

# MIGRATION FLOWS IN A MILLENNIAL CITY WASHINGTON, D.C. 2005-2014

By

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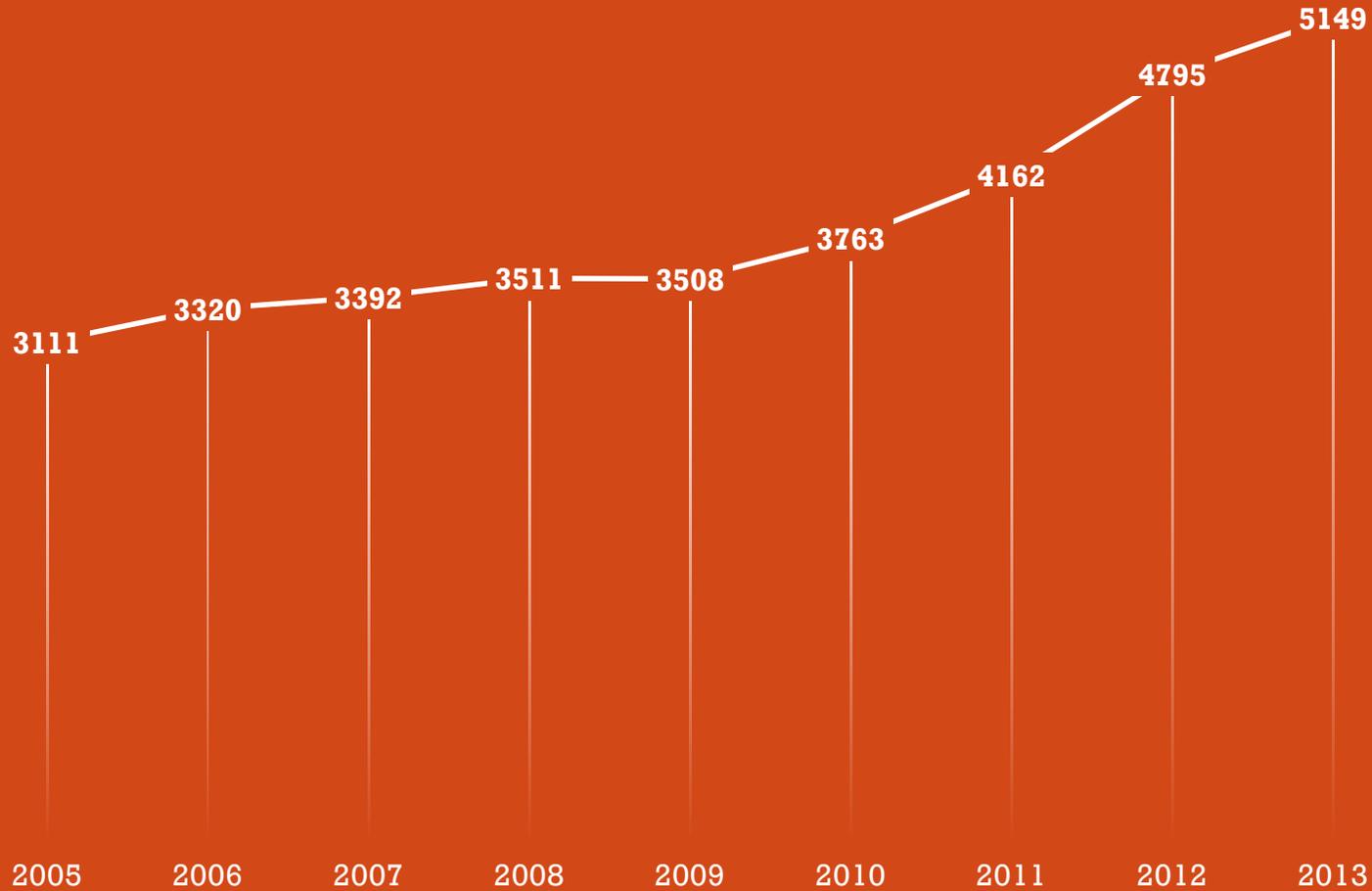
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# OUTLINE

- Introduction
- Review of Literature
- Research Question
- Theoretical framework
- Data
- Results
- Conclusion

## NUMBER OF HOUSEHOLDS PER SQ. MILE



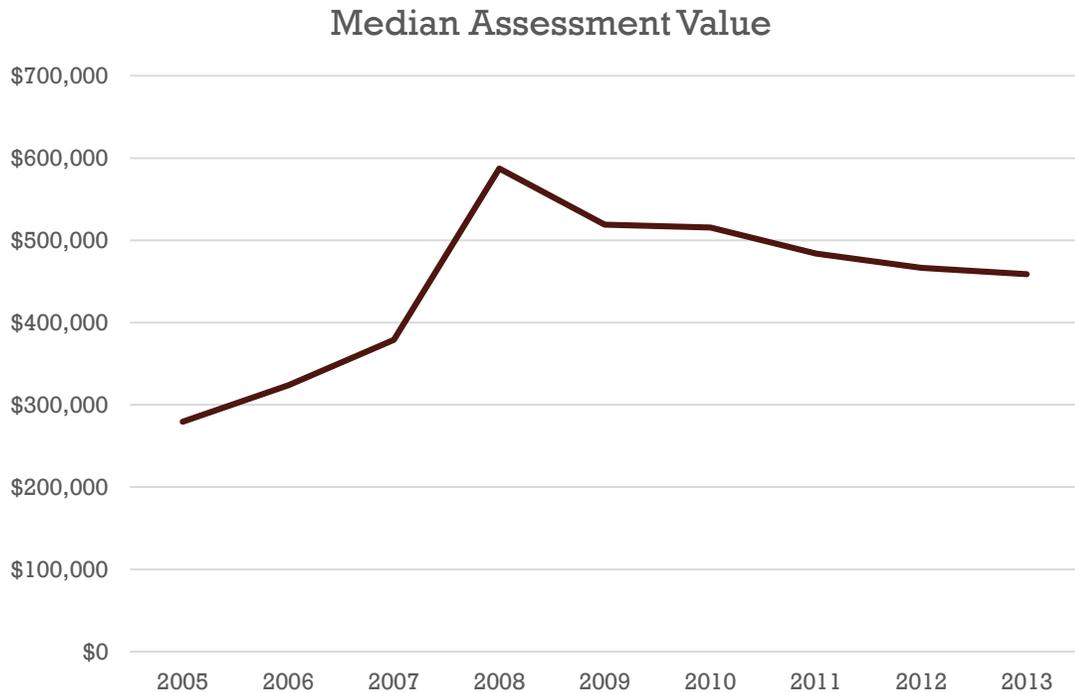
## INTRODUCTION: WHY WASHINGTON, D.C.?

- Recent migration patterns of households living in urban cities
  - Case Study: Washington D.C
- Population growth since after the millennium: since 2005

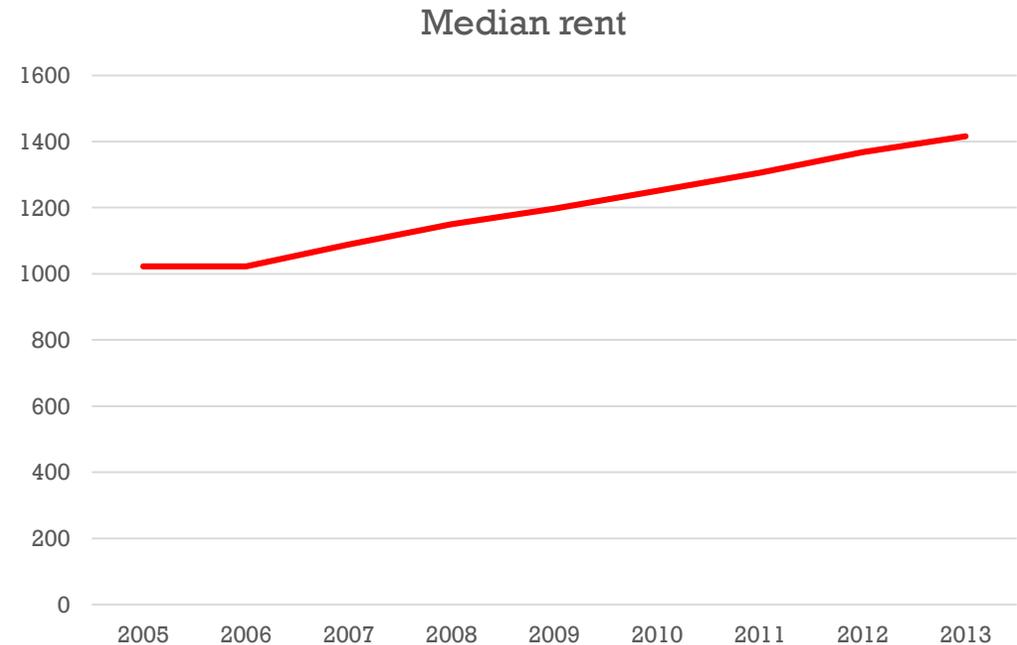
# INTRODUCTION: WHY WASHINGTON, D.C?

- Affordable housing

## Single family homes



## Median Rent

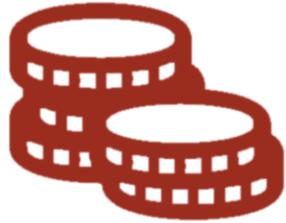


# INTRODUCTION: WHY WASHINGTON, D.C?

- A city experiencing demographic changes
  - In 1980, 70 percent of the District's population was black; in 2000, the share of black population fell to 61 percent and then to 51 percent by 2010 (Tatian, and Lei, 2014).
  - The influx of white population has driven the population growth in D.C (Sturtevant, 2013).
- Neighborhood change / gentrification/ youthification
  - Migration flows play an important role in the demographic composition of local communities
- DC is unique: a operates as a city and state
  - Study neighborhood changes
  - Impact of government policies on household behavior
    - EITC

# WHY PEOPLE MOVE

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## **Economic**

Housing cost

Jobs

Transportation costs



## **Amenities**

Entertainment, culture, restaurants

Schools,

Grocery stores

Crime

Weather, nature

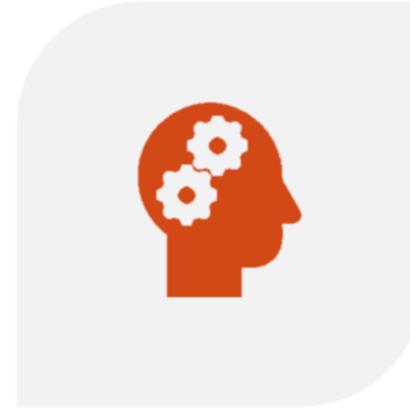
# PRIOR RESEARCH

## ■ Economic Migration

- Housing affordability (Quigley and Raphael, 2004; Schachter, 2001)
  - The highest percentage of people relocates for housing related reasons.
  - Quigley and Raphael (2004) : Housing affordability comes from two factors: the cost of housing the largest single expenditure for most households; and rental and housing cost has escalated in most U.S metropolitan areas.
- Gentrification-(Sturtevant, 2013; Brown-Robertson, Muhammad, Ward, & Bell, 2013).
  - There is evidence of displacement both within the city and to other places in the Washington, DC metropolitan area.
  - Less educated and lower income households are more likely to move than college-educated and higher income households.



WHAT EFFECTS DOES ECONOMIC AMENITIES (RENT, INCOME) HAVE ON MIGRATION FLOWS WITHIN THE DISTRICT OF COLUMBIA?



DOES DC'S GENEROUS EITC PROGRAM WORK AS A PULL FACTOR AGAINST THE DISPLACEMENT EFFECTS OF GENTRIFICATION?

# RESEARCH QUESTIONS

# THE ROLE OF EITC ON MIGRATION WITHIN THE DISTRICT OF COLUMBIA

- Why focus on Earned Income Tax Credit (EITC) recipients vs non-EITC?
  - EITC households about 18% of income tax filers.
  - Low income households: average median income \$14,748.
  - The EITC in DC also reduces negative income instability when income falls among residents, and city-level EITC expansions throughout the 2000s appear to have reduced poverty (Hardy, Muhammad, and Samudra 2015).
  - The District's EITC program equals 40 percent of the federal EITC and is the largest state or local supplement to the federal EITC in the country (Clark 2008).
  - There is little to no research on household's migration patterns within Washington, D.C. especially after the millennium with the rapid increase in population and median area income (AMI).

# Theoretical Framework

## • Gravity Model

➤ Basic equation:

$$T_{jk} = G \frac{P_j P_k}{d_{jk}},$$

$$\ln T_{jk} = \ln G + \alpha \ln(P_j) + \beta \ln(P_k) - \gamma \ln(D_{jk}) + \varepsilon_{jk}$$

where

- $T_{jk}$  = total population flows (in both directions) between j and k
- $G$  = constant,
- $P_j$  = population of origin j,
- $P_k$  = population of destination k, and
- $d_{jk}$  = distance between j and k

# THEORETICAL FRAMEWORK

- $T_{jk} = e^{(\ln\beta_0 + \beta_1\ln(\text{POP}_k/\text{POP}_j) + \beta_2\ln(X_{kj}) + \varepsilon_{kj})}$ ,

WHERE

- $T_{jk}$  = TOTAL POPULATION FLOWS (FROM ORIGIN TO DESTINATION NEIGHBORHOODS) BETWEEN J AND K
- $\text{POP}_k/\text{POP}_j$  = LOG OF THE RATIO OF NEIGHBORHOOD DESTINATION TO NEIGHBORHOOD ORIGIN POPULATION,
- $X_{kj}$  =  
LOG OF THE RATIO OF NEIGHBORHOOD DESTINATION TO ORIGIN MATRIX VARIABLES

# DATA AND METHODOLOGY

## Methodology

- Poisson Pseudo-maximum-likelihood Estimator (PPML)
- Santos Silva, J.M.C. And Tenreyro, Silvana (2006); Chort And Rupelle (2015)

## Data: 2005-2014

- Individual Income Tax And Real Property Tax Data (2005-2006, 2006-2007, 2007-2008, 2008-2009, 2010-2011, 2011-2012, 2012-2014, and 2013-2014)
- American Community Survey (ACS)
- Neighborhoodinfodc
- National Bureau of Economic Research (NBER)

# WHO ARE WITHIN CITY MOVERS?

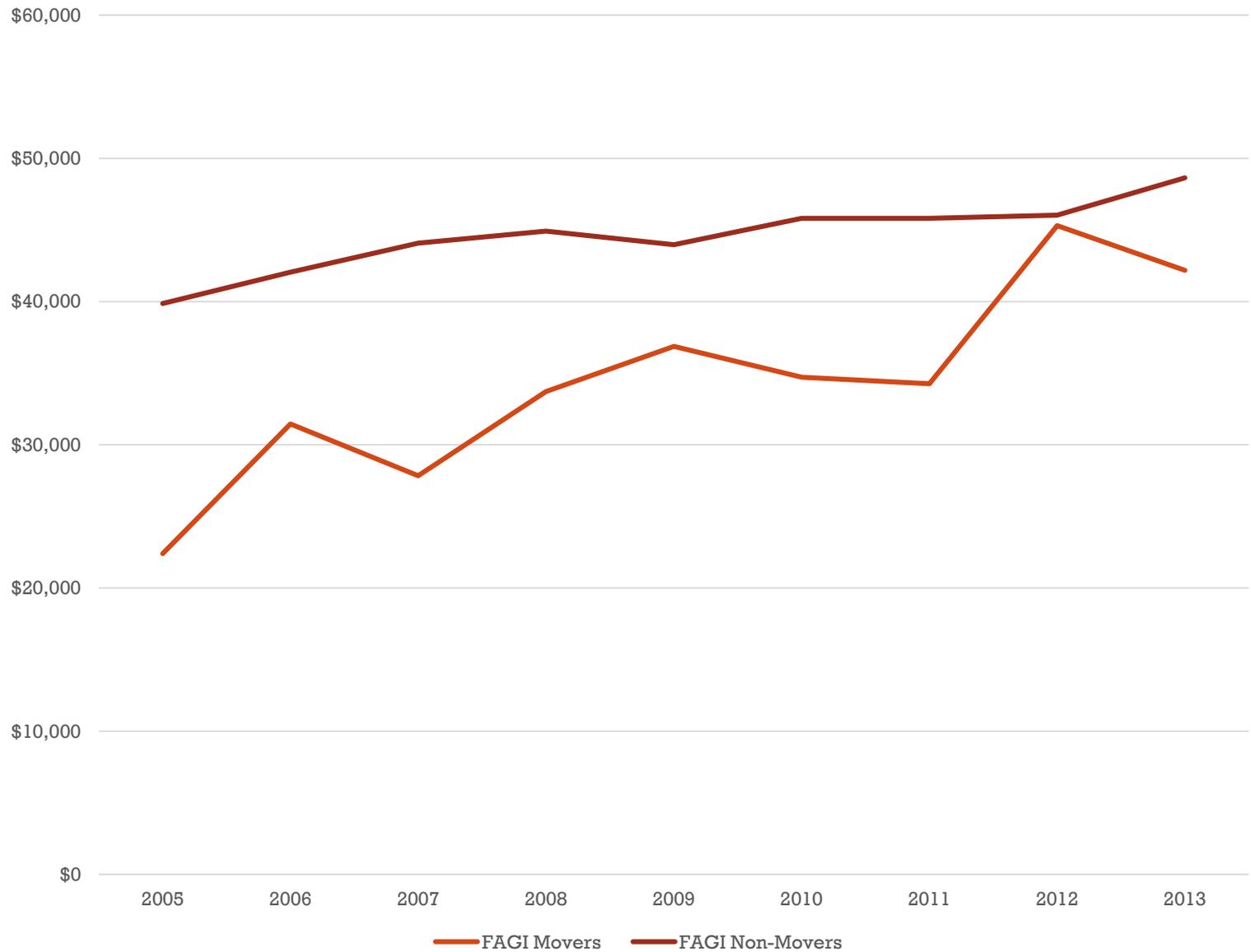
- Households whose geocoded address in the individual income tax data is in a census tract in Washington, D.C. at time  $t$  and whose geocoded address is in a different census tract in the District at time  $t+1$ .

# DESCRIPTIVE ANALYSIS

YEAR	TOTAL FILERS IN DC	TOTAL FILERS THAT MOVED TO ANOTHER CENSUS TRACT	MOVERS AS A % OF TOTAL POPULATION	EITC MOVERS AS A % OF TOTAL MOVERS	EITC MOVERS AS A % OF EITC POPULATION
2005-2006	212614	4003	1.88	44.2	4.68
2006-2007	226898	18333	4.04	18.7	8.89
2007-2008	231777	8805	3.80	33.0	7.09
2008-2009	239963	11979	4.99	24.6	6.96
2009-2010	239768	39	0.02	5.1	0.00
2010-2011	257181	9659	3.76	22.2	4.64
2011-2012	284461	20017	7.04	24.2	9.42
2012-2013	327720	14001	4.27	12.0	3.03
2013-2014	351895	39251	11.15	21.5	14.00

- Characteristics of movers within D.C
  - 126,087 households moved between census tracts within the District between 2006 and 2014. An average of 5% per year
  - Among EITC recipients, about 28,151 households moved within D.C., which makes up about 22.3 percent of movers

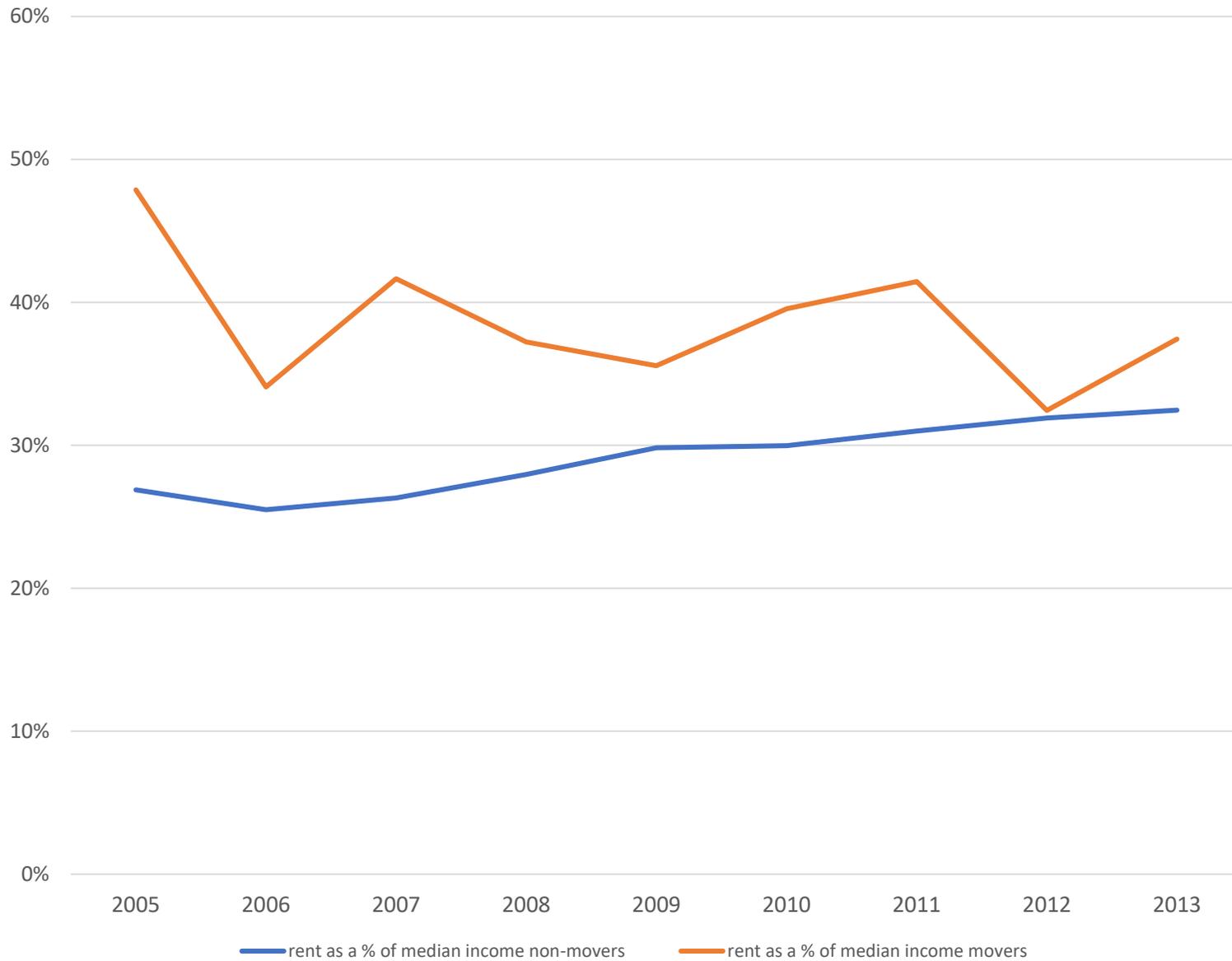
Median income: movers vs. non movers



## • CHARACTERISTICS OF MOVERS WITHIN D.C

- Within city movers are low-to-moderate income households

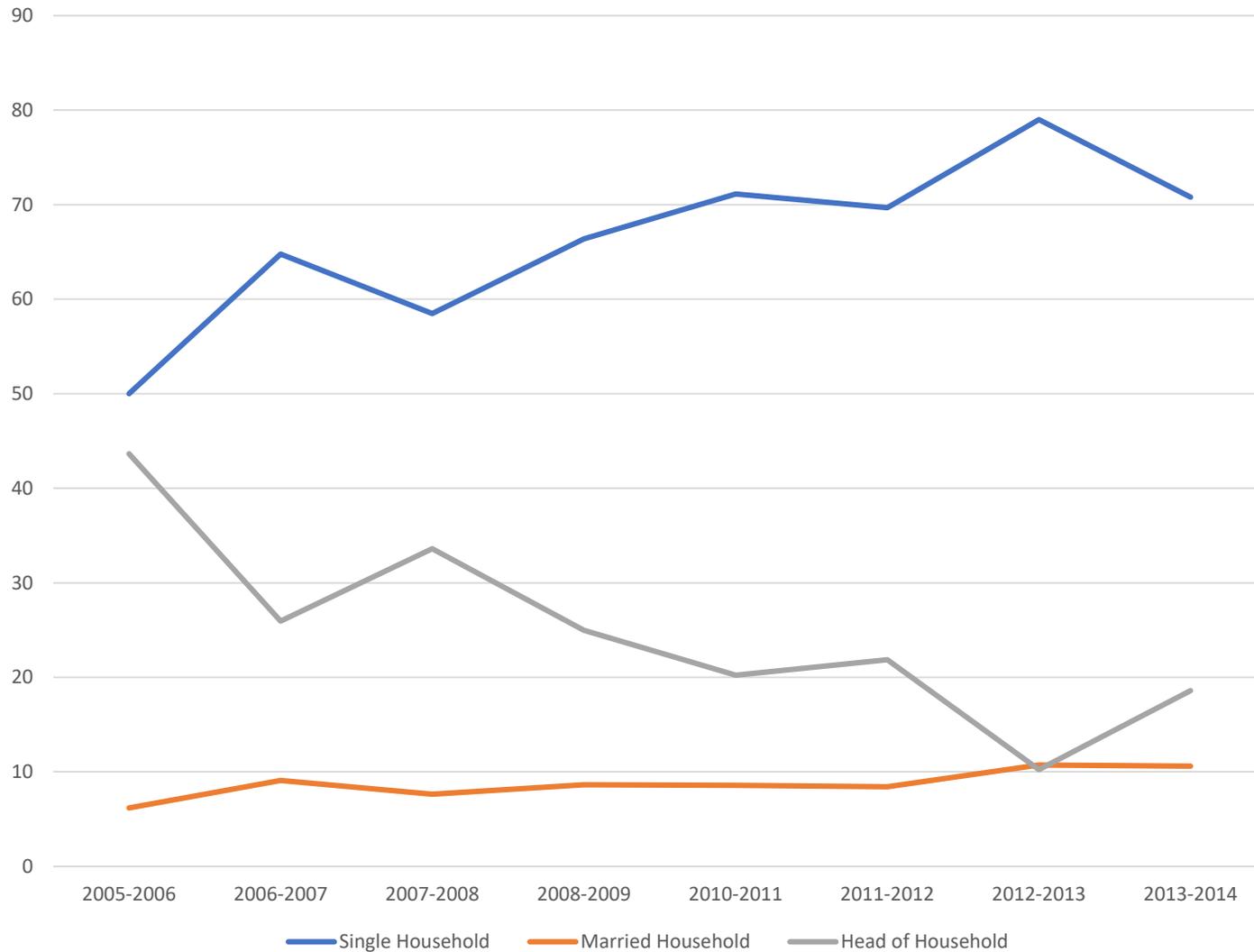
Rent as a percentage of median monthly income



## • CHARACTERISTICS OF MOVERS WITHIN D.C

- Within city movers are low-to-moderate income households
- Have a higher housing cost burden

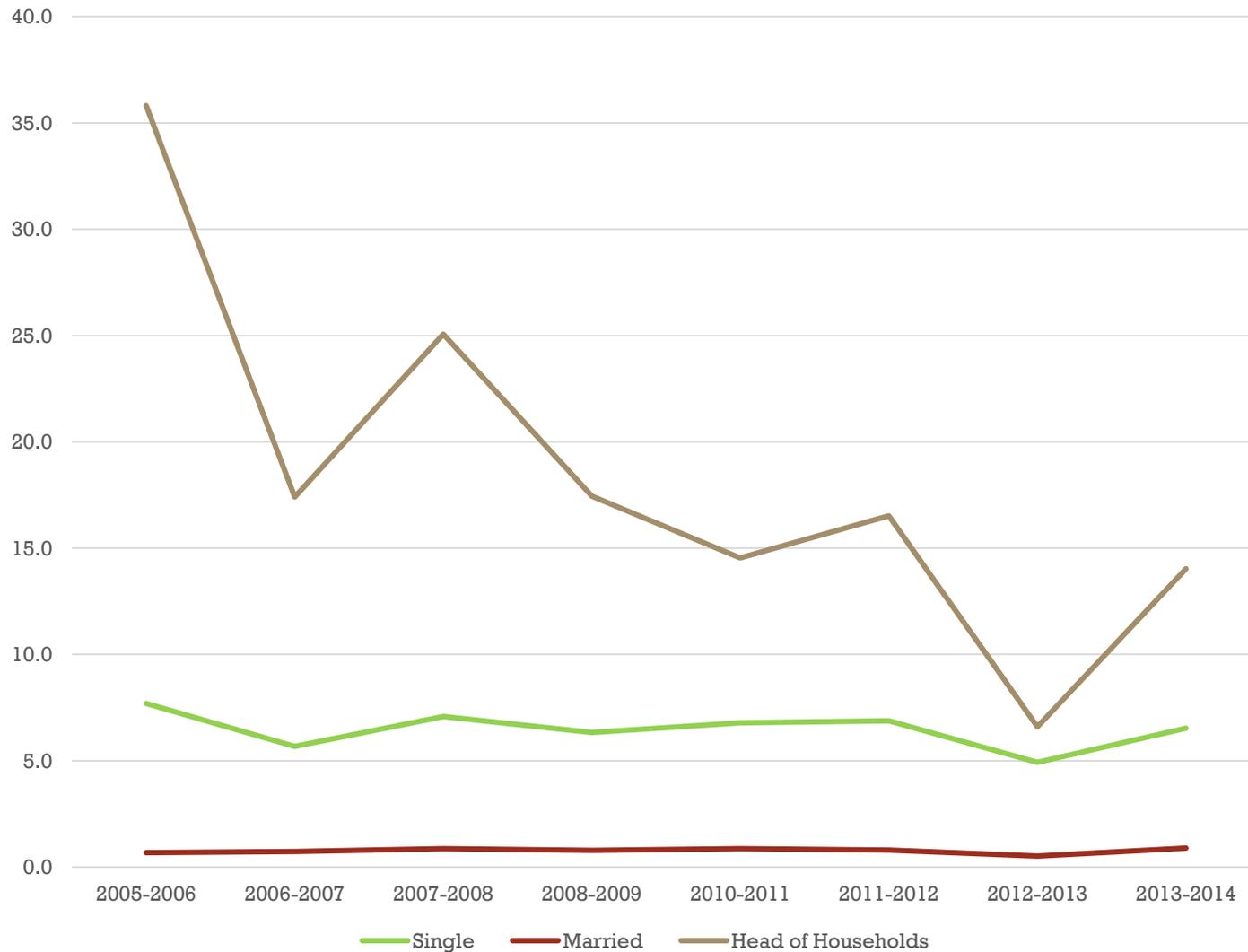
Percentage of movers by filing status



## • CHARACTERISTICS OF MOVERS WITHIN D.C

- Within city movers are low-to-moderate income households
- Have a higher housing cost burden
- Mostly single households

Percentage of EITC Movers by Filing Status



## • CHARACTERISTICS OF MOVERS WITHIN D.C

- Within city movers are low-to-moderate income households
- Have a higher housing cost burden
- Mostly single households
- EITC: more single families with dependents

## CHARACTERISTICS OF MOVERS WITHIN D.C

- Within city movers are low-to-moderate income households
- Have a higher housing cost burden
- Mostly single households
- EITC: more single families with dependents
- Higher percentage move to higher income census tract

<b>YEAR</b>	<b>% MOVE TO LOWER INCOME CENSUS TRACT</b>	<b>% MOVE TO HIGHER INCOME CENSUS TRACT</b>	<b>EITC-% MOVE TO LOWER INCOME CENSUS TRACT</b>	<b>EITC-% MOVE TO HIGHER INCOME CENSUS TRACT</b>
<b>2005-2006</b>	52.2%	47.8%	50.1%	49.9%
<b>2006-2007</b>	52.8%	47.2%	51.4%	48.6%
<b>2007-2008</b>	52.3%	47.7%	50.1%	49.8%
<b>2008-2009</b>	53.2%	46.8%	51.5%	48.5%
<b>2010-2011</b>	46.4%	53.6%	47.5%	52.6%
<b>2011-2012</b>	54.0%	46.0%	52.9%	47.1%
<b>2012-2013</b>	54.4%	45.6%	54.7%	45.5%
<b>2013-2014</b>	54.0%	46.0%	51.4%	48.7%

# SUMMARY CHARACTERISTICS OF DESTINATION NEIGHBORHOODS

Variable	All Observations		Observation with Positive Flows			
	Mean	Std. Dev.	Mean-All	Std. Dev.	Mean-EITC	Std. Dev.
<b>Transition population</b>	0.106	0.448	2.052545	2.160338	1.394	0.915
<b>Distance between census tracts</b>	4.002	2.146	2.776169	1.802619	2.899	1.952
<b>Assessment value</b>	<b>445845.600</b>	<b>335747.300</b>	<b>441338.9</b>	<b>312965.1</b>	<b>296048.400</b>	<b>200935.300</b>
<b>Income</b>	<b>46900.120</b>	<b>31033.760</b>	<b>45225.96</b>	<b>22783.42</b>	<b>33136.330</b>	<b>14095.190</b>
<b>Violent crime</b>	16.622	41.821	14.11723	10.29556	16.948	8.104
<b>Property crime</b>	71.946	331.231	49.89408	53.16081	45.566	26.276
<b>Age</b>	41.595	6.403	40.36086	5.994279	40.719	5.011
<b>Homeownership rate</b>	0.431	0.225	0.4145855	0.20474	0.357	0.202
<b>Renter rate</b>	0.558	0.228	0.5839732	0.2053354	0.642	0.203
<b>Distance to metro</b>	0.638	0.392	0.6121326	0.3722217	0.684	0.384
<b>White ratio</b>	0.311	0.302	0.3024805	0.288016	0.136	0.199
<b>Black ratio</b>	0.546	0.356	0.5484617	0.3431582	0.751	0.273
<b>Hispanic ratio</b>	0.084	0.087	0.0934418	0.0944955	0.078	0.100
<b>Total population</b>	1365.029	639.124	1543.478	670.3681	1401.380	589.579
<b>Single</b>	0.596	0.135	0.6066338	0.1293052	0.539	0.115
<b>Married</b>	0.181	0.112	0.1679122	0.0909189	0.129	0.063
<b>Head of household</b>	0.224	0.168	0.225454	0.1643578	0.331	0.153
<b>Observations</b>	286758		65220		21833	

- **Observations with positive flow:**
  - Average of 2 households move within DC per year
  - EITC households: 1 per year
  - Mean income and assessment value lower than total sample
  - Distance between census tract is less than total sample
  - Distance to metro is lower for all observations but higher for EITC households

# SUMMARY CHARACTERISTICS OF DESTINATION NEIGHBORHOODS

- Variables of interest
  - Income: measures neighborhood amenities, so that a higher income neighborhood equals more amenities.
    - Neighborhood quality
  - Housing assessment value: measure housing affordability in DC
    - Assessment value used because rent is correlated with income
  - Distance: measures commuting costs
    - Example: distance from friends, family, daycare centers, etc.

# YEAR BY YEAR MIGRATION- ALL HOUSEHOLDS

VARIABLES	(1) 2006	(2) 2007	(3) 2008	(4) 2009	(5) 2011	(6) 2012	(7) 2013	(8) 2014
Age	-24.89*** (5.959)	-14.41*** (2.881)	-21.75*** (4.104)	-5.834** (2.959)	-7.343** (2.931)	-4.904** (2.043)	-9.121*** (2.398)	-8.261*** (1.658)
Income	<b>-5.190***</b> <b>(1.096)</b>	<b>-5.194***</b> <b>(0.450)</b>	<b>-5.789***</b> <b>(0.681)</b>	<b>-5.052***</b> <b>(0.559)</b>	<b>-5.919***</b> <b>(0.562)</b>	<b>-5.883***</b> <b>(0.443)</b>	<b>-5.371***</b> <b>(0.501)</b>	<b>-5.767***</b> <b>(0.377)</b>
Assessment value	<b>-1.265***</b> <b>(0.382)</b>	<b>-1.285***</b> <b>(0.171)</b>	<b>-1.540***</b> <b>(0.261)</b>	<b>-1.508***</b> <b>(0.225)</b>	<b>-0.764***</b> <b>(0.283)</b>	<b>-1.373***</b> <b>(0.219)</b>	<b>-1.295***</b> <b>(0.235)</b>	<b>-1.201***</b> <b>(0.162)</b>
Violent crime	-0.273* (0.157)	0.0201 (0.0696)	-0.318*** (0.106)	-0.284*** (0.0778)	-0.151* (0.0819)	-0.0213 (0.0639)	-0.157** (0.0727)	-0.158*** (0.0455)
Property crime	0.310 (0.382)	-0.106 (0.166)	0.436 (0.266)	0.689*** (0.197)	0.322 (0.211)	-0.0895 (0.161)	0.317** (0.142)	0.0980 (0.106)
Metro distance	-0.581** (0.267)	-0.649*** (0.123)	-0.529*** (0.187)	-0.927*** (0.146)	-0.830*** (0.163)	-0.922*** (0.127)	-0.757*** (0.135)	-0.609*** (0.0997)
White	-0.199*** (0.0648)	-0.322*** (0.0351)	-0.289*** (0.0476)	-0.366*** (0.0418)	-0.281*** (0.0428)	-0.227*** (0.0347)	-0.383*** (0.0460)	-0.194*** (0.0270)
Black	-0.355*** (0.131)	-0.140** (0.0582)	-0.527*** (0.0857)	-0.395*** (0.0806)	-0.492*** (0.0963)	-0.473*** (0.0769)	-0.0435 (0.102)	-0.157** (0.0726)
Hispanic	-0.187*** (0.0665)	-0.0950** (0.0381)	-0.0507 (0.0472)	-0.109*** (0.0403)	-0.0601 (0.0495)	-0.0736* (0.0399)	-0.0276 (0.0601)	-0.0994*** (0.0350)
Population	-0.107 (0.524)	-0.321 (0.261)	-1.148*** (0.378)	-0.604* (0.314)	0.0202 (0.319)	-0.292 (0.235)	-0.283 (0.262)	-0.464** (0.182)
Distance	<b>-1.386***</b> <b>(0.0482)</b>	<b>-1.511***</b> <b>(0.0268)</b>	<b>-1.439***</b> <b>(0.0367)</b>	<b>-1.519***</b> <b>(0.0307)</b>	<b>-1.586***</b> <b>(0.0335)</b>	<b>-1.511***</b> <b>(0.0259)</b>	<b>-1.667***</b> <b>(0.0320)</b>	<b>-1.490***</b> <b>(0.0207)</b>
Constant	26.46*** (5.085)	16.09*** (2.441)	17.75*** (2.971)	14.15*** (2.695)	5.766*** (2.081)	19.92*** (2.187)	4.686** (2.026)	15.60*** (1.447)
Observations	24,534	25,488	25,344	26,775	27,612	27,650	28,302	27,966
R-squared	0.265	0.577	0.404	0.498	0.508	0.620	0.633	0.702

# YEAR BY YEAR MIGRATION- EITC HOUSEHOLDS

VARIABLES	(1) 2006	(2) 2007	(3) 2008	(4) 2009	(5) 2011	(6) 2012	(7) 2013	(8) 2014
Age	-19.13 (13.32)	-16.37** (7.966)	-19.10** (9.014)	12.31 (7.883)	14.15* (7.510)	2.820 (4.750)	5.272 (7.252)	-0.161 (3.750)
<b>Income</b>	<b>1.589</b> <b>(2.932)</b>	<b>-0.248</b> <b>(1.452)</b>	<b>0.333</b> <b>(1.957)</b>	<b>-1.032</b> <b>(1.622)</b>	<b>0.688</b> <b>(1.482)</b>	<b>2.373**</b> <b>(1.085)</b>	<b>-1.116</b> <b>(1.430)</b>	<b>0.425</b> <b>(0.851)</b>
<b>Assessment value</b>	<b>-0.0570</b> <b>(0.740)</b>	<b>-1.224***</b> <b>(0.397)</b>	<b>-3.329***</b> <b>(0.630)</b>	<b>-1.139***</b> <b>(0.439)</b>	<b>-2.346***</b> <b>(0.828)</b>	<b>-1.644***</b> <b>(0.560)</b>	<b>-1.929**</b> <b>(0.858)</b>	<b>-0.769*</b> <b>(0.402)</b>
Violent crime	-1.625*** (0.587)	-0.445* (0.254)	-1.179*** (0.346)	-0.724** (0.302)	-0.398 (0.252)	-0.702*** (0.202)	-0.573** (0.257)	-0.765*** (0.133)
Property crime	0.373 (1.035)	0.321 (0.475)	0.583 (0.582)	1.875*** (0.581)	1.712*** (0.610)	0.633 (0.415)	-0.344 (0.476)	0.187 (0.287)
Metro distance	0.494 (0.452)	0.372 (0.267)	0.390 (0.360)	-0.665** (0.316)	-0.387 (0.345)	-0.0294 (0.257)	-0.879** (0.409)	-0.251 (0.203)
White	0.00538 (0.0989)	-0.0315 (0.0620)	0.125 (0.0796)	-0.00278 (0.0689)	0.0323 (0.0691)	0.0276 (0.0493)	-0.0765 (0.0853)	0.0498 (0.0399)
Black	-1.255*** (0.375)	-0.324 (0.239)	-0.776** (0.352)	-1.183*** (0.394)	-0.619 (0.384)	-1.163*** (0.298)	-0.298 (0.424)	-0.441* (0.250)
Hispanic	-0.264*** (0.0888)	-0.266*** (0.0603)	-0.132* (0.0698)	-0.201*** (0.0571)	-0.143* (0.0731)	-0.263*** (0.0526)	-0.0591 (0.0958)	-0.199*** (0.0469)
Population	-2.074** (0.991)	-1.290** (0.571)	-2.294*** (0.720)	-2.502*** (0.665)	-1.381* (0.725)	-1.548*** (0.491)	-1.105 (0.775)	-1.167*** (0.406)
<b>Distance</b>	<b>-1.259***</b> <b>(0.0694)</b>	<b>-1.330***</b> <b>(0.0463)</b>	<b>-1.253***</b> <b>(0.0563)</b>	<b>-1.231***</b> <b>(0.0526)</b>	<b>-1.261***</b> <b>(0.0631)</b>	<b>-1.141***</b> <b>(0.0441)</b>	<b>-1.279***</b> <b>(0.0755)</b>	<b>-1.176***</b> <b>(0.0342)</b>
Constant	17.78* (10.38)	14.96** (7.295)	24.05*** (6.767)	-7.623 (6.713)	-7.396 (6.003)	-0.363 (4.133)	5.190 (5.338)	-2.105 (3.974)
Observations	17,097	23,525	20,187	24,131	24,552	26,524	26,707	27,492
R-squared	0.209	0.354	0.275	0.286	0.234	0.379	0.168	0.476

## CONCLUSION/ POLICY RECOMMENDATIONS

- Movers: lower income households vs non-movers
- Migration flows within the District are such that households are in search for cheaper housing in lower quality neighborhoods
- EITC Movers: neighborhood quality is neither a pull nor push factor
  - Also search for cheaper housing cost (highlights housing affordability issue)
- The importance of the District EITC policies as a pull factor for migration flows
  - EITC policy as a factor in limiting the effects of gentrification
- POLICY RECOMMENDATIONS
  - Keep EITC policies and maybe extend it
    - Households in the same income brackets not receiving EITC

# LIMITATIONS

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Individual income  
tax data may  
underestimate total  
population



Racial  
demographics of  
households not  
included in tax data

