HOUSING OPTIONS OF FEMALE-HEADED HOUSEHOLDS: EVIDENCE FROM THE AMERICAN HOUSING SURVEY

Augustin N. Ntembe, Bowie State University
LaTanya Brown-Robertson, Bowie State University

ABSTRACT

Over the last three decades, the growth in housing costs relative to household incomes across cities in the United States has dramatically affected households' housing options. For this study, we apply a logit model to data from the American Housing Survey to provide evidence on how rising house costs affect female-headed households' decisions to move from the current home to another. Estimates reveal that total housing cost is a significant determinant of a female-headed household's decision to move. We also found that lower-income female-headed households are more likely to move to a new location than higher-income female-headed households. These results support the idea that affordable housing programs should be maintained and expanded to offer some alleviation to the burden of rising housing costs on lower-income female-headed households and other vulnerable groups.

INTRODUCTION

The majority of US cities, over the last three decades, have undergone transitional and migration changes. The mobility of households can partly be attributed to gentrification, which has led to increased property value and housing costs (Goetz, 2010; Ellen & O'Regan, 2011; HUD, 2018; Zenebe, et al., 2018). Low income and minority households are disproportionately cost-burdened and faced with less comparable affordable housing options (Desmond & Shollenberger, 2015; Mills et al., 2006; Taylor, 2015; HUD, 2017). According to the (HUD, 2017), an estimated 12 million homeowners are now paying more than 50 percent of their annual incomes on housing. This amount exceeds the recommended amount of 30 percent annual income for housing.

The high rental costs in the cities place a significant burden on low-income and moderate-income residents who are then obliged to make difficult choices. Households either chose to stay and incur high costs or migrate to less expensive locations further away from jobs and transportation. Besides, households forced to relocate often end up residing in less prosperous neighborhoods, faced with financial hardship and restricted economic mobility (Ding & Hwang, 2016). The extent of the hardship differs across socioeconomic groups. Most often, households facing the most challenge from the rising housing cost across cities are headed by female heads and minority households.

These groups are considered as the most vulnerable and cost-burdened households and would be unable to afford the high rental costs, significantly when some form of government housing assistance to alleviate their burden does not exist (Patrick, 2017; Disney, et al., 2010)

The study seeks to comprehend the housing choices and demographic make-up of the female-headed households in the United States utilizing the American Housing Survey. Female-headed households are identified as one of the most economically challenged groups in society (Patrick, 2017). Thus, the study seeks to provide answers to the following research questions. Do housing costs influence the decision on whether a female-headed household should migrate? Do the education level and household income impact the likelihood of a minority or female-headed household moving out of their residence? The study will use logistic regression to determine whether the displacement of single female-headed households in the United States is attributed to rising housing costs. The study will also investigate the role of household income and household head's educational attainment on whether to move or not as housing cost changes.

REVIEW OF PREVIOUS STUDIES

In a study of the mobility and destination in the US's migration decision, Berger & Blomquist (1992) find that moving costs and earnings significantly affect the probability of moving from one county to another. However, the study finds no evidence those differences in housing costs matter in deciding whether to move or not. The study by Berger and Blomquist was conducted three decades ago when housing costs were stable. In recent years, housing costs across the United States have continued to rise while wages have flattened (Schierholtz & Mishel 2013). The rise in costs is attributable to gentrification and insufficient housing units, and a general increase in living costs.

Rising housing cost is typical in cities where it is challenging to increase housing densities to satisfy the growing demand for housing units (Gyourko, et al., 2013). The shortage in housing units tends to bid up housing costs, forcing households with limited incomes to migrate because they cannot afford the high premiums. The rise in housing costs is forcing people across America to make tradeoffs (Mills, et al., 2006); (Taylor, 2015). They can continue to incur the escalating cost of housing and spend less on food, health, and other necessities or simply move to distant areas and commute to work (Taylor, 2015). Those who bear the brunt of rising housing costs and are forced to the high-cost metropolis' outskirts are middle-income and low-income households.

The average cost of housing has been rising, and rent growth has been faster, especially in gentrifying neighborhoods (Ellen & O'Regan, 2011). This phenomenon gained momentum across the United States cities since the 1990s (Goetz, 2010; Ellen & O'Regan, 2011; HUD, 2018. Freeman & Braconi (2004) found in a study of New York that three-fourths of the low-income renters in gentrifying neighborhoods pay more in rents than the recognized standard of affordability (30% of their income) towards rents, and half of those were paying up to 67% of their annual incomes towards rents. Renters and, most often, low-income residents are forced to move to neighborhoods not previously considered (Ellen, et al., 2013). These authors studied why households move into relatively low-income neighborhoods and found that the critical reason for displacement was affordability. Households move to areas where the total cost of housing is lesser or too inexpensive neighborhoods.

Desmond & Shollenberger (2015) analyzed survey data on the reasons why people move to Milwaukee. The authors identified housing or neighborhood conditions as the reasons why people move. In particular, rent hikes, deterioration in housing quality, and violence were the forces that motivate the displacement of people. Wyly et al. (2010) analyzed New York housing

survey data to conclude that poor households were almost two times more likely to be displaced than non-poor. The rise in housing costs can tremendously affect income distribution. Understanding how housing costs affect households headed by single females' decisions to migrate is essential when making housing-related decisions. Furthermore, studies have argued that increases in housing costs result in housing inequity as households with lower incomes tend to relocate (Disney, et al., 2010).

Gentrification and rising housing costs affect different races unequally Goetz (2011) examines the racial dimension of state-supported gentrification in large US cities by looking at the direct and the indirect displacements provoked by public housing transformation. Based on data, the author found that public housing demolition forced out residents from their neighborhoods, and a majority of the households displaced were black. However, Goetz's study suggests that there was a significant reduction in poverty in the gentrified neighborhood.

Martin & Beck (2018) merged the Panel Study of Income Dynamics with a decennial Census-tract-level measure of gentrification. A new dataset on state-level property tax policy covering 1987 to 2009 discusses the effect of gentrification and property taxes on homeowners' displacement. The authors observed that property tax engenders homeowners' displacement but find no evidence that this displacement was limited to gentrifying neighborhoods. Although the 2017 US Census Bureau data show that families, in general, are faring better economically, women's poverty remains a challenge as their poverty rate tends to be higher compared to that of whites (Patrick, 2017). The situation is dire for single-mother families where more than 1 in 3 single-mother families live in poverty in 2016. This ratio is higher for minority communities than for whites (Patrick, 2017). Also, older women, compared to older men, are more likely to live in poverty.

The increase in housing costs has impacted migration not only in the United States but across the globe. A study of household relocation pressures from rising transport and housing costs in Australia, Li et al. (2018). Another study from São Paulo, Brazil metropolitan indicated that between 2007 to 2013, housing cost increased at a faster rate than income (Acolin & Green, 2017). In São Paulo, household spending accounts for more than 30 percent of income or 45 percent on housing and transportation costs. The findings from the two studies suggest that households are then forced to relocate to more affordable areas, which are often further away from their jobs. However, Acolin & Green (2017) indicate that although households move to more affordable locations, that do not raise their living standards because commutes become longer, which substantially increases transportation costs. Besides costs, attachment can also affect migration decisions. Although wage and housing costs are significant factors in migration decisions, Michaelides (2011) found that workers are more likely to make decisions about relocating based on their attachment to their homes and networking experiences in their hometowns.

While several studies have focused on the effect of gentrification on displacement, this study focuses instead on the consequences of rising costs and how this impacts a single female-headed household. Thus, data from the American Housing Survey should better understand the effects of rising residential costs on a vulnerable group's migration patterns, such as households headed by single females and minorities.

METHODOLOGY AND DATA

Based on data from the 2017 American Housing Survey, we apply a logit model to investigate the links between a female-headed household and a set of covariates that affect the household's decision to migrate. The variable $HMOVE_i$ denotes a response variable that takes the value 1 if a single female-headed household migrated or moved from the current location and 0, otherwise. The problem of heteroscedasticity is completely avoided following the transformation of a probability with finite vale (0 to 1) to a logit with finite range ($-\infty\ to\ \infty$). The continuous latent variable $HMOVE_i$ can be written as:

$$HMOVE_i = \beta_0 + \beta_1 HGRAD_i + \beta_2 HAGE_i + \beta_3 HINCP_i + \beta_4 HCOST_i + \epsilon_i \quad (1)$$

where $HGRAD_i$ is a categorical that denotes the level of education of the household head; $HAGE_i$ is a set of three variables denoting four categories of the age of household head: under *30 years*, 30-40, 40-66, and over 66; $HINCP_i$ denotes income categories of household heads: less than *30k, 30k-50k, 50k-70k*, and incomes above *70k*; $HCOST_i$ denotes categories of total housing costs to household heads: less than *5k, 5k-10k, 10k-15k*, and above *15k*. The β's are the parameters in the regression model, and epsilon is the error term.

The latent variable $HMOVE_i$ is viewed as the random variable, that takes the values *1* and *0* with probabilities P_i and $1 - P_i$. Where P_i is the conditional probability of a positive response for the household with characteristics specified in equation (1).

$$\Pr(HMOVE_i) = log\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \beta_1 HGRAD_i + \beta_2 HAGE_i + \beta_3 HINCP_i + \beta_4 HCOST_i + \epsilon_i \quad (2)$$

The logit is the natural logarithm of the odds of the dependent variable, and the odds $\left(\frac{P_i}{1-P_i}\right)$ are the ratios of probabilities (P_i) that an individual who is a female head of household will move to the probabilities ($1 - P_i$) that a single female-headed household will not move. Taking the antilog of equation (2) on both sides, we derive an equation for predicting the probability that a single female head of household moves as follows:

$$\Pr(Y_i = 1) = \frac{\exp(\beta_0 + \beta_1 HGRAD_i + \beta_2 HGRAD_i + \beta_3 HINCP_i + \beta_4 HCOST_i}{1 + \exp(\beta_0 + \beta_1 HGRAD_i + \beta_2 HGRAD_i + \beta_3 HINCP_i + \beta_4 HCOST_i} \quad (3)$$

The value of the coefficient β determines the direction of the relationship between the predictor variables and the logit of the categorical outcome variable. When $\exp(\beta) = b > 1$ a unit change in the value of each of the dependent variables would make the event b times as likely to occur as is non-occurrence, also, an increase in income, for example, will most certainly reduce the probability of moving to another location by b times. Similarly, $\exp(\beta) = 1$ an additional year in college or an increase in income will likely be associated with a decrease in migrating probability.

The coefficients $\beta's$ are estimated by way of the maximum likelihood (ML) method. The ML is designed to maximize the likelihood of reproducing the data given the parameter estimates. The estimation process involves finding the values of $\beta's$ that maximizes the likelihood function in equation (4). However, it is cumbersome to estimate and can be simplified by taking the likelihood's natural logarithm. Thus, the log-likelihood equation (4) yields the log-likelihood function as follows:

$$LogL(\beta_0) = \sum_{i=1}^{N} Y_i(\beta'x) - \sum_{i=1}^{N} \log[1 + e^{\beta x}] \quad (4)$$

The null hypothesis underlying the overall model states that all β's equal 0 or that the predictor variables (X_i) which include HGRAD, HAGE, HINCP, and HCOST, do not influence the likelihood that a single female-headed household head would move (HMOVE). The interpretation is made using odd ratios for both categorical and continuous predictors.

Data and Definition of Regression Variables

Data for the study was drawn from the American Housing Survey (AHS) Database for 2017. The AHS database is a large dataset consisting of 66,753 observations. The estimated sample was drawn from the dataset, and missing data were eliminated. The dependent variable used for the logit regression HMOVE is a dichotomous variable that takes the value one if the female-headed household or minority migrated (HMOVE) and 0 otherwise. An equation representing minority households was estimated with the non-minority household head as the control group. Households from different backgrounds face unequal equity challenges, and these are often more severe for minorities than for non-minority households. Thus, analyzing the impact of race on the probability that a person would be displaced following an increase in housing costs can show whether there is any difference in rental price increases on households' migration decisions.

Education (HGRAD) widens opportunities for employment and higher income. The educational level variable is important because we can assume that the higher education a person has, the less likely they will be displaced when gentrification happens. Income (HINCP) can be a strong determinant of the probability that a household head will migrate in response to gentrification. Higher incomes mean higher opportunities and higher standards. The income can also signify a person's willingness to migrate. The amount that households pay as rents (HCOST) is likely to be related to the probability that a household will be displaced by rising housing costs. Higher housing costs are likely to increase the propensity to migrate to areas with low housing costs.

RESULTS AND DISCUSSIONS

The AHS databases provide questions and data regarding head of the household decision habits for residing in their current dwelling. One question we utilized in our study asked households if they have recently moved, what were the reasons for the move. The largest group answering this particular survey question was whites, and the rest were minority races. Of the 12,734 households selected for this analysis, 2,572 indicated that high housing cost was the reason behind their moving (20.2 percent) compared to 79.8 percent who did not cite cost as their displacement. Also, 689 of the 3,632 minorities (19 percent) indicated that high housing cost was why they left their previous homes. This is less than the 26 percent of whites who cited cost as the reason for their displacement. However, there was only 282 female head of households in the cleaned and reduced dataset.

Table 1 summarizes the estimated logistic model of the relationship between the odds of a female head of household migrating from the current residence to another location following a rise in housing cost. Based on the fact that across US cities, the housing costs are increasing rapidly as communities change. As economic situations are changing, The AHS database also

surveyed households from different races on the effect of housing costs as a factor that motivated them to migrate. The decision to move was assumed to be affected by factors such as the level of education of the household (HGRAD) head, the age of the household head (HAGE), the annual income of the household (HINCP) head, and the total cost of housing (HCOST). The baseline independent variables were created as categories, and the fourth category of each variable was taken as the reference variable for logistic regression.

Table 1 LOGIT REGRESSION FOR THE PROBABILITY OF MIGRATION BY HOUSEHOLD TYPE (DEPENDENT VARIABLE: HOUSEHOLD FEMALE HEAD MOVE = 1, NO MOVE = 0; N = 12764)				
Variable	B	SE.	Exp(B)	t-statistic
Constant	-4.188	0.219	0.015	-19.123
HGRAD				
High School or under	-0.227	0.195	0.797	-1.164
Some College (13-15 yrs.)	-0.021	0.193	0.979	-0.109
First Degree	-0.222	0.209	0.801	-1.062
(Ref = Advanced degree)				
HAGE				
Under 30 yrs.	-0.164	0.147	0.849	-1.116
30 and 40	-0.355	0.195	0.701	-2.457
40 and 66	-0.388	0.158	0.679	-2.456
(Ref = 66+)				
HINCP				
<= 30k	0.925^{***}	0.171	2.523	5.409
30k and 50k	0.801^{***}	0.181	2.228	4.425
50k and 70K	0.487^{**}	0.205	1.627	2.376
(Ref = 70k+)				
HCOST				
<= 5k	1.192^{***}	0.175	3.294	6.811
5k and 10k	0.528^{***}	0.165	1.696	3.497
10k and 15k	0.626^{***}	0.151	1.870	4.146
(Ref = 15k +)				

Note: Controls are HGRAD, HAGE, HINCP, TOTHCAMT. Exp(B) is the odd ratio. $^{***}p<1\%$, $^{**}p<5$, $^{*}p<10\%$.

The estimates show that female heads of household with less education are less likely to move to cheaper residences than those with advanced certificates. However, the coefficient of the education variable is not significant. The baseline age of the female head of the household is weakly significant (at 10 percent). However, the household becomes less likely to move from the current residence compared to older groups. The household's income is a significant determinant of the female head of the household's decision to move to a new location. The odd for household heads that earn less than $30,000 is 2.523, indicating that the female head of households who earns that income bracket is more likely to move to a new and cheaper location than those with higher income. Thus, they are 1.52 times more likely to move to a new location than those earning $70,000.

The rising cost of housing is a key reason for a female head of households' decisions to migrate. The total cost of housing (HCOST) is also significant for all cost categories. Female heads of households that earn $5,000 and below are more likely than those who spent more to move to new housing locations as cost rises.

The odd of moving for this group are 3.294, indicating that this group is 2.29 times more likely to move as costs increase than households in the reference housing units. The latter is assumed to be richer, and cost does not seem to be an obstacle compared to other categories.

Table 2 shows the regression results for minority heads of households relative to whites who moved because they cited the housing cost as the reason they moved.

Unlike in the previous regression, the head of households' level of education seems to play a significant role in the decision to move because of the high cost of housing. However, the odds ratio indicates that minority head of household is less likely to move than those with advanced degrees. The household head's age does not seem to be a significant obstacle to the decision to move. The odds ratios are all less than 1, indicating that younger minority household heads are more likely to move than older groups.

Like households headed by females, minority household heads with less income are more likely to move because of the high housing cost than those with higher incomes. A minority who spends less than $5k is more likely to migrate than those who spend between $5 and $10k on housing. Households that spend between $10k and $15k are more likely to move than the reference group, consisting of households that spend $15k on housing per month.

Table 2				
LOGIT REGRESSION FOR THE PROBABILITY OF MIGRATION BY HOUSEHOLD TYPE (DEPENDENT VARIABLE: MINORITY MOVE = 1, NO MOVE = 0; N = 12764)				
Variable	B	SE.	Exp(B)	t-statistic
Constant	-0.856	0.072	0.425	-11.890
HGRAD				
High School or under	-0.355***	0.067	0.701	-5.299
Some College (13-15 yrs.)	-0.320***	0.066	0.726	-4.848
First Degree	-0.289***	0.066	0.749	-4.379
(Ref = Advanced degree)				
HAGE				
Under 30 yrs.	-0.129**	0.059	0.879	-2.186
30 and 40	-0.049	0.074	0.952	-0.662
40 and 66	-0.107*	0.061	0.899	-1.754
(Ref = 66+)				
HINCP				
<= 30k	0.624***	0.057	1.867	10.947
30k and 50k	0.300***	0.062	1.349	4.839
50k and 70K	0.235***	0.066	1.265	3.561
(Ref = 70k+)				
HCOST				
<= 5k	0.046	0.076	1.047	0.605
5k and 10k	-0.055	0.060	.947	-0.917
10k and 15k	0.109*	0.052	1.116	2.096
(Ref = 15k +)				

Note: Controls are HGRAD, HAGE, HINCP, HCOST. Exp(B) is the odd ratio. ***p<1%, **p<5, *p<10%.

This research extends the housing choice and displacement literature of Wyly (2010); Disney et al. (2010); Goetz (2011); Patrick (2017); Martin & Beck (2018) by examining single female head-households locations decisions utilizing survey questions from the AHS database. Through the analysis, we found that single female-headed households tend to relocate due to rising housing costs. These findings suggest that safety net programs are not enough to combat displacement.

Policies that address affordable housing and income mobility for single female household heads and their families are recommended to permanently combat displacement and poverty.

CONCLUSION

This research aimed to investigate the factors that are most likely to affect the probability that a household headed by a female or a minority will be displaced following an increase in housing cost. The study is critical because of the phenomenal transformation of many US cities and the rising housing costs. However, cost increases have been attributed to the transforming neighborhoods through gentrification and the mismatch between the rising demand for residential units in the cities and limited supply. In the absence of affordable housing plans to assist vulnerable groups with limited incomes, most households cannot afford the increase in cost that results from this phenomenon and would simply migrate or move to cheaper locations.

The study has produced startling results regarding households headed by females and by minorities. The evidence shown in Table 1 and Table 2 indicates that households with lower incomes are more prone to migrate to less costly locations than those with higher incomes. Another remarkable result is that households headed by single females and those headed by minorities are more likely to be displaced than non-minority households. The results are rather intriguing and should provide policy makers guidance on how to develop more inclusive economic development policies that strives to mitigate displacement of vulnerable households. Additional policies addressing affordable housing, and housing cost burden will also help local governments mitigate the issues of displacement of single female headed households.

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