Report

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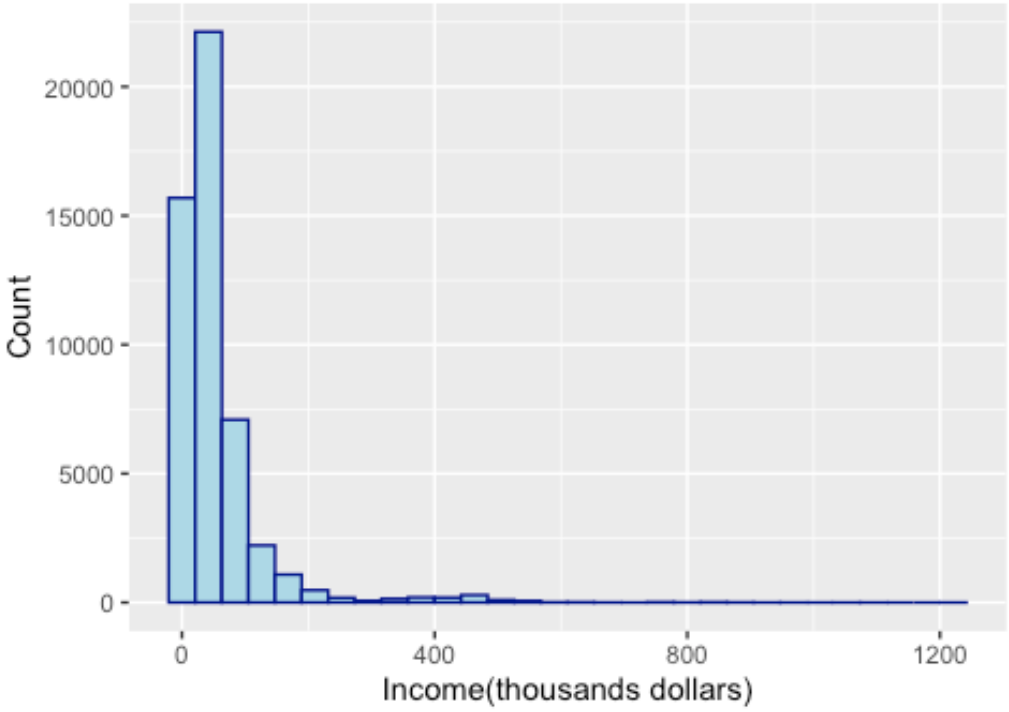
1. Move or Stay

In this project, I will examine the relationship between income and residential mobility in the United State using the American Community Survey(ACS) data. Income could be an important economic factor for residential mobility decisions. I expect that individuals with higher income are more likely to relocate houses than those with lower income. High income could guarantee the financial resources for moving costs and rent mortgage (Mulder&Hooimeijer, 1999). Thus, individuals having high income are more possible to facilitate moving house. For low-income people, moving house frequently could be less likely, although this group of people may be more often have the desire to move for reasons such as financial imperative on current house, unsafe neighborhood, and legal impairment (Cotton&Schwartz-Barcott, 2016). It is possible that low-income people choose to move to a relatively cheap house. Thus, I would expect a positive relationship between income and residential mobility in general, but this relationship might not be significantly strong.

To begin this, I use `migrat1` as my dependent variable and transform it into binary form as a move or stay no matter whether the move is within or between states. As for the independent variable, I choose `inctot` variable to represent each individual's total pre-tax personal income or losses for the previous year. I transform the variable into a thousand-unit and examine the income distribution. Figure 1 presents a centralized value of around a hundred thousand dollars while highly right-skewed, meaning that a mass of respondents is bunched at lower values. In case the highly skewed values affect the result, I use the log of income that is more approximately normal as my independent variable in the whole project.

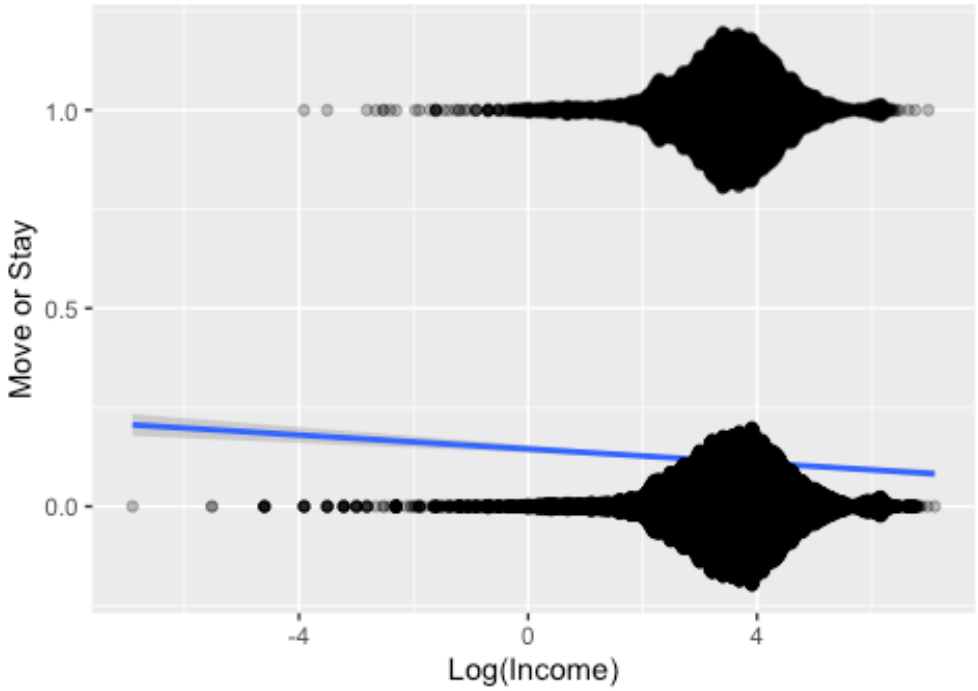
Then, I examine the income trends in relocating choice. Focusing on the AMC respondents who were non-missing or non-infinite on the log of income and residential choice (N = 47,858), the result is displayed in Figure 2, as the blue line represents a linear probability model. The overall trends of higher income, less likely to move, don't conform to my general expectation. And the negative linear effect seems to be marginal

Figure 1. Histogram of Income



Source: American Community Survey, N=50,000

Figure 2. Residential Choice by Income



Source: American Community Survey, N=47,858

To further assess whether there is a statistically significant negative association between income and residential choice, I fit a logistic regression model to the data. The model is present in column 1 of Table 1. The income effect is statistically significant at the $p<0.01$ level in the model. One unit increase in the log of income causes a 8% decline in the odds of moving house. Adding one unit to the log of income means multiplying income itself by $e \approx 2.72$. If converted to a percentage change, it is to say that income increase by 172%. Overall, this result is similar to the income trends estimated by the linear probability model. People with low incomes are more likely to move, this might be due to the reason that as Widerstedt(1998) illustrated, there would be a lower opportunity cost of moving for low-income people than high-income people.

Apart from income, other personal characteristics such as age, race, and marital status could also affect residential decisions. Eluru et al.(2009) argue that aged or married people could be less likely to move. And black and Asian have higher residential mobility than Whites. These three factors are added as explanatory factors in columns 2, 3, and 4 of Table 1. The results show that the odds of moving house are 4% lower for each year of age, 60% higher for a single or separated individuals than a married person. There is a difference among ethnic groups. Black and Asian are estimated to have lowered probability to move than Whites, while other races are more likely. This result is contradictory to Eluru et al.'s argument, which might be due to the sample bias. One should note that the income effect decreases after adding marriage as an explanatory variable, and marital status has a stronger predictive effect on residential choice than other personal characteristics.

In addition, residential mobility might also be correlated to commuting and housing-related reasons. Eluru et al.(2009) indicate that households that rent their home are more mobile than those who own their house. And there could be an increase in the probability of relocating with the increase in commuting time. Considering these covariates, I add travel time for work and house ownership as control variables in columns 5 and 6 of Table 1. The effect of travel time is marginal. However, house ownership is a strong predictor of residential mobility. Those who rent their house have 186% higher odds of moving than those who own theirs. And after controlling the ownership, the income effect becomes positive but insignificant. These results suggest that the income effect on residential mobility might be spurious and can be explained by other factors correlated with income such as house ownership.

I consider that house ownership may account for the income effect on residential mobility. People with higher income are more likely to have their own house, while low-income people tend to rent their house. This is confirmed in Figure 3. And the negative association between income and house ownership could be the reason for the negative downwards bias in columns 1 to 5 of Table 1. It further implies that the effect of income is associate with relocating because income is associate with house ownership. Those who rent a house are more likely to have low income and more likely to move out with low opportunity cost.

Table 1. Logistic Regression Models of Residential Mobility

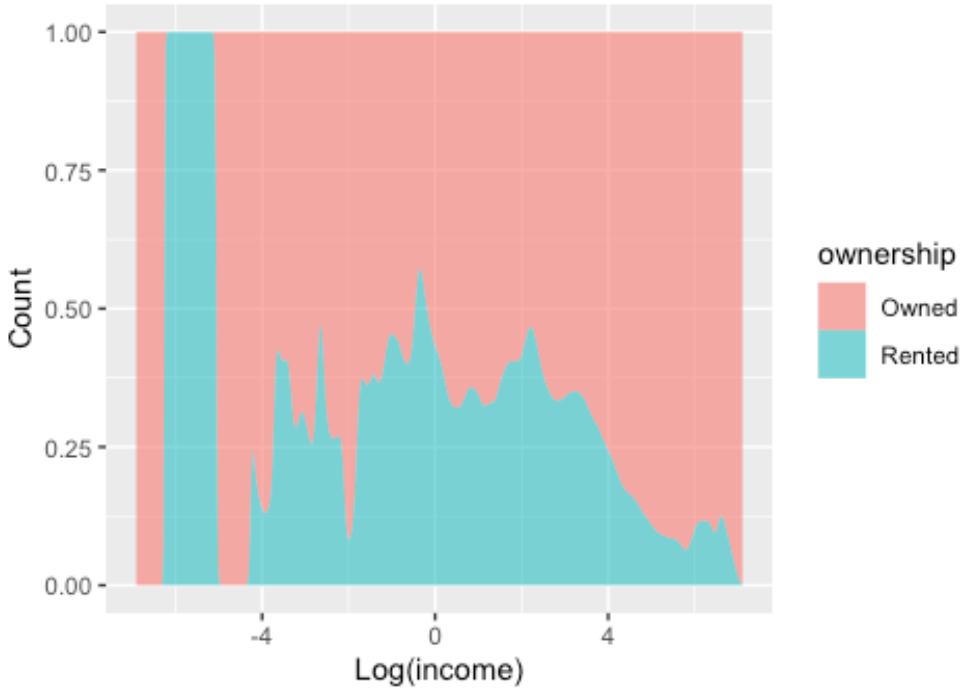
	(1)	(2)	(3)	(4)	(5)	(6)
log(income)	-0.084***	-0.094***	-0.067***	-0.068***	-0.054***	0.022
	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)	(0.015)
age		-0.043***	-0.042***	-0.041***	-0.043***	-0.032***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
not married(ref=married)			0.465***	0.470***	0.465***	0.254***
			(0.031)	(0.031)	(0.031)	(0.032)
race: black(ref=white)				-0.099**	-0.091*	-0.253***
				(0.047)	(0.047)	(0.048)
race: other				0.253***	0.263***	0.166**
				(0.066)	(0.066)	(0.067)
race: asian				-0.031	-0.030	0.007
				(0.094)	(0.094)	(0.096)
travel time for wotk					-0.004***	-0.003***
					(0.001)	(0.001)
rented(ref=owned)						1.052***
						(0.034)
Constant	-1.756***	0.517***	0.118*	0.109	0.192***	-0.908***
	(0.047)	(0.064)	(0.070)	(0.072)	(0.074)	(0.084)
Observations	47,858	47,858	47,858	47,858	47,858	47,858
Log Likelihood	-16,969.680	-15,739.140	-15,621.240	-15,610.920	-15,598.650	-15,118.080
Akaike Inf. Crit.	33,943.360	31,484.280	31,250.470	31,235.830	31,213.310	30,254.150

Note: *p<0.1; **p<0.05;** p<0.01

Data from American Community Survey

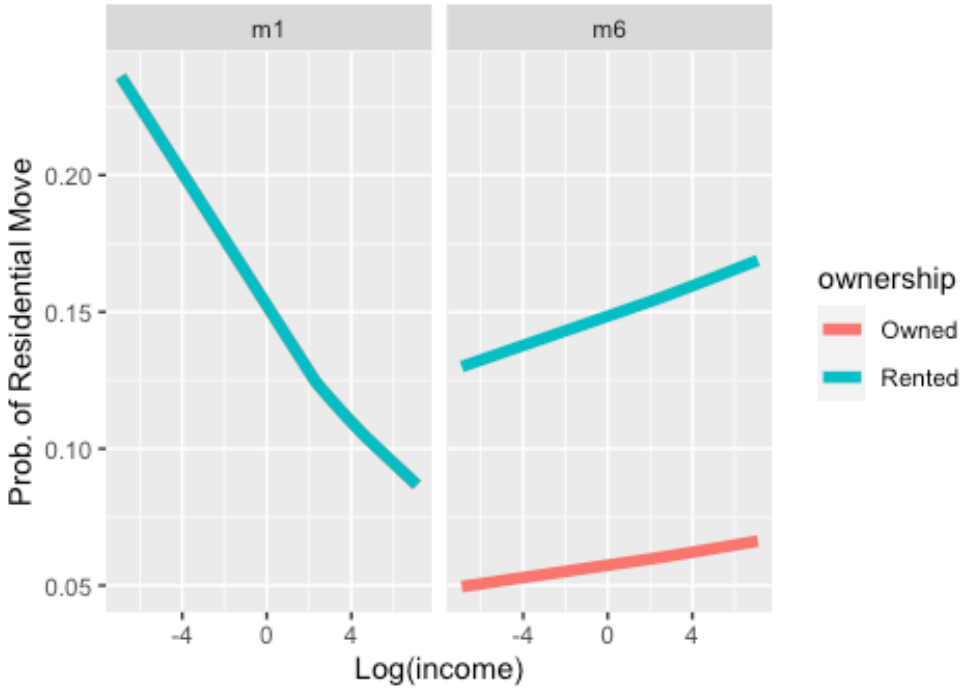
Here I plot predictions from the simple model estimated in column 1 of Table 1 and the full model estimated in column 6 of Table 1. I specify that the log of income is set to decile, and age and travel time for work is set to the average for a hypothetical person who is white and married. Then I produce separate predictions by house ownership based on the complex model. Figure 4 shows the results. Overall, the negative correlation between income and residential mobility estimated by the simple model may be spurious. Income does not affect residential mobility significantly, while house ownership is an important predictor. People who rent houses are much more likely to move out than those who own their house regardless of their income level.

Figure 3. Income Distribution by House Ownership



Source: American Community Survey, N=47,858

Figure 4. Predicted Probability of Residential Move



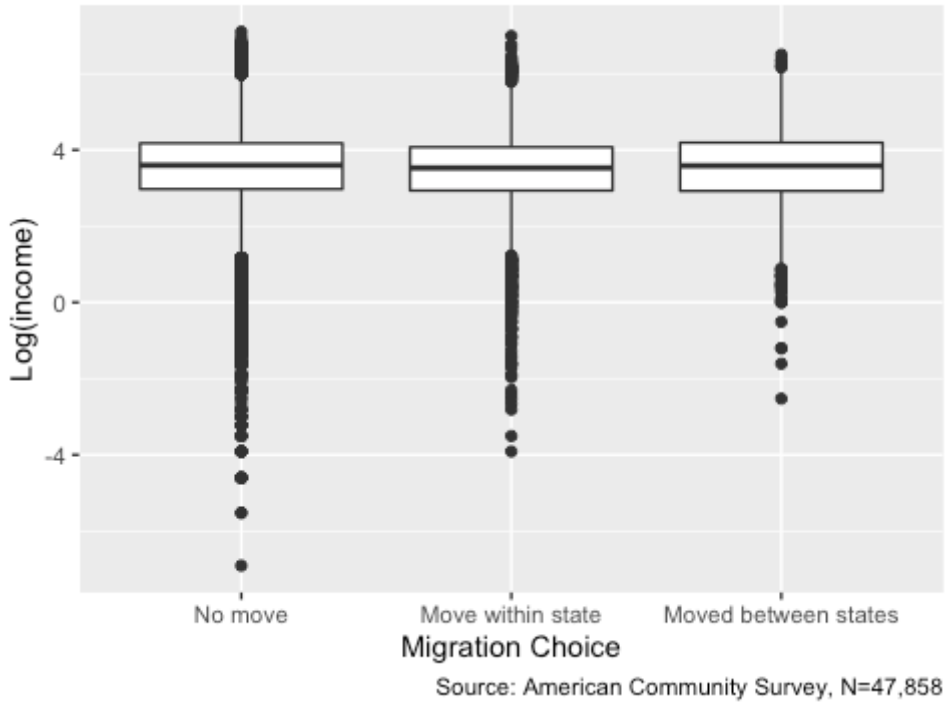
Source: American Community Survey

2. Move Distance

In this part of the project, I will examine the relationship between income and residential mobility across various geographic boundaries. As the effect of income on the decision of whether move or stay is ambiguous from the above analysis, I assume that income may not affect the decision on short versus long-distance move either. Instead, shore distance moves, namely, moving within the state, are more likely to occur for housing-related reasons, while long-distance moves are more likely to be driven by job-related reasons(Eluru et al, 2009). Thus, I expect that comparing with income, other jobs- and housing-related factors could play more important roles on multinomial migration outcome. And people who are currently employed or have a higher education level are more likely for a long-distance move. Those who rent their house are more likely for a long-distance move than those who own their houses as well.

To test this hypothesis, I use `migrate1` as my dependent variable. Figure 5 presents a boxplot of income and migration choice. The result is primarily in line with my expectation that there is no much difference in median income across these three migration groups.

Figure 5. Income and Multinomial Migration Outcome



To avoid the separation problem, I create a dummy variable for the `educ` variable distinguishing those who completed higher education from those who only had secondary or below secondary education. Tables 2, 3, and 4 present employment status, education, and house ownership by the three migration choices. No separation problem founded.

Table 2. Migration Choices by Labour Force

	No	Yes
No move	19288	24975
Move within state	1344	3490
Moved between states	315	586

Table 3. Migration Choices by Education

	<=Secondary Education	Higher Education
No move	17245	26528
Move within state	1721	3057
Moved between states	255	642

Table 4. Migration Choices by House Ownership

	Owned	Rented
No move	32990	10783
Move within state	1998	2780
Moved between states	351	546

Then, I estimate four multinomial logistic regression models of migration choices featuring income, employment status, education, and house ownership as explanatory variables in Table 5. For all variables, the reference migration outcome is “No move”. The first two columns of Table 5 display coefficients for a model with income as the only explanatory variable. The results are not 100% in line with my expectation. For example, it reveals that one unit increase in the log of income will cause 8.97% lower odds of moving within the state, compared to stay at the same house. Low-income people are relatively more likely to move within the state. However, the effect of income is not significant for decisions on moving between states. This part of the result aligns with my expectation.

After controlling job-related variables in columns 3, 4, 5, and 6 of Table 5, the negative effect of income magnifies. One unit increase in the log of income will cause 18.5% lower odds of moving within the state, and 8.6% lower odds of moving between states, compared to no movement. And those who are in the labor force have 149% higher odds of moving within states, rather than no move, compared to those who are not in a labor force. Meanwhile, they have 55% higher odds of moving

between states, rather than no move, compared to those who are not in a labor force. Education is also positively correlated with migration distance. People who have higher education degrees have 66% higher odds of moving between states, rather than no move, compared to those who only have or below secondary education. This result confirms my expectations.

As for the effect of house ownership on migration outcome, columns 7 and 8 of Table 5 reveal a much stronger predicting effect from this variable. Those who rent their house have 286% higher odds of moving within the state, and 421% higher odds of moving between states, rather than no movement, compared to those who have their own houses. Note that the downward effect of income also decreases and even becomes insignificant for the outcome of moving between states. This result is similar to the findings in problem 1 that house ownership can offset the downward effect of income to some extent.

Predicted probabilities for the simple model with income as the only explanatory variables are presented in Figure 6. The figure shows that while the stay is the most common outcome, income has different effects on choosing to stay or move within states. And it can not account for the decision on moving between states. Predicted probabilities for the complex model with the job- and housing-related variables are presented in Figure 7. I specify that the log of income is set to decile for hypothetical people who are in the labor force and rents a house. The figure indicates a smaller gap between moving within and between states for low-income people. For people who have extremely low income or suffer from economic loss in the last year, moving within states is more likely to occur than stay. Moving between states is still least likely. Overall, the effect of income on migration outcome is ambiguous. It can not account for long-distance move in most cases, while it may be a factor for the short-distance move.

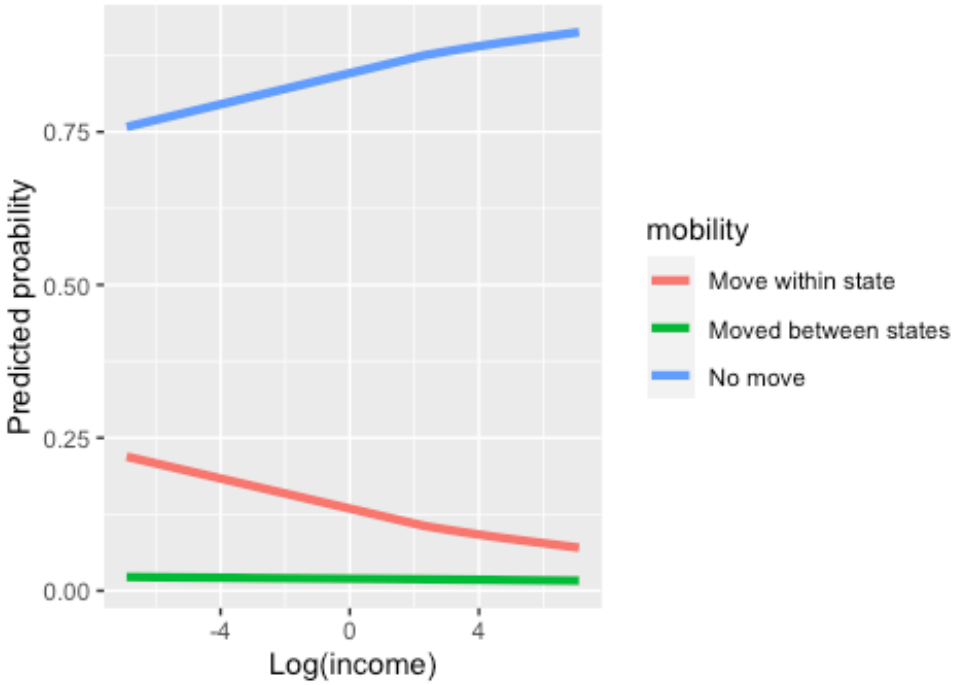
Table 5. Multinomial Logistic Regression Models of Residential Mobility

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(income)	-0.094***	-0.036	-0.205***	-0.093***	-0.220***	-0.140***	-0.079***	0.044
	(0.014)	(0.032)	(0.015)	(0.033)	(0.015)	(0.032)	(0.016)	(0.037)
labforceYes(ref:No)			0.913***	0.443***	0.903***	0.411***	0.564***	-0.011
			(0.038)	(0.077)	(0.038)	(0.077)	(0.039)	(0.080)
higher education(ref: <=secondary education)					0.164***	0.511***	0.239***	0.599***
					(0.034)	(0.078)	(0.035)	(0.079)
rented(ref:owned)							1.347***	1.651***
							(0.034)	(0.075)
Constant	-1.893***	-3.759***	-2.124***	-3.835***	-2.167***	-3.990***	-3.018***	-5.120***
	(0.050)	(0.116)	(0.052)	(0.117)	(0.053)	(0.118)	(0.062)	(0.142)
Akaike Inf. Crit.	38,356.480	38,356.480	37,680.630	37,680.630	37,618.750	37,618.750	35,602.720	35,602.720

Note: *p<0.1;* ***p<0.05;*** p<0.01

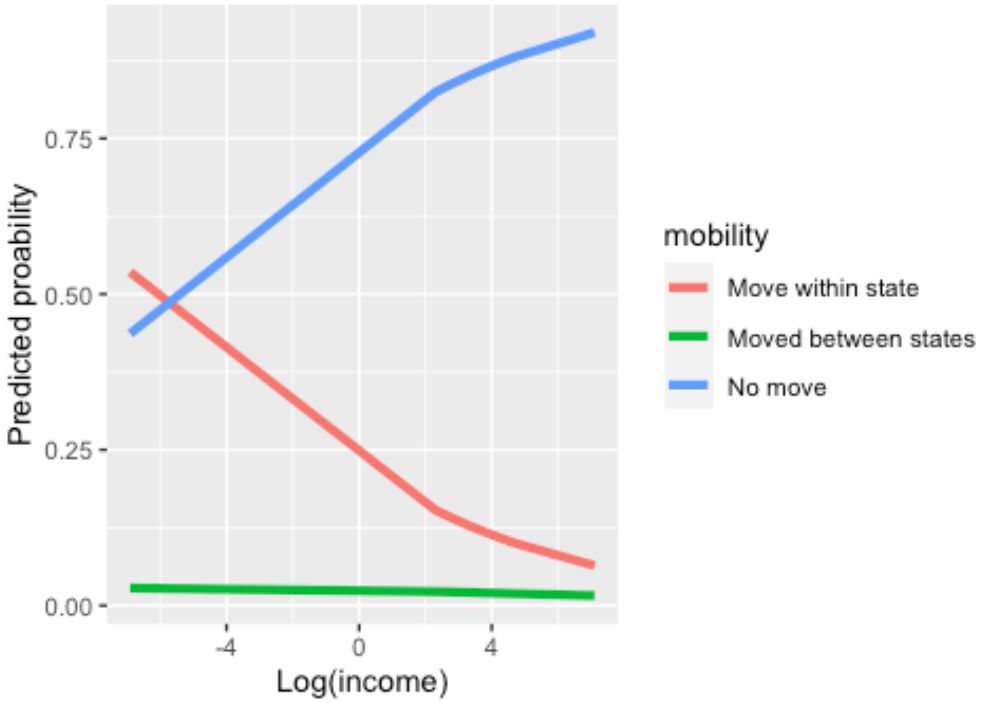
Source: American Community Survey, N=47,353

Figure 6. Predicted Probability by Simple Model



Source: American Community Survey

Figure 7. Predicted Probability by Complex Model



Source: American Community Survey

3. Move Destination

In the third question, I will examine how income relates to the decision on move destination. According to the spatial assimilation model presented by Vaalavuo et al.(2017), economic and cultural assimilation affects the moving decision, leading to spatial distributions as a reflection of an individual's socioeconomic resources. I assume that high-income people are more likely to move to high-income neighborhoods and are associated with a higher chance of moving to a state with a low share of ethnic minorities, namely with a more white dominant culture. At the same time, it's more affordable for people with higher income to pursue a quality life with a better environment. Thus, I would expect that they prefer to move to states with comfortable weather conditions.

To test these hypotheses, I estimate two multinomial logistic regression models of the 56 moving destinations, using the AMC data and States data. The estimation results are contained in Table 6. Model 1 in the table includes minority, household income, sunlight, and uncomfortable months as explanatory variables. Here I code the proportion of non-whites in the states as the share of minority including black, Asian, and Hispanic people. Household income is represented by the log of median household income of a state. The uncomfortable month is a sum of hot months and freezing months. Model 2 in the table has the same specification as model 1, but with interactions between income and those explanatory variables.

Model 1 in Table 6 shows that those who chose to move between states typically moved to states with a higher level of diversity, lower level of median household income, less number of uncomfortable months, and slightly less average daily sunlight. The coefficient of minority share indicates that all else equal, a typical migrant from Florida has 18 times higher odds of moving to a state with an increase of minority share. The coefficient of log of household income shows that all else equal, a typical migrant from Florida has 50% lower odds of moving to the state with one unit increase in the median household income. The coefficient of uncomfortable months indicates that all else equal a typical migrant from Florida has 28% lower odds of moving to the state with a one-month increase in the uncomfortable months. The effect of sunlight is relatively marginal.

Turning to Model 2 of Table 6, it appears that when the log of income is zero, namely personal income of last year is 1000 dollars, now represented by the main effects, migrants have a stronger preference for states with amounts of non-whites and lower level of median household income. The preference for more comfortable months and sunlight decreases slightly. However, referring to the interaction terms, there is a significantly greater preference for states with higher household income with an increase in personal income, and the coefficient is strongly significant ($p<0.01$). This provides suggestive evidence of the hypothesis of economic spatial assimilation. Migrants with higher income seem to prefer the state with a lower share of non-whites, but the coefficient is not significant. Thus, it cannot provide evidence of the cultural spatial assimilation that rich people want to assimilate into the dominant white culture. As for the last hypothesis about income and weather, an

increase in personal income has a statistically weak but positive relation to the sunlight meaning that rich people are more likely to move to the states with slightly more average sunlight.

Table 6. Multinomial logistic regression models of states preferences

	(1)	(2)
Minority Share	2.939***	4.140***
	(0.367)	(1.213)
Log(Household Income)	-0.761***	-3.301***
	(0.255)	(0.867)
Sunlight	-0.0001**	-0.0003***
	(0.00003)	(0.0001)
Uncomfortable Months	-0.338***	-0.226**
	(0.033)	(0.108)
Minority Share:Log(Income)		-0.337
		(0.329)
Log(Household Income):Log(Income)		0.719***
		(0.233)
Sunlight:Log(Income)		0.0001**
		(0.00003)
Uncomfortable Months:Log(Income)		-0.032
		(0.029)
Observations	42,287	42,287
R^2	0.007	0.008
Max. Possible R^2	0.146	0.146
Log Likelihood	-3,178.762	-3,172.003
Wald Test	277.760*** (df = 4)	292.590*** (df = 8)
LR Test	313.055*** (df = 4)	326.575*** (df = 8)
Score (Logrank) Test	296.470*** (df = 4)	311.145*** (df = 8)
Note:		*p<0.1;* ***p<0.05;*** p<0.01
		Data from American Community Survey

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