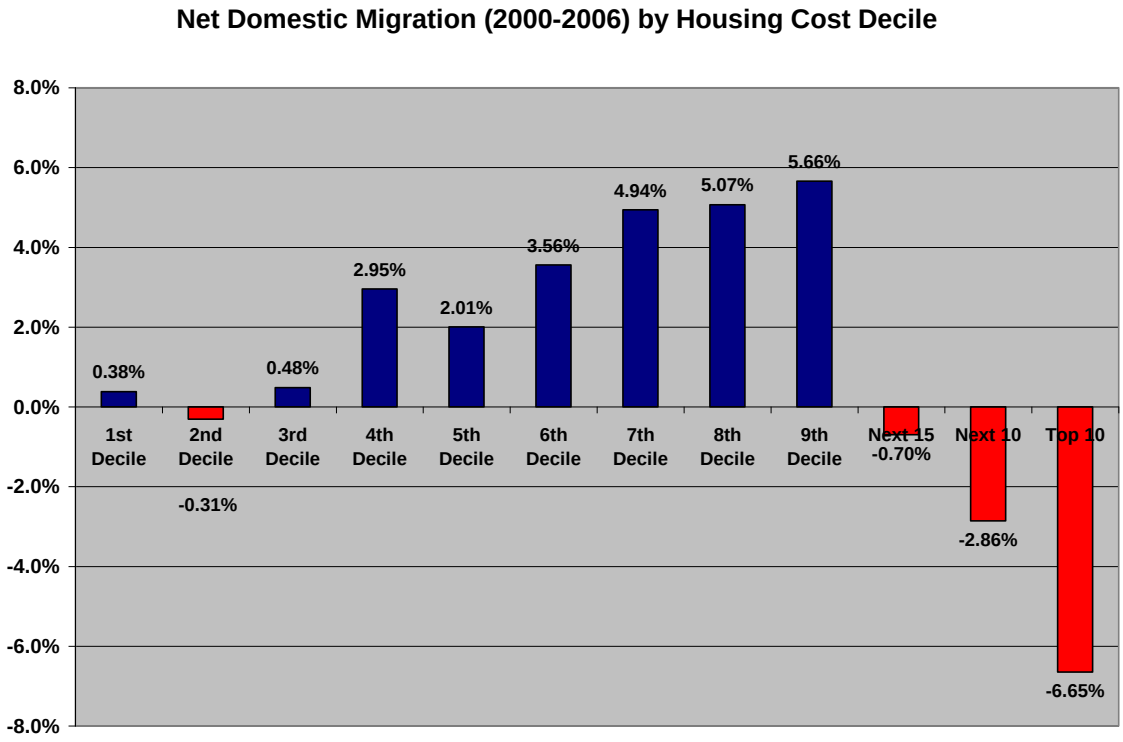


Figure 2



The unique character of the Top Decile MSAs appears to have a powerful impact on net domestic migration as **Figure 3** demonstrates. Here we display the average migration rates for the ten housing cost deciles.

Figure 3



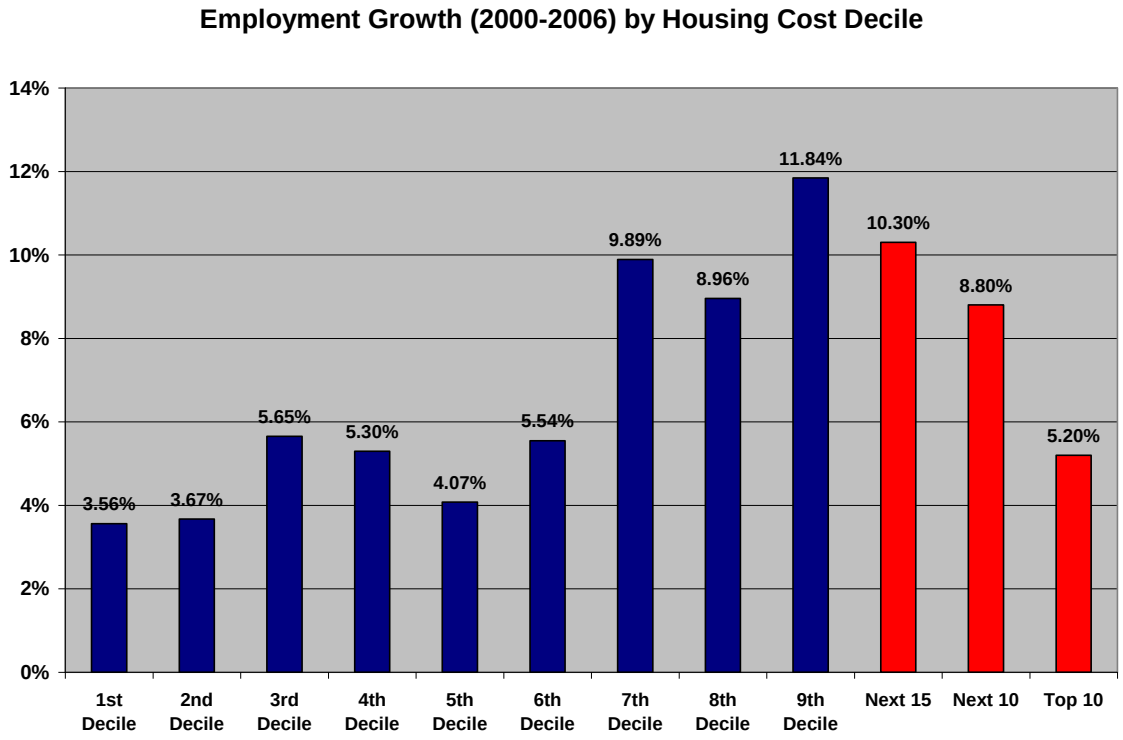
What is rather remarkable is that, for the most part, the higher the cost of housing, the higher the net-IN-migration rate right through the 9th decile. This pattern abruptly changes in the 10th decile and reverses direction. The 15 MSAs at the bottom of the top housing cost decile have a small average net out-migration rate (-0.70%); the next ten more expensive MSAs average -2.86%; while the ten communities with the very highest housing costs average an extremely high -6.65% out-migration rate. Overall, 23 of the 35 (66%) metro areas in the top decile have lost population to out-migration. Among the

210 MSAs in the 4th through 9th housing cost deciles, only 27 percent have net out-migration rates.

How might we explain this pattern? Households appear to be moving from the costliest MSAs – those in the Top Decile - to those in the 7th, 8th, and 9th deciles. These are generally communities where housing costs are somewhat above the all-MSA median, but where the economies are healthy, where sufficient amenities exist to offset the somewhat higher housing costs, and where housing costs are not prohibitively expensive as in the 10th decile. The bottom three deciles, on average, have had little in-migration nor out-migration. In these low cost of living metro regions, one suspects that job opportunity is severely limited, reducing the opportunity for households to move in even if housing costs are very low. Some of the metro areas in these low cost deciles are Decatur, Alabama; Dubuque, Iowa; Muskegon, Michigan; Duluth, Minnesota; and Scranton, Pennsylvania. In each of these cases the net domestic migration rate is no higher than 0.4 percent and no lower than 0.9 percent.

A similar pattern, although not as striking, holds for the pattern of employment growth across the ten housing cost deciles. As **Figure 4** reveals, employment growth appears fastest in the 7th to 9th deciles and then falls off sharply in the 10th.

Figure 4



It appears that firms are willing to expand production and employment in relatively expensive MSAs, but do not seem to do so to anywhere near the same degree in the very most expensive communities.

This is the prima facie evidence of the most costly communities "pricing themselves out" of the market for both households and jobs. Indeed, these two figures suggest a reversal of causation between housing cost and both migration and employment growth once we reach the top decile MSAs. Strong employment growth and in-migration may put upward pressure on housing price as we move from the 1st to the 9th decile. However, beyond the 9th decile, causation reverses with high housing cost restricting in-migration, encouraging out-migration, and discouraging job creation.

Findings - Regression Results

To further examine the impact of housing costs on net domestic migration we ran a series of regressions on the entire sample of 347 metropolitan areas and a subsample of 285 metropolitan areas for which we had rankings from Sperling's *Best Places to Live*. We then segmented the sample by housing costs, aggregating metropolitan areas in the two top deciles. We ran another set of regressions on the 70 metropolitan areas in the top two deciles and on a subsample of 64 areas for which we had rankings from Sperling's *Best Places to Live*.

Regression Results – Net Domestic Migration

Regressions Results for the Full Sample of Metropolitan Areas: **Table 1** reports the regression results for the dependent variable, Net Domestic Migration, in nine different specifications. Column 1 shows that in a linear specification, housing costs are not significant. However, a quadratic specification (column 2) reveals that net domestic migration rises as housing costs increase up to a point, but then decline at higher levels of housing costs. Variables in this quadratic specification are significant but the adjusted R^2 is relatively low.

Since responding to job opportunities is one important motivation for migration, we added the employment growth rate (column 3) which improved the R^2 considerably. This regression explains over forty percent of the variation in net domestic migration across metropolitan areas. Columns 4 and 5 add climate variables to the equation. While warm climates do not appear to have a significant effect on net domestic migration after controlling for employment growth and housing costs, cold climates have a negative effect (significant at the 10% level). Columns 6 and 7 added crime variables (the violent

crime rate and the property crime rate, respectively) but these were not significant. While households might take crime rates into account when making location decisions at the neighborhood level or even at the level of the municipality, they apparently do not do so at the metro area level. In Columns 8 and 9, we substitute the analogous quadratic terms for non-housing costs and for total costs. The non-housing cost coefficients are not significant; the terms for total costs are significant, but this equation has somewhat less explanatory power than the equation we specified in Column 5 which uses housing costs.

Table 1 Net Domestic Migration (2000-2006)

Var		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant		0.0417	-0.2563	-0.1705	-0.1761	-0.1651	-0.1653	-0.1633	-0.2084	-0.415
Mhousing		-0.00002529	0.00068055	0.0004376	0.000438	0.000451	0.00045	0.000452		
		(-1.21)	(5.77)	(4.64)	(4.65)	(4.78)	(4.71)	(4.78)		
Mhousing2			-0.00000039	-0.00000027	-0.00000027	-0.00000028	-0.00000028	-0.00000028		
			(6.07)	(5.29)	(5.25)	(5.48)	(5.40)	(5.74)		
NonHousing									0.000144	
									(1.25)	
NonHousing2									-0.00000003	
									(1.46)	
MtotalCost										0.00022
										(2.96)
MTotalCost2										-0.00000003
										(3.25)
EmpGrR				0.38686	0.37075	0.3744	0.3746	0.3742	0.3919	0.3896
				(14.59)	(12.83)	(13.69)	(13.6)	(13.65)	(13.88)	(14.07)
Days Over 90					0.000122					
					(1.39)					
Days Under 32						-0.0000994	-0.0000973	-0.000103	0.000025	-0.0000048
						(1.77)	(1.57)	(1.68)	(0.42)	(0.08)

VCrimeR							0.0000012			
							(0.08)			
PCrimeR								-0.00000039		
								(0.14)		
N		347	347	347	347	347	347	347	347	347
R2		0.001	0.095	0.440	0.442	0.444	0.442	0.442	0.388	0.409

t-statistics in ( )

Regression Results for Subsample with Sperling's Best Places to Live Rankings:

In an effort to use a more comprehensive gauge of the relative desirability of metropolitan areas, we ran a series of regressions on net domestic migration in which we used Sperling's *Best Places to Live* rankings as one of our independent variables (see **Table 2**). Although The Best Places to Live (BPL) index included information on cost of living, climate, and crime, we found it was not highly correlated with any of the other independent variables in our regressions. Because a higher ranking has a lower numerical value, we expected a negative relationship between BPL ranking and net domestic migration, and that is precisely what we found for the 285 metropolitan areas for which we had Sperling data. While the coefficients are small, the BPL rankings are significant in each equation. In Column 1, an equation containing only BPL explains less than 5 percent of the variance in migration rates. The adjusted R^2 improves when the quadratic housing terms are added (Column 2). Adding the employment growth variable yields a large improvement in the R^2, providing an equation that explains over 45 percent of the variation in net domestic migration (Column 3). The climate variables added in Columns 4 and 5 have the expected signs (holding all else constant, people are likely to move toward warm climates and away from cold ones) and are significant at the 10% level.

Table 2 Net Domestic Migration using Sperling's Best Places to Live Index

Var		(1)	(2)	(3)	(4)	(5)
Constant		0.0455	-0.1752	-0.1172	-0.1228	-0.1088
BPL		-0.0001624	-0.000167	-0.000136	-0.000145	-0.000142
		(3.97)	(4.06)	(4.09)	(4.33)	(4.25)
Mhousing			0.000562	0.000375	0.000373	0.000385
			(4.78)	(3.92)	(3.92)	(4.03)
Mhousing2			-0.000000333	-0.000000242	-0.000000389	-0.000000252
			(5.38)	(4.82)	(4.76)	(5.00)
EmpGR				0.3789	0.3518	0.3619
				(12.41)	(10.43)	(11.34)
Days Over 90					0.00017	
					(1.86)	
Days Under 32						-0.000104
						(1.77)
N		285	285	285	285	285
R2		0.049	0.156	0.454	0.458	0.458

t-statistics in ( )

Deciphering Causation

As noted above, where we described the decile results, the direction of causation in our model is not unambiguous. Similarly, it can be argued that there is ambiguity in causation in the regressions reported in Tables 1 and 2. Instead of housing costs driving net migration or employment growth, it seems likely that migration and job growth drive housing costs. Metro areas experiencing substantial in-migration and rapid employment growth are likely to see an increase in housing costs if housing supply lags behind demand. As Figure 3 revealed, the relationship between housing costs and net migration rates has a sharp break between the 9^{th} and 10^{th} deciles on housing cost. For the first 9 deciles, higher migration rates appear to be correlated with higher housing costs – possibly suggesting that higher housing costs are a result of more rapid in-migration. But this causation cannot apply to the top decile where there is an inverse relationship between housing costs and net migration. There is no plausible theory that could explain why higher out-migration would actually contribute to an upward spike in housing costs.

To obtain an estimate of the impact of housing costs and employment growth on net migration in the high housing cost MSAs, we re-ran our regressions restricting the sample to the 70 metro areas with the highest housing costs.

Regression Results for Metropolitan Areas in the Top Two Deciles of Housing Costs: Once the full sample is segmented by housing costs for the top two decile MSAs, we found a statistically significant inverse linear relationship between housing costs and net migration rates (see Columns 1 in **Table 3**). Housing costs alone explain nearly a quarter of the variance (R^2= .231) in migration rates in these 70 high housing cost metro areas. Adding the employment growth rate to the regression equation (Column 3) brings the adjusted R^2 above .55. Only partially offsetting the adverse impact of high housing costs is a warm climate as shown in Column 4. This equation explains 64 percent of the variation in net domestic migration within this group of "high-flying" metropolitan areas. BPL rankings were available for 64 out of the 70 areas, but this variable was never statistically significant (Columns 5 and 6) within this truncated sample.

Table 3 Net Domestic Migration (Top 2 Deciles)

Variable		(1)	(2)	(3)	(4)	(5)	(6)
Constant		0.2708	0.6397	0.1667	0.0887	0.1798	0.0896
Mhousing		-0.000243	-0.000907	-0.000186	-0.000131	-0.000190	-0.000128
		(4.79)	(1.72)	(4.70)	(3.42)	(4.68)	(3.22)
MHousing2			0.000000287				
			(1.26)				
BPL						-0.0000777	-0.0000512
						(0.91)	(0.66)
EmpGR				0.4756	0.3771	0.4956	0.3966
				(7.03)	(5.75)	(7.36)	(6.07)
Days Over 90					0.00079		0.000788
					(4.06)		(3.95)
N		70	70	70	70	64	64
R2		0.241	0.248	0.557	0.640	0.590	0.670

t-statistics in ( )

Regression Results – Employment Growth

From the previous regressions, there is evidence that housing costs have a statistically significant effect on net domestic migration rates, even after controlling for a metro area's employment growth. But is employment growth itself affected by housing costs?

Table 4 presents evidence suggesting a relationship between job growth and housing costs over the 2000-2006 period similar to that we have found for migration.

Table 4 Employment Growth

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	0.0131	-0.2218	-0.243	-0.1786	0.3213	-0.3181	-0.2374	-0.198	-0.2266
Mhousing	0.0000716	0.000628	0.000532	0.000658			0.000591	0.000525	0.000584
	(2.23)	(3.33)	(3.06)	(3.60)			(3.46)	(3.04)	(3.41)
Mhousing2		-0.0000003	-0.00000023	-0.00000034			-0.000000255	-0.000000233	-0.000000253
		(2.99)	(2.49)	(3.45)			(2.77)	(2.50)	(2.75)
NonHousing					-0.000114	0.000187			
					(0.51)	(0.87)			
NonHousing2					0.00000001	-0.00000003			
					(0.30)	(0.81)			
Days Over 90			0.0012			0.00126	0.0015	0.00137	0.00152
			(8.08)			(7.25)	(9.13)	(8.36)	(9.03)
Days Under 32				-0.00053					
				(4.92)					
VCrimeR							-0.000113		-0.000104
							(3.92)		(3.17)
PCrimeR								-0.000124	-0.0000031
								(2.32)	(0.51)
N	347	347	347	347	347	347	347	347	347
R2	0.011	0.034	0.186	0.095	0.016	0.144	0.219	0.196	0.217

As in the case of the simple net migration rate regression, the regression equation in column 1 reveals a statistically significant positive relationship between housing costs and employment growth across the full set of MSAs. However, housing costs only explain about one percent of the total variance in the number of jobs added in a metro area between 2000 and 2006. Column 2 adds the housing cost quadratic term which demonstrates that the same non-linear pattern that holds for migration appears to hold for employment, as well. The adjusted R^2, however, remains quite low at .034.

The addition of a climate variable (Days Over 90 degrees) in Column 3 adds substantially to the overall explanatory power of the regression, boosting the R^2 to .186 while leaving the impact of housing costs largely unchanged. Substituting the alternative climate variable (Days Under 32 degrees) into the equation as in Column 4 suggests that "cold" places are less likely to see employment growth than warmer ones, but the overall explanatory power of this equation is only about half (R^2=.095) that found in the previous regression. Apparently, warm climate metro areas are much more likely to attract jobs than cold climate cities repel them.

Columns (5) and (6) substitute non-housing cost of living for housing costs and these prove (as in the case of net migration) to have no apparent bearing on employment growth rates. Differences in housing costs seem to matter in where jobs proliferate, but not apparently other costs.

The next two columns in Table 5 reveal that crime rates, which did not appear to affect migration, do seem to matter to where employment growth occurs. Both the violent crime rate and the property crime rate enter into the job growth regression as statistically significant and improve the overall explanatory power of the equation

(R^2=.219 and R^2=.196, respectively). When both crime rates are added to the equation, the violent crime rate dominates the property crime rate, leaving the second statistically insignificant.

From these regressions, we conclude that there is strong evidence that matters related to climate and crime have a substantial impact on where firms expand operations, but that extremely high housing costs can deter job growth as they deter in-migration. Firms may find it difficult to attract workers to high cost areas or are unwilling to pay wage premia to attract them.

Substituting the Sperling *Best Places to Live* variable into this model as reported in **Table 5** does little to change this result. The coefficient on the BPL variable has the expected sign and is generally significant at the .05 level. The housing cost quadratic behaves as in the previous regression formulation, warmer places seem to be able to attract more jobs, and violent crime repels them.

Overall, then, we have found statistical evidence that is in accord with our model suggesting that higher housing costs for most metro areas do not deter either migration or job creation, but the most expensive MSAs are in danger of pricing themselves out of the market for both people and jobs.

Table 5 Employment Growth

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.0834	-0.153	-0.1625	-0.094	-0.1709	-0.1289
BPL	-0.000139	-0.0000823	-0.000129	-0.000103	-0.000112	-0.000127
	(2.27)	(1.27)	(2.20)	(1.67)	(1.91)	(2.17)
Mhousing		0.000494	0.000392	0.000504	0.00045	0.000383
		(2.68)	(2.35)	(2.86)	(2.69)	(2.30)
Mhousing2		-0.000000239	-0.000000168	-0.00000268	-0.000000191	-0.000000165
		(2.45)	(1.90)	(2.88)	(2.17)	(1.88)
Days Over 90			0.0012		0.0014	0.0013
			(8.05)		(8.33)	(7.75)
Days Under 32				-0.000556		
				(5.31)		
VCrimeR					-0.0000727	
					(2.50)	
PCrimeR						-0.00000917
						(1.58)
N	285	285	285	285	285	285
R2	0.014	0.036	0.214	0.121	0.229	0.218

t-statistics in ( )

Simulation Results

These regression results suggest that those metropolitan areas in the nation with the very highest housing costs are losing population due to out-migration and gaining jobs at a slower pace than regions with more modest priced housing. What we would like to know, however, is the possible magnitude of this phenomenon.

To answer this question, we have simulated what the net migration rate and the employment growth rate would be for one MSA within the top decile by simulating different housing costs. Here we shall use the Boston Metropolitan Area, a community we know quite well. According to our data, Boston ranks sixth in terms of monthly housing costs among the 347 communities in this study.

Using Regression #5 for the entire data set (Table 1), we find that a 10 percent reduction in monthly housing cost would reduce the outmigration rate by 43 percent, from 6.0 percent to 3.4 percent. In contrast, an increase in employment growth of 10 percent appears to have almost no impact on reducing outmigration with the rate falling by only 0.1 percentage point to 5.9 percent. To check these results, we performed these simulations based on the simple linear Regression #4 for the sample restricted to MSAs in the top 2 deciles (Table 3). In this case, a 10 percent reduction in monthly housing cost reduces Boston's outmigration rate by about 20 percent to 4.8 percent. (This is a smaller reduction and can be traced to the absence of the quadratic housing cost variable in the truncated sample regressions.) A 10 percent increase in employment growth again reduces net out-migration by only 0.1 percent points.

Essentially, high housing costs trump employment as the chief factor in explaining net migration for high housing cost areas like Boston.

Conclusion

Housing costs affect net domestic migration between U.S. metropolitan areas even after controlling for employment growth and climate indicators, but the effect is strongly non-linear. Net domestic migration is positively correlated with housing costs for most U.S. metropolitan areas, suggesting that in-migration increases demand for housing and thereby housing prices. However, in the top ten percent of metropolitan areas with the highest housing costs, the causation reverses with these costs causing substantial out-migration.

Simulations for the Boston metropolitan area demonstrate that holding employment growth, climate variables, and crime rates constant, a 10 percent reduction in housing costs would reduce outmigration from 6.0 percent to as little as 3.4 percent depending on the form of the regression equation used. In contrast, an increase of 10 percent in the employment growth rate would decrease the out-migration rate by only 0.1 percentage point. The combination of extremely high housing costs plus a cold climate is especially problematic for metropolitan areas hoping to maintain or grow their populations.

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