Endowments and Minority Homeownership

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Abstract

Fifty years after the adoption of the 1968 Fair Housing Act that prohibits discrimination in the housing market, homeownership rates have not increased for Black or Hispanic households. The current homeownership rate for Black households is 42 percent, identical to the 1970 census reported level, and 48 percent for Hispanic households, lower than that in 1970. Using data from the 1989, 2005, and 2013 American Housing Surveys, we identify the extent to which group differences in household endowments account for persistently low minority homeownership levels.

1 Introduction

The Fair Housing Act, formally Title VIII of the Civil Rights Act of 1968, aims to remove barriers to access to opportunity to individuals regardless of their race or ethnicity.[1] Following the FHA, Congress passed the 1974 Equal Credit and Opportunity Act (ECOA), to prohibit discrimination in mortgage lending; the 1975 Home Mortgage Disclosure Act (HMDA), to monitor mortgage lending activity; the 1977 Community Reinvestment Act (CRA), to encourage financial institutions to meet the credit needs of all communities in their service; and the Financial Institutions Reform, Recovery, and Enforcement Act of 1989, to make HMDA data and CRA ratings publicly available. In 1992, Congress enacted the Government Sponsored Enterprise Act of 1992 to set annual targets

1 The law prohibits discrimination in renting or purchasing a dwelling based on an individual belonging to defined classes, including initially race, color, religion, gender, familial status or national origin. The Fair Housing Act included enforcement mechanisms to address discriminatory behaviors and affirmatively further fair housing with unequal efforts put into implementing these provisions (Bostic and Acolin, 2017).

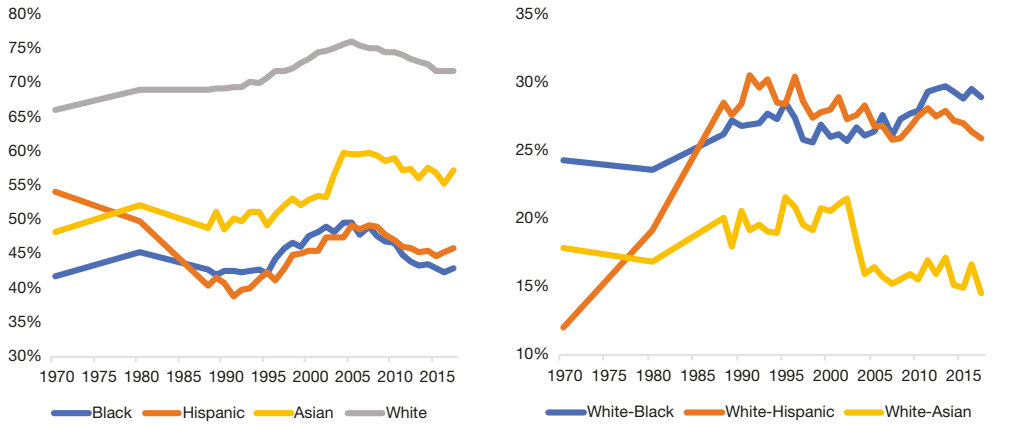
for affordable mortgage purchases for Fannie Mae and Freddie Mac (Bostic and Surette, 2001; Gabriel and Rosenthal, 2008).

In 1970, 2 years after the adoption of the Fair Housing Act, 66 percent of non-Hispanic White households owned their homes,[2] whereas 42 percent of Black households, 54 percent of Hispanic households, and 48 percent of Asian households were homeowners (based on census data; IPUMS, 2017). These disparities reflect less favorable socioeconomic conditions for minority households and decades of individual and structural barriers that prevented minority access to homeownership. Barriers included discriminatory actions government entities took, such as the Federal Housing Administration limiting minority access to mortgages for financing home purchases by redlining minority neighborhoods; the Fair Housing Act and other legislation address these actions (Schill and Wachter, 1995; Wachter and Acolin, 2015; Rothstein, 2017).[3]

Despite legislative initiatives, homeownership rates for Black and Hispanic households did not increase until the second half of the 1990s (exhibits 1 and 2). The Black homeownership rate rose from 42 percent in 1990 to 49 percent in 2000 and continued to rise to 50 percent in 2004.

Exhibit 1

U.S. Homeownership Rate by Race and Homeownership Gap Relative to White Households, 1970–2017



(a) Homeownership rate

(b) Homeownership gap

Note: White is non-Hispanic White; Asian is Asian, Hawaiian, or Pacific Islander.

Sources: Decennials: 1970 and 1980 U.S. Census, CPS March ASEC supplement: 1988–2017. IPUMS 2018.

2 Throughout the paper, White households refer to non-Hispanic White households unless otherwise indicated.

3 The ECOA prohibits mortgage lending discrimination based on defined classes, as noted in footnote 1. Redlining or neighborhood lending discrimination is determined based on neighborhood characteristic (Guttentag and Wachter, 1980).

Exhibit 2.1

Homeownership Rates: 1989, 2005, and 2013

Data	Year	Black	Hispanic	Asian	White
AHS	1989	46.4%	43.1%	49.6%	70.5%
	2005	49.5%	50.7%	60.1%	76.1%
	2013	43.8%	43.8%	54.6%	72.7%
CPS	1989	42.1%	41.6%	51.2%	69.3%
	2005	49.7%	49.3%	59.7%	76.1%
	2013	42.9%	45.9%	56.0%	73.3%

Notes: CPS data is from Housing Vacancies and Homeownership (CPS/HVS). 1989 data comes from CPS March Supplement. White refers to non-Hispanic White households. AHS data is from American Housing Survey from Census Bureau.

Exhibit 2.2

Homeownership Rate Gaps: 1989, 2005, and 2013

Data	Year	White-Black	White-Hispanic	White-Asian
AHS	1989	24.1%	27.4%	20.9%
	2005	26.6%	25.4%	16.0%
	2013	28.9%	28.9%	18.1%
CPS	1989	27.2%	27.7%	18.1%
	2005	26.4%	26.8%	16.4%
	2013	30.4%	27.4%	17.3%

The Hispanic homeownership rate rose from 41 percent in 1990 to 46 percent in 2000 and to 50 percent in 2005. Homeownership rates did increase slightly for Asian households from 1970 to 1990, from 48 percent to 49 percent, and then increased to 53 percent in 2000 and 60 percent in 2004. Homeownership rates for White households increased from 66 percent in 1970 to 69 percent in 1990, to 74 percent in 2000, and peaked at 76 percent in 2004. Homeownership rates increased from the mid-1990s to 2004–2005 for all groups, and disparities in homeownership decreased.[4]

Decreases in homeownership gaps and increases in the homeownership rates for all groups are consistent with a heightened impact of the CRA due to increased bank merger activity (Bostic and Surette, 2001) and public access to data on CRA ratings, along with more emphasis on government sponsored enterprise (GSE) affordable housing goals (Gabriel and Rosenthal, 2008). The increases in minority homeownership rates reversed in the aftermath of the financial crisis.

As of the second quarter of 2018, the homeownership rate is 42 percent for Black households and 47 percent for Hispanic households, at or beneath their 1970 levels, whereas the homeownership rate is 73 percent for non-Hispanic White households and 58 percent for Asian households, both higher than in 1970 (U.S. Census, 2018).[5] With demographic shifts toward a "minority-majority" nation, the aggregate homeownership rate for the U.S. in coming decades is projected to decline if

4 The minority-White homeownership gap decreased between 1990 and 2004–2005 by 2 percentage points for Black households, 3 points for Hispanic households, and 5 points for Asian households.

5 These percentages are based on the Current Population Survey (CPS), a nationally representative survey that includes information about race, ethnicity, and tenure.

the homeownership attainments of minority groups remain at these levels (Acolin, Goodman, and Wachter, 2016).

The ability to become a homeowner affects access to opportunity. Homeownership provides a hedge against future housing cost increases and encourages wealth accumulation through saving mechanisms embedded in amortizing mortgages. Homeownership also allows households to continue to live in neighborhoods with improving public amenities and services, including the quality of local public schools (Dietz and Haurin, 2003). The benefits accompanying homeownership can enable intergenerational economic mobility (Acolin and Wachter, 2017); hence, the public has an interest in homeownership outcomes.

Historically, government policies have favored homeownership in the United States, including through the mortgage interest rate deduction.[6] Several policy actions directly aim to increase access to homeownership by expanding mortgage credit availability. These include the Federal Housing Agency and U.S. Department of Veterans Affairs (VA) low and no down payment mortgages, respectively, with Ginnie Mae government backing; the government regulated GSE mortgages (through Fannie Mae and Freddie Mac); and the CRA and the GSEs' affordable housing goals (Bostic and Surette, 2001; Wachter and Acolin, 2015).

The CRA is currently under revision (U.S. Department of the Treasury, 2018). The GSEs' affordable housing goals are also under consideration to limit their scale (Parrott and Zandi, 2018). Uncertainty around the reform of the GSEs persists but their future structure will have major implications for the availability and pricing of credit to support minority access to homeownership (Acolin, Goodman, and Wachter, 2018; Parrott and Zandi, 2018).

In this article, we describe the rise and fall in homeownership rates for minority households since 1989. Using data from the 1989, 2005, and 2013 American Housing Surveys (AHS), we decompose disparities in homeownership rates into the share accounted for by endowments—most importantly, permanent income—and a residual share. We find permanent income declines are associated with decreases in minority homeownership rates, but we also find an unexplained increase in residual gaps.

Section 2, which follows, reviews the literature examining differences in homeownership rates across racial and ethnic groups. Section 3 describes the data we use to account for homeownership gaps. Section 4 presents the method used to decompose the homeownership gap into the share explained by endowment and unexplained residuals and presents results. Section 5 discusses implications and concludes.

6 The mortgage interest deduction (MID), prior to the recent changes, provided a substantial tax benefit to homeowners with most of the benefits flowing to borrowers with larger mortgages (Poterba and Sinai, 2008). The 2017 Tax Cuts and Jobs Act substantially limited the benefit from the MID (ABA, 2017), although this might only have a marginal impact on homeownership decisions (Poterba and Sinai, 2008).

2 Literature Review

An extensive literature examines disparities in homeownership rates across racial and ethnic groups.[7] This literature identifies factors that contribute to lower homeownership rates among minority groups. These include income and wealth disparities, which contribute to an "endowment effect." Standard tenure choice models attribute homeownership gaps to the estimated effects of endowments, and, to a residual, which may be linked to individual and structural discrimination as well as to other unobserved factors.

Standard tenure choice determinants include household permanent and transitory income, the price of owning relative to renting, and household life cycle characteristics as endowment factors (Wachter and Megbolugbe, 1992). Differences in income across demographic groups play an important role in explaining differences in homeownership given differences in household characteristics, such as marital status and number of children (Wachter and Megbolugbe, 1992; Gabriel and Rosenthal, 2005; Seah, Fesselmeyer, and Le, 2017; Newman, Holupka, and Ross, 2018).

Differences in location, with minorities more concentrated in central cities where housing prices tend to be higher, and the substantial level of segregation experienced by minorities also help to explain lower minority homeownership rates (Gyourko, Linneman, and Wachter, 1999; Deng, Ross, and Wachter, 2003; Carrillo and Yezer, 2009). For minority households, the impact of lending practices, such as the use of redlining the Federal Housing Administration (FHA) implemented that considered minority neighborhoods too risky to lend into, contributed to depressing homeownership outcomes (Rothstein, 2017).

Long after the end of institutional barriers that restricted minority access to mortgages, particularly through FHA redlining, these practices continue to have a negative impact on homeownership in minority areas, in part due to the lack of opportunity to share in wealth building through homeownership in these neighborhoods (Appel and Nickerson, 2016; Krimmel, 2018; Rothstein, 2017). Hence, endowment effects, particularly through intergenerational wealth transfers, can have a persistent impact on homeownership outcomes (Bricker et al., 2017).

Such endowment effects may operate through borrowing constraints that limit access to mortgages based on down payment requirements.[8] The empirical literature shows the impact of a lesser ability to receive family support for a down payment through intergenerational wealth transfers (Hilber and Liu, 2008; Gyourko, Linneman, and Wachter, 1999) and the positive impact on homeownership of receiving family transfers and having parents who are homeowners (Lee et al., 2018).[9]

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7 See among others, Bayer, Ferreira, and Ross, 2016; Calem, Hershaff, and Wachter, 2004; Kain and Quigley, 1972; Wachter and Megbolugbe, 1992; Coulson, 1999; Gyourko, Linneman, and Wachter, 1999; Painter, Gabriel, and Myers, 2001; Deng, Ross, and Wachter, 2003; Gabriel and Rosenthal, 2005; Hilber and Liu, 2008; DeSilva and Elmelech, 2012; Seah, Fesselmeyer, and Le, 2017; and McCabe, 2018.

8 The literature provides empirical evidence on the significance of credit related factors to homeownership outcomes (Linneman and Wachter, 1989; Haurin, Hendershott, and Wachter, 1997).

9 For minority groups in which a substantial share is foreign-born, factors specific to immigration such as lack of language ability, limited credit history, and temporary migratory projects, contribute to different homeownership outcomes (Coulson, 1999; Painter, Gabriel, and Myers, 2001; Painter, Yang, and Yu, 2004; DeSilva and Elmelech, 2012).

The empirical evidence suggests that the impact of credit barriers on gaps declined over the 1983–2001 period and, more generally, that the unexplained portion of estimated White-minority gaps, along with the actual gaps, decreased over that period (Gabriel and Rosenthal, 2005).[10] The empirical evidence also suggests that, in the aftermath of the Great Recession, tightened credit particularly impacted minority homeownership.[11] A decomposition study for the years 2005 to 2011 shows that much of the increase in the minority homeownership gap is due to income disparities, and most of the unexplained increase is found for Black households on the margin of homeownership (Seah, Fesselmeyer, and Le, 2017). This is consistent with research showing the decline in first-time homebuyers following the crisis (Acolin et al., 2018).[12]

Here, we employ a cross-sectional modeling technique for the years 1989, 2005, and 2013 to examine decreases from 1989 to 2005 and then increases from 2005 to 2013 in homeownership disparities. Data limitations and possible estimation strategies do not allow us to provide causal estimates due to the potential for omitted variable bias and selection effects.[13] Despite these limitations, we identify the extent to which observed household and market endowments account for gaps. Particularly we draw implications from the changing role of permanent and transitory income over time by demographic group. We also consider the implications of income-related and residual homeownership gaps for the future evolution of aggregate homeownership rates.

As Acolin, Goodman, and Wachter (2016) showed, with anticipated demographic changes, the United States will become a "minority-majority" country, (with White representing less than 50 percent of the overall population), and persistent low homeownership rates among minorities may result in substantially lower aggregate homeownership rates. In contrast, continued increases in human capital through increased educational outcomes for minority households could contribute to increasing homeownership rates and smaller homeownership gaps (Painter et al., 2018).

3 Data and Summary Statistics

We utilize the Public Use File (PUF) of the 2013 American Housing Survey (AHS) to examine minority/majority homeownership gaps.[14] The AHS includes detailed information on households and housing characteristics that allow for hedonic price estimation with a nationally representative

10 The impact of credit scores, which intergenerational transfers may also affect, increased in this period, relative to down payment and debt to income credit constraints (Barakova et al., 2003).

11 See Goodman and Mayer (2018) for evidence of tightened credit constraints in the aftermath of the financial crisis. Banks tightened credit through so-called "credit overlays" after insurers imposed penalties for representation and warranty failures in mortgage loan origination (McCoy and Wachter, 2017).

12 Acolin et al. (2016) show that the aggregate homeownership rate decline from 69.0 percent in 2004 to 63.7 percent in 2015 can be attributed to tighter credit.

13 For instance, some evidence shows that higher headship rates among some groups (Black and White) can result in lower measured homeownership rates than in others (Asian and Hispanic), and these differences in propensity to form households have been shown to change over time (Yu and Haan, 2012; Lee and Painter, 2013). Higher mobility rates among some minority groups (Kan, 1999; Painter et al., 2001) and their concentration in neighborhoods with lower levels of amenities (Gabriel and Painter, 2008) could contribute to lowering the demand for homeownership for a given level of endowment. However, there is no evidence that these differences in mobility and neighborhood characteristics have changed differentially across groups over time.

14 Housing price and market value data are not available in the most recent Public Use File of the 2015 AHS. We thus use the 2013 AHS.

sample. One limitation is the lack of information about household wealth, credit, and employment history that affect the household's ability to access credit.

In terms of racial and ethnic composition, 67 percent out of the AHS 2013 sample are non-Hispanic White households. Black, Hispanic, and Asian households account for 15 percent, 14 percent, and 5 percent, respectively, of the sample. AHS PUFs provide identifiers for 15 consolidated metropolitan statistical areas (CMSA), with each further divided into two submarkets by center city status.[15]

As exhibit 2 shows, the homeownership rate pattern over time in the AHS is broadly consistent with that of the CPS. Exhibit 3 reports summary statistics across years for the four demographic groups examined: non-Hispanic White (the reference group referred to as White), Black, Hispanic, and Asian. We include t-statistics of the mean differences indicating whether the mean of a variable is statistically different across the White and the minority group.

Exhibit 3.1a

Sample Statistics by Group: White and Black, 2013

	White_mean	sd	Black_mean	sd	mean_diff_tstat
Household income	76,127.83	80,915.47	42875.12	47666.27	25.28
Permanent income	66,708.51	34,433.85	38699.68	24910.78	49.17
Transitory income	9,419.32	70,417.65	4175.44	40239.84	4.59
Price-rent ratio	144.20	29.49	139.11	31.10	9.89
Value-rent ratio	157.26	60.41	131.69	56.39	24.06
Age	54.08	17.45	50.33	16.46	12.57
Family size	2.33	1.34	2.41	1.53	– 3.44
Married	0.52	0.50	0.29	0.45	27.41
Gender (male)	0.54	0.50	0.37	0.48	19.45

15 The 1980 design consolidated MSA code is used in AHS 1989, 2005, and 2013 samples. Due to confidentiality restrictions, only 14 CMSA codes are allowed on the public use file (Boston-Lawrence-Salem, MA-NH; Buffalo-Niagara Falls, NY; Dallas-Fort Worth, TX; Denver-Boulder, CO; Hartford-New Britain-Middletown, CT; Kansas City, MO-Kansas City, KS; Los Angeles-Anaheim-Riverside, CA; Miami-Fort Lauderdale, FL; New York-Northern New Jersey-Long Island, NY-NJ-CT; Pittsburgh-Beaver Valley, PA; Portland-Vancouver, OR-WA; Providence-Pawtucket-Fall River, RI-MA; Saint Louis-East Saint Louis-Alton, MO-IL; Seattle-Tacoma, WA). We group households not in those CMSAs for which we do not have information about location into a separate market. The AHS is a random national survey with a stratified sample design in which units in each large county and units in a randomly selected small county stratified by geography and characteristics are sampled.

Exhibit 3.1b

Sample Statistics by Group: White and Hispanic, 2013

	White_mean	sd	Hispanic_mean	sd	mean_diff_tstat
Household income	76,127.83	80,915.47	50,946.54	53,631.79	18.27
Permanent income	66,708.51	34,433.85	46,314.90	26,003.44	34.37
Transitory income	9,419.32	70,417.65	4,645.24	47,785.42	3.97
Price-rent ratio	144.20	29.49	152.24	41.30	– 14.17
Value-rent ratio	157.26	60.41	153.46	60.44	3.45
Age	54.08	17.45	46.13	15.61	25.92
Family size	2.33	1.34	3.19	1.74	– 34.21
Married	0.52	0.50	0.51	0.50	0.41
Gender (male)	0.54	0.50	0.52	0.50	2.24

Exhibit 3.1c

Sample Statistics by Group: White and Asian, 2013

	White_mean	sd	Asian_mean	sd	mean_diff_tstat
Household income	76,127.83	80,915.47	83,195.17	83,494.80	– 4.89
Permanent income	66,708.51	34,433.85	74,207.44	34,517.75	– 10.84
Transitory income	9,419.32	70,417.65	8,987.73	74,457.58	– 0.19
Price-rent ratio	144.20	29.49	161.54	44.58	– 17.47
Value-rent ratio	157.26	60.41	175.61	68.15	– 10.61
Age	54.08	17.45	47.23	15.84	11.53
Family size	2.33	1.34	2.95	1.53	– 11.71
Married	0.52	0.50	0.64	0.48	– 8.51
Gender (male)	0.54	0.50	0.59	0.49	– 4.10

Exhibit 3.1d

Sample Statistics by Group: White and Black, 2005

	White_mean	sd	Black_mean	sd	mean_diff_tstat
Household income	64,765.17	70,494.15	39,500.25	43,208.38	24.25
Permanent income	55,875.18	28,312.26	34,070.62	21,941.27	51.27
Transitory income	8,889.99	62,647.59	5,429.62	36,185.99	3.75
Price-rent ratio	179.78	41.38	176.55	41.87	5.05
Value-rent ratio	197.98	80.35	164.42	73.07	26.48
Age	51.66	17.52	47.44	16.53	15.73
Family size	2.39	1.33	2.54	1.56	– 7.00
Married	0.55	0.50	0.32	0.47	30.43
Gender (male)	0.58	0.49	0.41	0.49	22.32

Exhibit 3.1e

Sample Statistic by Group: White and Hispanic, 2005

	White_mean	sd	Hispanic_mean	sd	mean_diff_tstat
Household income	64,765.17	70,494.15	47,932.18	52,705.10	15.77
Permanent income	55,875.18	28,312.26	42,273.61	23,323.33	31.47
Transitory income	8,889.99	62,647.59	5,658.57	47,957.46	3.40
Price-rent ratio	179.78	41.38	203.20	75.13	– 31.77
Value-rent ratio	197.98	80.35	210.84	94.96	– 9.77
Age	51.66	17.52	42.99	15.11	32.26
Family size	2.39	1.33	3.31	1.76	– 41.86
Married	0.55	0.50	0.56	0.50	– 1.37
Gender (male)	0.58	0.49	0.56	0.50	2.21

Exhibit 3.1f

Sample Statistics by Group: White and Asian, 2005

	White_mean	sd	Asian_mean	sd	mean_diff_tstat
Household income	64,765.17	70,494.15	72,643.44	67,919.74	– 5.31
Permanent income	55,875.18	28,312.26	62,580.04	28,247.73	– 10.90
Transitory income	8,889.99	62,647.59	10,063.39	60,877.43	– 0.97
Price-rent ratio	179.78	41.38	210.03	77.93	– 20.33
Value-rent ratio	197.98	80.35	240.41	103.52	– 17.37
Age	51.66	17.52	45.22	14.84	11.40
Family size	2.39	1.33	3.07	1.58	– 14.43
Married	0.55	0.50	0.67	0.47	– 8.79
Gender (male)	0.58	0.49	0.64	0.48	– 4.42

Exhibit 3.1g

Sample Statistics by Group: White and Black, 1989

	White_mean	sd	Black_mean	sd	mean_diff_tstat
Household income	36,981.96	30,505.32	23,738.09	22,018.11	29.17
Permanent income	33,345.19	15,789.34	21,215.67	13,187.66	51.06
Transitory income	36,36.77	25,569.78	2,522.42	17,409.85	2.94
Price-rent ratio	120.91	32.04	122.29	28.90	– 2.86
Value-rent ratio	163.81	57.95	145.02	55.61	20.69
Age	49.54	17.64	47.06	16.74	9.23
Family size	2.53	1.38	2.77	1.65	– 11.12
Married	0.71	0.45	0.51	0.50	29.11
Gender (male)	0.70	0.46	0.49	0.50	29.53

Exhibit 3.1h

Sample Statistics by Group: White and Hispanic, 1989

	White_mean	sd	Hispanic_mean	sd	mean_diff_tstat
Household income	36,981.96	30,505.32	28,100.48	24,600.51	15.24
Permanent income	33,345.19	15,789.34	25,544.39	13,837.85	25.74
Transitory income	3,636.77	25,569.78	25,56.09	20,940.26	2.21
Price-rent ratio	120.91	32.04	136.78	37.73	– 25.23
Value-rent ratio	163.81	57.95	164.30	55.93	– 0.43
Age	49.54	17.64	42.04	15.44	22.15
Family size	2.53	1.38	3.36	1.83	– 30.32
Married	0.71	0.45	0.63	0.48	9.12
Gender (male)	0.70	0.46	0.66	0.47	4.06

Exhibit 3.1i

Sample Statistics by Group: White and Asian, 1989

	White_mean	sd	Asian_mean	sd	mean_diff_tstat
Household income	36,981.96	30,505.32	42,783.48	34,233.67	– 6.37
Permanent income	33,345.19	15,789.34	37,939.29	17,421.56	– 9.73
Transitory income	3,636.77	25,569.78	4,844.19	30,255.09	– 1.55
Price-rent ratio	120.91	32.04	136.74	38.55	– 13.73
Value-rent ratio	163.81	57.95	176.73	65.81	– 6.60
Age	49.54	17.64	42.53	13.93	11.25
Family size	2.53	1.38	3.43	1.92	– 17.69
Married	0.71	0.45	0.69	0.46	1.30
Gender (male)	0.70	0.46	0.73	0.44	– 2.46

Following Wachter and Megbolugbe (1992), we estimate tenure choice logit models and include independent variables that allow us to capture the impact of key factors that affect tenure outcomes. We categorize observable factors into household and market endowments. As part of household endowment, household income is decomposed into permanent and transitory components, based on the permanent income hypothesis (Friedman, 1957). Permanent and transitory income are the fitted value and the residual of a household income estimation regression, respectively, and permanent income is expected to be a primary driver of the demand for homeownership (Goodman, 1988). We estimate permanent income based on household characteristics including education, age, gender, marital status, number of cars, family size, ethnicity/race and the location of the households as explanatory variables.[16]

In the tenure choice logit models, we use household structure variables including age, marital status, and gender of household head, and size of household as controls, with sample statistics shown in exhibit 3. Household structure variables evolve over time with household size and married status declining, and age and gender of household head shifting, consistent with population trends.[17]

16 Descriptive statistics and econometric results from the permanent income regression are available in the online appendix.

17 Age of household head increases and household head shifts from male to female.

Important missing variables to measure household endowment include household current wealth and parental wealth that impact homeownership attainments as noted earlier (Lee et al., 2018). The historically lower homeownership and wealth attainment of the parents of minority households continue to affect current homeownership attainment. Permanent income can proxy for household wealth and for the impact of credit constraints (Haurin, Hendershott, and Wachter, 1997). However, permanent income is an imprecise measure of wealth-related borrowing constraints, and, hence, this factor would also go into the unexplained portion of our estimates (Gyourko, Linneman, and Wachter, 1999).

Market endowment measures used in the literature includes costs of renting versus owning, through two housing ratios: the value-rent ratio and the price-rent price ratio, which are expected to drive the tenure choice decision in opposite directions, with a higher value-rent ratio and a lower price-rent ratio having positive impacts on the decision to own (Goodman, 1988; Wachter and Megbolugbe, 1992). The literature uses the price-rent ratio to capture the cost of renting versus the (user) cost of owning and the value-rent ratio to identify the expected price appreciation component of user costs. The value-rent ratio is constructed using property-specific data and is derived from the hedonic regressions for renters and owners. For each owner (renter), the counterfactual rent (price) is estimated from the hedonic price (rent) regression with housing characteristics of the owner's (renter's) house. The house-specific value-rent ratio is then the ratio of two fitted values from two hedonic regressions. A high value-rent ratio captures expectation of housing price appreciation and is expected to have a positive impact on homeownership. The price-rent ratio is a market level variable of the cost of owning, relative to renting, that controls for differences in quality across markets based on a national renter sample and a national owner sample. The consolidated MSA defined 30 submarkets for public use and central city status. Within each submarket, average renter and owner characteristics are used in the hedonic price regression to derive the submarket-specific price-rent ratio.[18] In areas with higher price-rent ratios, individuals are expected to have lower homeownership rates all else equal (Wachter and Megbolugbe, 1992).

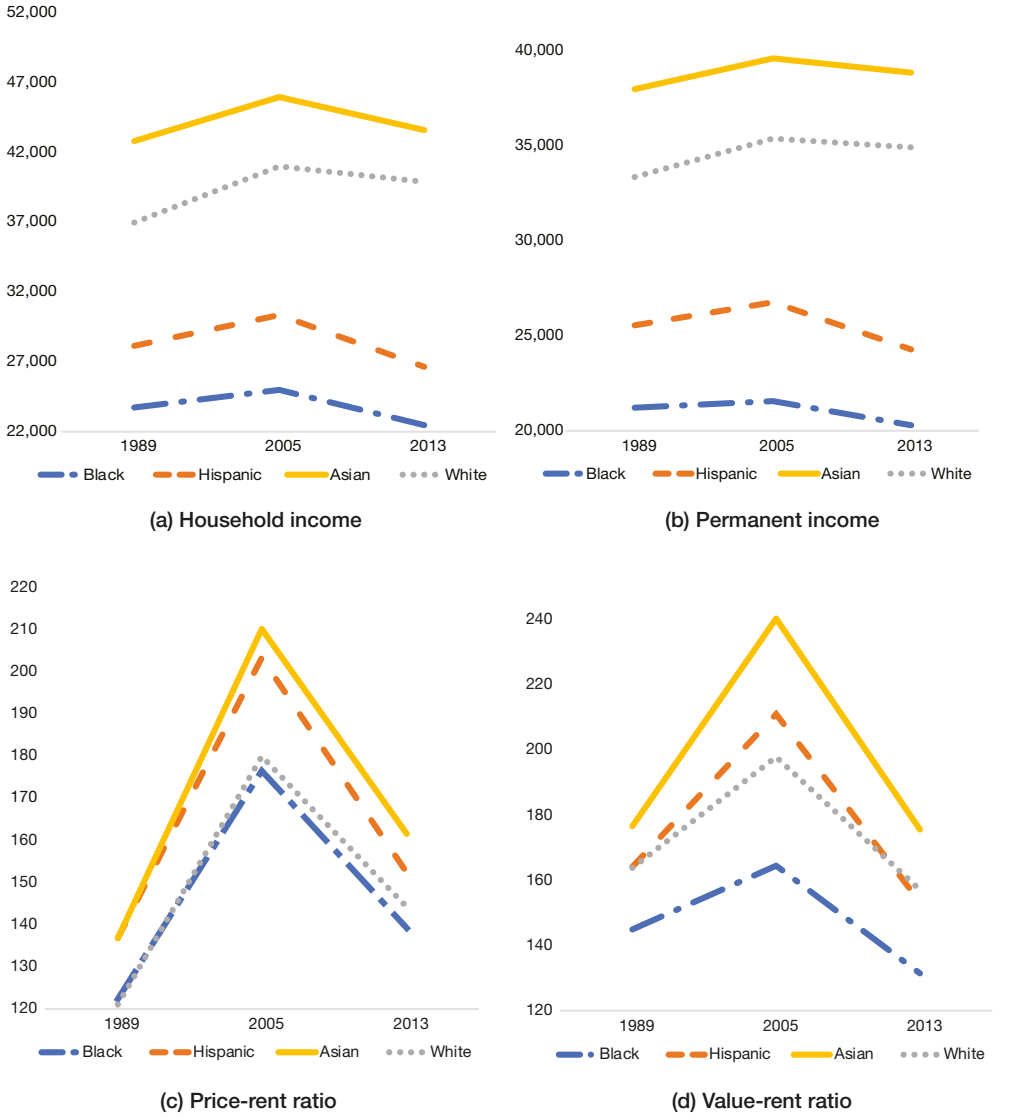
Exhibits 4 and 5 report the mean of the value-rent ratio and the price-rent ratio by group over time. The price-rent and value-rent ratios show a hump-shaped pattern over time with the ratios peaking in 2005, with countervailing implications for homeownership rate outcomes.

Exhibits 4 and 5 also show the substantial differences in actual household income and permanent income across demographic groups and their evolution over time. Most notably, the inflation adjusted actual and permanent income of Black and Hispanic households decreased over the 1989–2013 period, while for White households and Asian households, real actual and permanent income increased over time, increasing income disparities across groups.

18 The descriptive statistics and details of the hedonic regressions are available in the online appendix.

Exhibit 4

Mean Income (Dollars), Price-Rent and Value-Rent Ratios, AHS 1989, 2005, 2013



Note: Income has been inflation-adjusted to 1989 dollars.

Exhibit 5

Comparison of Income and Market Endowment: 1989 v. 2005 v. 2013

Year	Variable	Black		Hispanic		Asian		White	
		mean	sd	mean	sd	mean	sd	mean	sd
1989	Household income	23,738	22,018	28,100	24,601	42,783	34,234	36,982	30,505
	Permanent income	21,216	13,188	25,544	13,838	37,939	17,422	33,345	15,789
	Price-rent ratio	122.29	28.90	136.78	37.73	136.74	38.55	120.91	32.04
	Value-rent ratio	145.02	55.61	164.30	55.93	176.73	65.81	163.81	57.95
2005	Household income	25,000	27,347	30,337	33,358	45,977	42,987	40,991	44,617
	Permanent income	21,564	13,887	26,755	14,762	39,608	17,878	35,364	17,919
	Price-rent ratio	176.55	41.87	203.20	75.13	210.03	77.93	179.78	41.38
	Value-rent ratio	164.42	73.07	210.84	94.96	240.41	103.52	197.98	80.35
2013	Household income	22,448	24,956	26,674	28,079	43,558	43,715	39,858	42,364
	Permanent income	20,262	13,042	24,249	13,614	38,852	18,072	34,926	18,028
	Price-rent ratio	139.11	31.10	152.24	41.30	161.54	44.58	144.20	29.49
	Value-rent ratio	131.69	56.39	153.46	60.44	175.61	68.15	157.26	60.41

The real permanent income of an average Black household increased from 1989 to 2005 by 1.6 percent and then declined from 2005 to 2013 by 6 percent (decreasing from 1989 to 2013 by 4.4 percent), which *ceteris paribus* is consistent with the observed rise and then decline in homeownership rates (exhibit 5).[19] Similarly, real permanent income for Hispanic households increased by 4.7 percent and then decreased by 9.4 percent between 2005 and 2013 (decreasing 4.7 percent from 1989 to 2013). Both measures of income increased in real terms over the period 1989 and 2005 for Black and Hispanic households but the decline observed during the 2005–2013 period more than offset these gains. Unlike Black and Hispanic households, Asian and White households' real permanent income increased from 1989 to 2013 by 2.5 and 4.9 percent, respectively (it increased by 4.4 percent and 6.1 percent respectively from 1989 to 2005 then declined from 2005 to 2013).

Because of these diverging trends, the permanent income of an average Black household as a share of the permanent income of an average White household declined from 64 percent in 1989, to 61 percent in 2005, and 56 percent in 2013. For an average Hispanic household, it declined from 77 percent in 1989, 76 percent in 2005, and 69 percent in 2013. The average Asian household has higher permanent income than the average White household, The average Asian household has higher permanent income than the average White household, 14 percent higher in 1989, 12 percent higher in 2005, and 11 percent higher in 2013. In addition, income inequality within group grew as shown by increasing standard deviations. We turn to the analysis of the impact of these changes.

19 Homeownership rates were unusually low in 1989 due to high interest rates. All else equal, homeownership rates would be expected to be higher in 2013 than in 1989 due to the lower prevailing interest rates in 2013.

4 Model and Estimation Results

4.1 Model

We conduct logistic regression analyses to estimate the determinants of homeownership. Specifically, we use differences in household and market endowments to account for disparities in homeownership rates, with the model taking the following general form.

$$E(tenure_i=1 \mid X) = F(\beta_0 + inc_i \cdot \vec{\beta}_1 + hratio_i \cdot \vec{\beta}_2 + race_i \cdot \vec{\beta}_3 + D_i \cdot \vec{\beta}_4 + Z_i \cdot \vec{\beta}_5)$$

Where *tenure* = 1 indicates that a household is an owner and 0 otherwise. *F* is the cumulative distribution function of the logistic distribution. *hratio* is a vector and includes the value-rent ratio and the price-rent ratio. *inc* is a vector of household income which may include the permanent and the transitory components. *race* is a vector of ethnicity indicators, while *D* bundles the demographic information including age, family size, gender, citizenship status, and marital status that are expected to affect the demand for homeownership. *Z* is a vector of the rest of the variables including the interaction of the explanatory variables.

The next subsections present the empirical results. Exhibits 6.1 to 6.3 report results for 2013, exhibit 7.1 to 7.3 do so for 2005. Exhibit 8.1 to 8.3 report results for the analysis of the role of citizenship (for which we only have data for the years 2005 and 2013). Exhibits 9.1 to 9.3 report results for 1989. We compare 1989 to 2013 results in exhibit 10.

4.2 Logistic Results with Pooled Sample in 2013

We show 2013 results in exhibit 6.1 for tenure choice logit models for the pooled sample representative of the U.S. population.[20] Model 1 includes actual household income; model 2 includes estimated permanent and temporary income; models 3, 4, and 5 respectively add dummies for Black, Hispanic, and Asian separately; and model 6 combines all groups. Additional control variables include household structure (family size and age, gender, and marital status of household head) and price ratios along with dummies for demographic groups.

In the pooled regressions, coefficients of family structure variables, including the age and gender of the household head, family size, and marital status generally have the expected signs. A 1-year increase in household age is associated with 0.6 to 0.7-percentage points increase in homeownership probability; a male household head increases homeownership probability by 0.8 to 1.5 percentage points; and, a married household head's probability to own is 7.7 to 9.1 percentage points higher.[21]

20 The reported coefficients are the marginal probability with respect to explanatory variables, while the statistics in the parentheses are t-values. As some of the models are nested in others, the difference of the log-likelihood multiplied by (-2) are Chi-square distributed with difference of the number explanatory variables to be the degree of freedom. Likelihood ratio test results are reported which evaluate the goodness of fit in the case of incremental inclusion, as there is no direct analog of R-squares in the context of the logistic regression; in all cases they are significant.

21 The coefficient on family size is generally not significant. We perform pooled sample regressions to provide an overview of the impact of the determinants of homeownership for a nationally representative sample. We report results with citizenship status in the online appendix.

The coefficient on the dummy for Black households implies that Black households are 8 percentage points less likely to own a house relative to the average U.S. household, with Hispanic and Asian households 5 percentage points less likely to do so, in the pooled regressions, where coefficients on control variables are constrained to be the same across groups. Model 6 shows similar effects. As expected, coefficients on income variables, household income, and its permanent and transitory components are positive and significant, and coefficients on permanent income are lower in size with household characteristics included.

Exhibit 6.1

Logit Models of Tenure Choice: Pooled Sample, 2013

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Household income	1.2e-06***					
	(21.033)					
Permanent income		2.9e-06***	2.5e-06***	2.3e-06***	2.8e-06***	2.0e-06***
		(32.778)	(22.222)	(20.432)	(25.466)	(16.724)
Transitory income		4.8e-07***	8.1e-07***	7.8e-07***	8.1e-07***	7.4e-07***
		(8.557)	(14.404)	(13.811)	(14.388)	(13.438)
Price-rent ratio	– .0048***	– .0045***	– .0039***	– .0037***	– .0038***	– .0037***
	(– 53.458)	(– 50.398)	(– 45.482)	(– 43.646)	(– 43.752)	(– 42.841)
Value-rent ratio	.004***	.0036***	.0029***	.0029***	.0029***	.0029***
	(80.940)	(68.810)	(52.433)	(53.215)	(52.529)	(53.489)
Age			.0067***	.0065***	.0067***	.0063***
			(49.910)	(48.168)	(49.860)	(46.218)
Family size			– .0098***	– .0061**	– .01***	– .003
			(– 5.058)	(– 3.090)	(– 5.207)	(– 1.544)
Married			.077***	.087***	.077***	.091***
			(11.665)	(13.044)	(11.634)	(13.692)
Gender			.0082	.015**	.011*	.012*
			(1.639)	(2.963)	(2.269)	(2.463)
Black			– .072***			– .099***
			(– 10.935)			(– 15.054)
Hispanic				– .094***		– .12***
				(– 13.622)		(– 17.617)
Asian					– .11***	– .14***
					(– 9.615)	(– 12.456)
-2Log L	27,363	26,794	23,941	23,877	23,968	23,535
chi2	7,123	7,690	10,543	10,607	10,516	10,949
N	26,370	26,370	26,370	26,370	26,370	26,370

*Notes: t-statistics in parentheses * p < 0.05, ** p < 0.01, *** p < 0.001. Dependent variable is the binary indicator of homeownership. Reported coefficients are marginal probability.*

4.3 Homeownership Outcomes by Demographic Group in 2013

Exhibit 6.2 reports results for regressions by demographic groups, allowing coefficients to vary across groups. Models 1-4 are for White-only, Black-only, Hispanic-only, and Asian-only households, respectively. Model 5 uses the pooled sample (White and all minorities) as a reference. In appendix exhibit A3.1, we report White-minority pooled regression results when including a dummy for minority status. These results show that, *ceteris paribus*, a Black household is 10 percentage points less likely to own a house and a Hispanic household is 13 percentage points less likely to own a house than is a White household with a 13-percentage points difference for Asian households, controlling for varying household characteristics.[22]

Coefficients on variables vary by demographic group. Compared with the coefficients in Model 1 for White households, the coefficients on permanent income are statistically larger for Black and Hispanic households.[23] The marginal contribution of permanent income to the homeownership propensity of Black households is 3.8 times higher than that of White households and 2.5 times higher for Hispanic households.

Exhibit 6.2

Logit Models by Group, 2013

	Model 1	Model 2	Model 3	Model 4	Model 5
Permanent income	1.2e-06***	4.9e-06***	3.7e-06***	2.3e-06***	2.8e-06***
	(9.123)	(13.118)	(10.482)	(5.016)	(24.845)
Transitory income	6.1e-07***	1.1e-06***	1.2e-06***	5.7e-07**	8.2e-07***
	(9.894)	(6.018)	(6.516)	(3.200)	(14.460)
Price-rent ratio	– .0032***	– .0051***	– .004***	– .0044***	– .0038***
	(– 29.756)	(– 20.707)	(– 19.195)	(– 13.991)	(– 44.857)
Value-rent ratio	.0026***	.0035***	.0029***	.0041***	.0029***
	(40.714)	(25.150)	(18.441)	(18.647)	(52.478)
Age	.0056***	.0082***	.0077***	.0054***	.0068***
	(35.973)	(22.125)	(17.710)	(7.428)	(50.400)
Family size	– .0043	– .0039	.002	– .0043	– .011***
	(– 1.645)	(– 0.832)	(0.439)	(– 0.496)	(– 5.436)
Married	.12***	– .035	.051**	.0032	.077***
	(15.727)	(– 1.789)	(2.809)	(0.103)	(11.600)
Gender	.011	.013	.026	.015	.011*
	(1.829)	(0.929)	(1.815)	(0.634)	(2.202)
-2Log L	15,141	3,534	3,680	1,145	24,059
chi2	5,857	1,722	1,257	559	10,425
N	17,869	3,833	3,601	1,239	26,370

*Notes: t-statistics in parentheses * p < 0.05, ** p < 0.01, *** p < 0.001. Dependent variable is the binary indicator of homeownership. Reported coefficients are marginal probability. Model 1: non-Hispanic-White-only sample. Model 2: Black-only sample. Model 3: Hispanic-only sample. Model 4: Asian-only sample. Model 5: pooled sample.*

22 In appendix exhibit A3.1, we additionally report the White-minority pooled regression results with fully interactive terms with the minority dummy, allowing varying marginal effects across demographic groups. The likelihood ratio tests show that the interactive terms with minority dummies are statistically different from zero. The regression coefficients of minority and White households in exhibit 6.2 are thus statistically different.

23 We find the marginal effects of income are not statistically different between White and Asian households.

4.4 Endowment Effects in 2013

Exhibit 6.3 decomposes the extent to which lower homeownership rates for minorities are attributed to measured endowment effects relative to White households. We use the separately estimated tenure choice logit models for each demographic group and create a counterfactual to quantify endowment by group. For example, we hypothesize a White household with average traits and ask what the propensity for homeownership would be if the average White household were counterfactually treated as a Black one, that is, if the White household had the Black household's endowments.

As shown in exhibits 6.3 and 11, the actual difference in the sample between Black and White homeownership rates is 28.9 percentage points (the difference between 43.8 percent and 72.7 percent). We use the fitted difference in homeownership rates, which is 39.4 percentage points (the difference between 42.0 percent and 81.4 percent for Black and White households respectively) and find, for the average White household, homeownership propensity would decrease from 81.4 percent to 61 percent (using White coefficients but Black average endowments). The difference of these two rates, 20.4 percentage points, is the endowment effect. The residual effect, which is the unexplained portion of the gap of the estimated White-Black homeownership rates, is 19 percentage points.

The actual difference in the sample between Hispanic and White homeownership rates is 28.9 percentage points (the difference between 43.8 percent and 72.7 percent). The fitted difference is 38.6 percentage points (the difference between 42.8 percent and 81.4 percent); for the average White household, homeownership propensity would decrease from 81.4 percent to 65.7 percent (using White coefficients but Hispanic average endowments). The difference, 15.7 percentage points, is the endowment effect. The residual effect is 22.9 percentage points.

The actual difference in the sample between Asian and White homeownership rates is 18.1 percentage points (the difference between 54.6 percent and 72.7 percent). The fitted difference is 20.6 percentage points (the difference between 60.8 percent and 81.4 percent) and, for the average White household, homeownership propensity would decrease from 81.4 percent to 78.7 percent. The difference of these two rates, 2.7 percentage points, is the endowment effect. The residual effect is 18.0 percentage points.

Exhibit 6.3

Probability of Homeownership, 2013

	White	diff	Black	White	diff	Hispanic	White	diff	Asian
Actual Difference	0.727	0.289	0.438	0.727	0.288	0.438	0.727	0.181	0.546
Estimated Difference	0.814	0.394	0.420	0.814	0.387	0.428	0.814	0.207	0.608
Endowment		0.204			0.157			0.027	
Residual		0.190			0.229			0.180	

4.5 Racial/Ethnic Disparities in Homeownership Rates: 2005–2013

The U.S. aggregate homeownership rate reached a peak of 69 percent in the first quarter of 2004 (U.S. Census, 2018). This rate represents a substantial increase from prevailing levels of the post-World War II period. Homeownership rates also increased substantially for minority groups from the early 1990s low-40 percent range to peaks of approximately 50 percent for Black and Hispanic households and from about 50 percent to 60 percent for Asian households. By 2013, the aggregate homeownership rate declined to 65 percent. Homeownership rates fell disproportionately for minority households.

We examine the declines in homeownership rates by group from 2005 to 2013 using AHS data, which allows us to consider the role of endowment effects. Exhibit 7.1 reports results for 2005, which we compare to the 2013 results, for the pooled sample. The demographic effect, controlling for income and other independent factors on the probability of homeownership for Black households is -4.9 percentage points in 2005 versus -7.2 percentage points in 2013. For Hispanic households, it is -9.8 percentage points in 2005 versus -9.4 percentage points in 2013, and it is -13 percentage points in 2005 versus -11 percentage points in 2013 for Asian households.[24]

Exhibit 7.2 reports results for 2005 by demographic group, as before.[25] In the estimated homeownership probabilities for 2005, a Black household and a Hispanic household are 7.4 percentage points and 12 percentage points less likely to own a house than a White household, respectively, and these differences are significantly smaller than in 2013 (10 percentage points for Black households and 13 percentage points for Hispanic households). This is consistent with the observed gap increases between 2005 and 2013.[26] We also find a higher response of homeownership propensity to the permanent income of Black and Hispanic households relative to White households in 2013 compared to 2005.[27]

We estimate endowment and residual gaps for 2005 and report the results in exhibits 7.3 and 11. Estimated gaps increase for Black households and for Hispanic households, as do actual gaps, from 2005 to 2013. For Black households, the actual gap is 26.6 percentage points (compared with 28.9 percent in 2013). We use the fitted difference, 34.6 percentage points, and find that the homeownership propensity for the average White household would decrease from 86.6 percent to 66 percent using White coefficients but Black average endowments). The difference, 20.6 percentage points, is the endowment effect, which is similar to the 2013 20.4-percentage points difference in

24 The marginal contribution of controls in the national pooled sample regression are qualitatively similar in 2005 and 2013.

25 We report White-minority pooled regression results for group specific homeownership rates in appendix exhibit A3.2. We find qualitatively similar coefficients on control variables for 2005 and 2013 in these results, as well.

26 We pool the 2005 and 2013 AHS samples and run a linear probability model of tenure choice on the year dummy, the binary indicator of minority groups (Black, Hispanic, or Asian) and their interactive terms. Results reported in appendix exhibit A4.1 show that homeownership rate differences are significant over time and that the residual differences are significant over time for Blacks and Hispanics. All else being equal, the homeownership probability is 15 percentage points lower for Asian than White households in 2005, but that effect decreases to 13 percentage points in 2013, the reverse of the outcomes for Black and Hispanic households relative to White households (appendix exhibit A3.1-A3.8).

27 We present the statistical evidence of higher response to the permanent income of minorities and persistency in appendix exhibit A3.1 and A3.2 (with logit models) and in Exhibit A4.2 (with linear probability models) respectively.

estimated homeownership rates. The residual effect is 14 percentage points, which is smaller than the 19-percentage points rate of 2013, and which accounts for essentially the entire difference over these two periods in estimated homeownership rates for Black and White households.

The actual difference in the sample between Hispanic and White homeownership rates is 25.4 percentage points. We use the fitted difference, 33 percentage points, and find that of this, 11.8 percentage points is the endowment effect (compared with 15.7 percent in 2013) and 21.2 percentage points (compared with 22.9 percent) is the residual effect. Both are smaller than in 2013, although the endowment effect is mostly responsible for the increasing homeownership gap in 2013.

Exhibit 7.1

Logit Models of Tenure Choice: Pooled Sample, 2005 (1 of 2)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Household income	1.7e-06***					
	(28.358)					
Permanent income		3.2e-06***	2.3e-06***	2.1e-06***	2.6e-06***	1.8e-06***
		(37.698)	(21.514)	(18.997)	(23.831)	(16.479)
Transitory income		9.2e-07***	1.4e-06***	1.4e-06***	1.4e-06***	1.3e-06***
		(15.060)	(22.805)	(21.867)	(22.869)	(21.612)
Price-rent ratio	– .0036***	– .0034***	– .0029***	– .0028***	– .0029***	– .0027***
	(– 76.054)	(– 71.363)	(– 62.752)	(– 60.161)	(– 61.427)	(– 58.543)
Value-rent ratio	.0031***	.0028***	.0023***	.0024***	.0024***	.0024***
	(98.618)	(86.745)	(70.730)	(72.469)	(71.683)	(72.346)
Age			.0052***	.005***	.0052***	.0048***
			(49.962)	(47.660)	(49.883)	(46.077)
Family size			– .011***	– .0082***	– .012***	– .0054***
			(-7.367)	(-5.241)	(– 7.802)	(– 3.427)
Married			.1***	.11***	.1***	.11***
			(19.018)	(20.555)	(19.151)	(20.871)
Gender			.018***	.022***	.019***	.022***
			(4.610)	(5.779)	(5.001)	(5.636)
Black			– .049***			– .071***
			(– 9.142)			(– 13.309)
Hispanic				– .098***		– .12***
				(– 17.496)		(– 20.849)
Asian					– .13***	– .15***
					(– 13.011)	(– 15.603)
-2Log L	36,970	36,404	33,048	32,832	32,967	32,452
chi2	11,885	12,451	15,808	16,023	15,888	16,403
N	39,884	39,884	39,884	39,884	39,884	39,884

*Notes: t-statistics in parentheses * p < 0.05, ** p < 0.01, *** p < 0.001. Dependent variable is the binary indicator of homeownership. Reported coefficients are marginal probability.*

We find that the estimated gap between Asian and White households also increases from 2005 to 2013 from 16 percentage points to 18.1 percentage points. The endowment effect in 2005

is slightly negative, unlike the positive 2013 endowment effect, and the residual effect actually decreases slightly; hence, the increase in the gap in 2013 is due to an increase in the endowment effect, similar to the result for Hispanic households.

The results indicate that we can attribute the increase in the gap in homeownership for Hispanic and Asian households to changes associated with endowments, relative to White households, in income declines, as discussed further later. The increase in the Black-White gap is not explained and may be due to deterioration in unobserved variables, associated with access to credit, relative to White households, which we are not able to identify here.

Exhibit 7.2

Logit Models by Group, 2005

	Model 1	Model 2	Model 3	Model 4	Model 5
Permanent income	1.1e-06***	4.7e-06***	3.9e-06***	2.7e-06***	2.5e-06***
	(9.304)	(10.980)	(10.714)	(5.354)	(23.282)
Transitory income	1.1e-06***	2.0e-06***	2.2e-06***	1.6e-06***	1.5e-06***
	(15.982)	(8.670)	(10.212)	(6.415)	(22.866)
Price-rent ratio	– .0026***	– .004***	– .0029***	– .0027***	– .0029***
	(– 43.936)	(– 22.429)	(– 27.274)	(– 15.351)	(– 62.610)
Value-rent ratio	.0022***	.0031***	.0026***	.0027***	.0024***
	(58.029)	(29.027)	(27.724)	(19.105)	(71.328)
Age	.0042***	.0076***	.0063***	.0027***	.0053***
	(36.956)	(22.513)	(16.030)	(3.636)	(50.346)
Family size	– .0059**	– .0034	– .007	.0029	– .012***
	(– 2.910)	(– 0.811)	(– 1.795)	(0.354)	(– 8.041)
Married	.13***	.011	.097***	.059*	.1***
	(21.044)	(0.598)	(6.110)	(1.960)	(19.093)
Gender	.025***	.027*	– .0013	.0083	.019***
	(5.891)	(2.104)	(– 0.106)	(0.354)	(4.901)
-2Log L	22,632	4,223	4,395	1,168	33,130
chi2	9,993	2,052	1,880	608	15,725
N	29,673	4,527	4,527	1,319	39,884

*Notes: t-statistics in parentheses * p < 0.05, ** p < 0.01, *** p < 0.001. Dependent variable is the binary indicator of homeownership. Reported coefficients are marginal probability. Model 1: non-Hispanic-White-only sample. Model 2: Black-only sample. Model 3: Hispanic-only sample. Model 4: Asian-only sample. Model 5: pooled sample.*

Exhibit 7.3

Probability of Homeownership, 2005

	White	diff	Black	White	diff	Hispanic	White	diff	Asian
Actual	0.761		0.495	0.761		0.507	0.761		0.601
Difference		0.266			0.254			0.160	
Estimated	0.866		0.520	0.866		0.536	0.866		0.685
Difference		0.346			0.330			0.181	
Endowment		0.206			0.118			– 0.006	
Residual		0.140			0.212			0.187	

4.6 Citizenship and Homeownership

The literature (Myers and Lee, 1998; Coulson, 1999; Painter, Gabriel, and Myers, 2001; Cortes et al., 2007) has established a correlation of citizenship with household tenure outcomes. For 2005 and 2013, we have included citizenship and foreign-born status in the homeownership probability regressions. The AHS for 2005 and 2013 include citizenship and foreign-born status while the 1989 AHS does not, hence, we cannot include these variables in the 1989 analysis. To examine the impact of these variables, we run the previous regressions with citizenship and foreign-born status.[28]

For perspective on the importance of citizenship and foreign-born status, exhibit 8.1 reports the share of citizens and foreign-born by demographic group in 2005 and 2013. Citizenship status is divided into native, foreign-born with citizenship (*naturalized*), and foreign-born without citizenship (*non-citizen*). For non-Hispanic White and Black in 2013, 94 and 91 percent, respectively, are U.S. native (a household head is either born in the United States or born abroad with U.S. parents). More than 50 percent of Hispanic households surveyed are foreign-born, with 20.6 percent naturalized and 32 percent in non-citizen status. About 80 percent of the Asian households surveyed are foreign-born, with 50 percent naturalized and 30 percent in non-citizen status. The shares of citizenship in 2005 are similar.[29]

Exhibit 8.1

Citizenship Across Groups, 2005 and 2013

Year	Race	Native	Foreign, Naturalization	Foreign, Not Citizen
2005	White	95.77%	2.61%	1.63%
	Asian	23.80%	46.08%	30.12%
	Black	92.47%	3.81%	3.72%
	Hispanic	51.86%	16.32%	31.82%
	Total	88.22%	5.68%	6.11%
2013	White	94.00%	3.90%	2.10%
	Asian	20.30%	49.40%	30.30%
	Black	90.70%	5.70%	3.60%
	Hispanic	47.50%	20.50%	32.00%
	Total	84.00%	8.40%	7.60%

We compare citizenship's correlation with homeownership across demographic groups in exhibits 8.2 and 8.3, for 2013 and 2005, respectively. In the regressions that we rerun, we use a binary indicator to differentiate households that are not U.S.-native. We find weak or no statistical association between non-native status and homeownership for Hispanic and Asian households.[30] Because households in the foreign category are heterogeneous, we examine the foreign-born with the finer categories with the available data in 2005 and 2013. The insignificant foreign-born association of Hispanic households comes from the heterogeneous impact of naturalization and

28 Complete regression results controlling for citizenship for 2005 and 2013 are reported in the online appendix.

29 Citizenship not only captures the legal migration status of households, whether they are first-generation immigrants and extended length of residence in the United States but is also correlated with risk preference and social norms (Dalton, 2008; Bonin et al., 2009).

30 For Black households, native born increases the propensity of owning a house by 7.4 percentage points in 2013.

non-citizenship that exerts significant but opposite effects. A naturalized Hispanic household is 5.6 percentage points more likely to own a house, whereas a Hispanic household without U.S. citizenship is 5.8 percentage points less likely to own a house.[31] These results are consistent with findings from Coulson (1999), Gabriel, Myers, and Painter (2001), Shierholz (2010), Sumption and Flamm (2012), and DeSilva and Elmelech (2012). Citizenship status is positively correlated with homeownership. Broadly similar results are found for 2005 and 2013, so this does not explain shifts over time in homeownership gaps.

Exhibit 8.2

Homeownership and Citizenship, 2013

	Black	Hispanic	Asian	Black	Hispanic	Asian
Foreign-born	– .074***	– .0076	– .0049			
	(3.364)	(0.525)	(0.167)			
Naturalized				– .045	.056**	.057
				(– 1.704)	(3.006)	(1.818)
Non-citizen				– .12***	– .058***	– .1**
				(– 3.688)	(– 3.418)	(– 3.042)
-2Log L	3,523	3,680	1,145	3,519	3,648	1,110
chi2	1,733	1,257	559	1,736	1,290	595
N	3,833	3,601	1,239	3,833	3,601	1,239

Notes: Naturalized = 1 means a household head is foreign-born but naturalized, whereas Non-Citizen = 1 means a household head is foreign-born and is not a U.S. citizen. Unreported variables controlling endowment: Permanent Income, Transitory Income, Price-Rent Ratio, Value-Rent Ratio, Age, Family Size, Married, and Gender.

Exhibit 8.3

Homeownership and Citizenship, 2005

	Black	Hispanic	Asian	Black	Hispanic	Asian
Foreign-born	– .094***	– .034**	– .018			
	(– 4.179)	(– 2.728)	(– 0.723)			
Naturalized				– .059*	.049**	.056*
				(– 1.972)	(2.747)	(2.050)
Non-citizen				– .13***	– .084***	– .12***
				(– 4.280)	(– 5.746)	(– 4.156)
-2Log L	4,206	4,387	1,168	4,203	4,338	1,120
chi2	2,070	1,888	609	2,073	1,937	657
N	4,527	4,527	1,319	4,527	4,527	1,319

4.7 Disparities over 24 Years

Using 1989 results, we can examine changes in homeownership patterns over the past several decades.[32] We perform regressions for the year 1989 and find the coefficients on Black and

31 For Asian households, no statistical evidence of difference in homeownership between U.S. native and naturalized Asian households exists; however, a foreign-born Asian household without citizenship is 10 percentage points less likely to own a house, compared with their U.S. native counterparts, who are twice as likely to have a college degree or higher.

32 Income in 2013 is adjusted to 1989 dollars. To the extent possible, we use similar variables and estimation strategies in survey years for consistency. AHS 1989 and 2013 do not share all variables. We attempt to use variables with similar description if the same variables are not found.

Hispanic dummies in White-minority pooled samples increase in absolute value, implying widening homeownership disparities over the three periods.

We run pooled sample regressions (exhibit 9.1) and regressions by demographic group (exhibit 9.2) and construct counterfactual outcomes for 1989 to decompose the homeownership gap as reported in exhibit 11. The demographic effect (exhibit 9.1), controlling for income and other independent factors on the probability of homeownership is less than in 2005 and 2013 for Black and Hispanic households whereas it is the same in 1989 and 2005 (and lower than 2013) for Asian households. Similar results are found using group regressions.[33]

Exhibit 9.1

Logit Models of Tenure Choice Group: Pooled Sample, 1989

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Household income	2.3e-06***					
	(26.199)					
Permanent income		4.0e-06***	3.8e-06***	3.7e-06***	4.1e-06***	3.5e-06***
		(28.550)	(23.027)	(22.632)	(25.264)	(20.746)
Transitory income		1.5e-06***	2.3e-06***	2.2e-06***	2.3e-06***	2.2e-06***
		(15.305)	(23.490)	(23.059)	(23.669)	(22.771)
Price-rent ratio	– .0059***	– .0057***	– .0046***	– .0046***	– .0046***	– .0044***
	(– 90.550)	(– 87.970)	(– 71.955)	(– 69.970)	(– 71.363)	(– 68.311)
Value-rent ratio	.0047***	.0045***	.0034***	.0034***	.0034***	.0034***
	(131.391)	(120.853)	(82.291)	(82.606)	(82.403)	(81.942)
Age			.0051***	.005***	.0051***	.005***
			(44.955)	(43.841)	(44.846)	(43.651)
Family size			.0014	.0025	.001	.0055***
			(0.988)	(1.779)	(0.746)	(3.864)
Married			.088***	.09***	.089***	.086***
			(20.827)	(21.299)	(21.151)	(20.466)
Gender			.036***	.039***	.036***	.037***
			(8.201)	(8.884)	(8.212)	(8.620)
Black			– .043***			– .055***
			(– 7.650)			(– 9.860)
Hispanic				– .082***		– .094***
				(– 11.831)		(– 13.462)
Asian					– .13***	– .15***
					(– 10.760)	(– 11.762)
-2Log L	40,265	40,023	36,024	35,943	35,967	35,721
chi2	14,777	15,019	19,018	19,099	19,074	19,320
N	42,975	42,975	42,975	42,975	42,975	42,975

*Notes: t-statistics in parentheses * p < 0.05, ** p < 0.01, *** p < 0.001. Dependent variable is the binary indicator of homeownership. Reported coefficients are marginal probability.*

33 White-minority pooled regression results are reported in appendix exhibits A3.1-A3.3. The dummies for Black and Hispanics went from -6 percentage points and -10 percentage points in 1989 to -7.4 percentage points and -12 percentage points in 2005 and to -10 percentage points and -13 percentage points in 2013, respectively. The dummy for Asian went from -15 percentage points in 1989 and 2005 to -13 percentage points in 2013.

We identify explained and residual portions of gaps over time, as reported in exhibit 9.3. Using AHS data, we find increasing White-Black homeownership estimated and actual gaps from 1989 to 2005, but not for other minorities.[34] The White-Hispanic and White-Asian homeownership gaps decrease from 1989 to 2005 (and increase from 2005 to 2013, as noted earlier).[35] These declines are consistent with a heightened enforcement of anti-discrimination mortgage legislation, for Hispanic and Asian groups, but the increase in the Black homeownership rate in this period, in the AHS data, is proportionately similar to that of White households.

Exhibit 9.2

Logit Models by Group (No Citizenship), 1989

	Model 1	Model 2	Model 3	Model 4	Model 5
Permanent income	2.5e-06***	7.9e-06***	7.0e-06***	7.0e-06***	4.0e-06***
	(14.049)	(12.780)	(10.314)	(8.728)	(24.762)
Transitory income	1.9e-06***	2.7e-06***	3.6e-06***	3.1e-06***	2.3e-06***
	(18.697)	(7.413)	(8.554)	(6.534)	(23.652)
Price-rent ratio	– .0042***	– .0065***	– .005***	– .004***	– .0047***
	(– 57.941)	(– 26.717)	(– 20.788)	(– 11.374)	(– 72.252)
Value-rent ratio	.0034***	.0038***	.0033***	.0034***	.0035***
	(72.780)	(27.815)	(18.761)	(15.536)	(82.626)
Age	.0046***	.0076***	.0071***	.0042***	.0052***
	(36.153)	(20.025)	(15.289)	(5.030)	(44.924)
Family size	.0083***	.0062	– .0032	– .0045	.00014
	(4.716)	(1.675)	(– 0.707)	(– 0.662)	(0.099)
Married	.093***	.034**	.071***	.029	.09***
	(19.989)	(2.622)	(3.980)	(0.983)	(21.329)
Gender	.043***	.00066	.023	– .029	.036***
	(9.031)	(0.049)	(1.212)	(– 0.976)	(8.351)
-2Log L	28,425	4,000	2,502	675	36,082
chi2	13,741	2,313	1,257	568	18,960
N	34,863	4,566	2,744	897	42,975

*Notes: t-statistics in parentheses * p < 0.05, ** p < 0.01, *** p < 0.001. Dependent variable is the binary indicator of homeownership. Reported coefficients are marginal probability. Model 1: non-Hispanic-White-only sample. Model 2: Black-only sample. Model 3: Hispanic-only sample. Model 4: Asian-only sample. Model 5: pooled sample.*

Exhibit 9.3

Probability of Homeownership, 1989

	White	diff	Black	White	diff	Hispanic	White	diff	Asian
Actual Difference	0.705	0.240	0.464	0.705	0.273	0.431	0.705	0.208	0.496
Estimated Difference	0.801	0.338	0.464	0.801	0.384	0.417	0.801	0.276	0.525
Endowment		0.220			0.189			0.042	
Residual		0.117			0.195			0.234	

34 The slight decrease in the Black-White gap in the Census data may reflect differences in geographical distribution of households in the AHS and Census data.

35 The statistical tests for time-varying homeownership gaps are reported in appendix exhibits A5.1-A5.2.

Exhibit 10

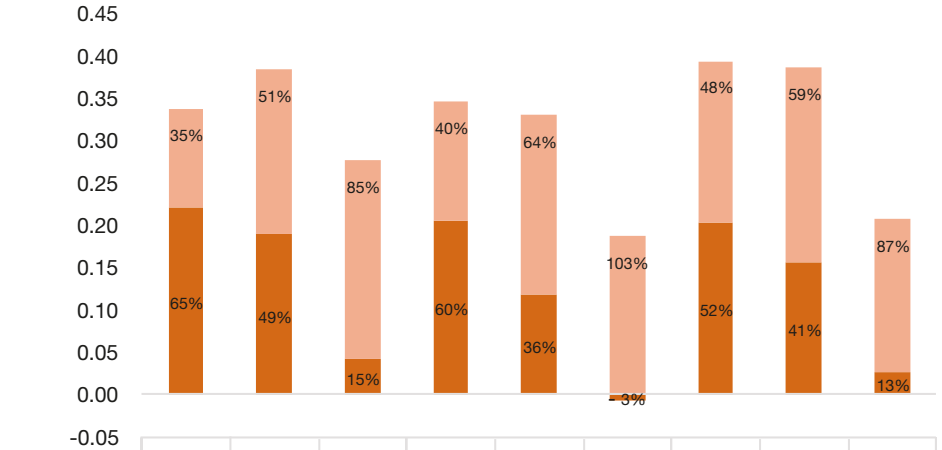
Coefficient on Permanent Income, 1989 v. 2005 v. 2013

	White	Black	Hispanic	Asian
Permanent income	1.4e-06***	7.3e-06***	6.6e-06***	7.2e-06***
	(8.872)	(12.225)	(9.460)	(7.715)
ahs05*permanent	– 7.4e-07**	– 1.6e-06	– 1.8e-06*	– 3.1e-06*
income	(– 3.108)	(– 1.810)	(– 1.988)	(– 2.476)
ahs13*permanent	– 8.5e-08	1.2e-06	5.7e-08	– 3.1e-06*
income	(– 0.308)	(1.284)	(0.059)	(– 2.508)
R^2	0.304	0.374	0.332	0.393
N	82,405	12,926	10,872	3,455

*Notes: t-statistics in parentheses * p < 0.05, ** p < 0.01, *** p < 0.001. The dependent variable in the linear probability model is household's tenure choice (owning = 1). ahs05 and ahs13 are indicators of AHS 2005 and 2013 respectively. Unreported variables controlling endowment: Transitory Income, Price-Rent Ratio, Value-Rent Ratio, Age, Family Size, Married, and Gender. Time-varying marginal effect of endowment is allowed. Income is adjusted to 1989 dollars.*

Exhibit 11

Decomposition of Ethnic Homeownership Gap with Respect to White Households



	Black	Hispanic	Asian	Black	Hispanic	Asian	Black	Hispanic	Asian
	1989			2005			2013		
Residual	0.117	0.195	0.234	0.140	0.212	0.187	0.190	0.229	0.180
Endowment	0.220	0.189	0.042	0.206	0.118	-0.006	0.204	0.157	0.027

Notes: The data used for comparison are AHS 1989, 2005, and 2013. Controls include Permanent Income, Transitory Income, Price-Rent Ratio, Value-Rent Ratio, Age, Family Size, Married, and Gender.

The actual difference in the Black-White homeownership rates in 1989 is 24 percentage points (70.5 percent versus 46 percent), whereas the estimated difference is 33.8 percentage points (80.1 percent versus 46.4 percent). In the actual and estimated results, Black-White homeownership gaps increase during the three periods. This increase is attributed almost entirely to an increase in the residual gaps, which in 1989 is 11.7 percentage points, and increases in 2005 and 2013, as opposed to the portion explained by endowments. We find that the marginal contribution of

endowment factors for Hispanic households relative to White households increases from 1989 to 2005 (and from 2005 to 2013). For Asian households, the marginal contribution of endowment factors relative to White households decreases over time.[36] The decline in gaps from 1989 to 2005, as reported in the Census data, is not.

Among the endowment factors, we examine further the impact of permanent income. To incorporate both the changes in coefficients on permanent income and the changing values of permanent income, we calculate the pattern of semi-elasticity of homeownership probability to this endowment factor.[37] We define semi-elasticity as the change of homeownership probability in response to a 1-percent change of permanent income and summarize the results in exhibit 12. The semi-elasticities with respect to permanent income of Black, Hispanic, and Asian households are more than two times higher than that of White households in 1989. A 1-percent negative shock on permanent income reduces homeownership probability by 18 percent for Black and Hispanic households, by 26 percent for Asian households, and by 8 percent for White households. The semi-elasticities decrease from 1989 to 2005 for all demographic groups, to 13 percent for Black, 15 percent for Hispanic, 16 percent for Asian, and 3 percent for White households. This is consistent with non-endowment factors having a greater impact on homeownership outcomes in this period, as shown in Gabriel and Rosenthal (2008), as discussed earlier. Although 2013 semi-elasticities for Black, Hispanic, and Asian households are persistently high, they decline as income increases for White households. In 2013, a 1-percent negative shock on permanent income reduces homeownership probability by 18 percent, 19 percent, and 17 percent for Black, Hispanic, and Asian households respectively, compared to a 6-percent reduction in probability for White households.[38] The rise and decline in observed homeownership is consistent with these changes.[39]

Exhibit 12

Semi-elasticity of Homeownership Probability, 1989 v. 2005 v. 2013

	Black			Hispanic		
	1989	**2005**	**2013**	**1989**	**2005**	**2013**
Permanent Income	.18***	.13***	.18***	.18***	.15***	.19***
	(14.33)	(10.55)	(13.04)	(10.40)	(10.39)	(11.36)
	Black			**Hispanic**		
	1989	**2005**	**2013**	**1989**	**2005**	**2013**
Permanent Income	.26***	.16***	.17***	.076***	.034***	.062***
	(8.83)	(6.01)	(5.95)	(14.76)	(6.30)	(8.36)

*Notes: t-statistics in parentheses * p < 0.05, ** p < 0.01, *** p < 0.001. Semi-elasticity is defined as the change of homeownership probability in response to 1-percentage change of a variable. Income is adjusted to 1989 dollars.*

36 The inference is based on appendix exhibits A3.1-A3.3. In exhibit 10, we conduct statistical tests to examine how the marginal contribution of permanent income varied from 1989 to 2013. We find evidence of a decrease in marginal effect of permanent income for Hispanic, Asian, and White households from 1989 to 2005. The marginal effects of permanent income in 2013 are not statistically different from 1989 for Black, Hispanic, and White households, but are smaller for Asian households.

37 Because other variables do not change as much in size or in influence we confine our analysis here to income.

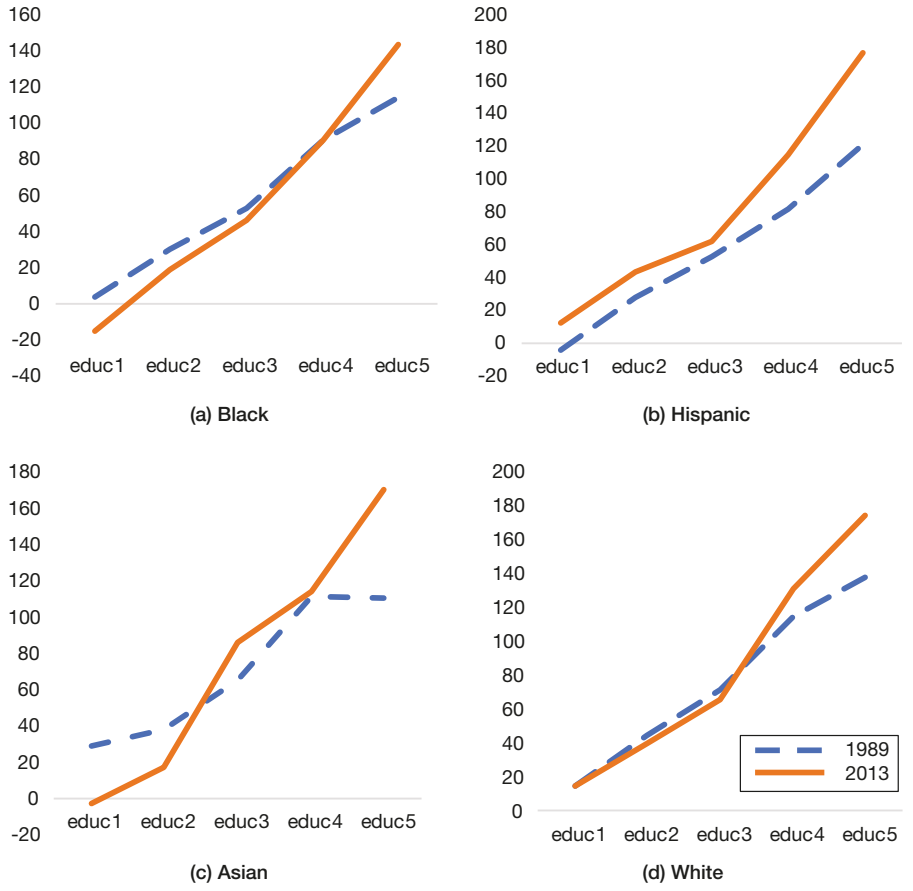
38 The semi-elasticities of homeownership probability with respect to housing ratios show similar but weaker and countervailing effects of higher semi-elasticities among minority groups.

39 The semi-elasticities reported in exhibit 12 are point estimates capturing first order effects, over-estimating the response of homeownership propensities. The over-estimation may be due to higher-order nonlinear effects.

Because education is an important factor driving the long-term trends in permanent income across demographic groups, as shown in the permanent income regressions, in the online appendix, we further consider the trend in return on education in exhibit 13.[40] There we show an increase in returns at higher levels of education (college graduate, graduate) for all groups. However, Black and Hispanic households still show far lower levels of college graduation and lower returns to a given education level. In 2013, Black households witnessed a decrease in returns in the lower end of the curve where the distribution of education was concentrated (exhibit 14).[41]

Exhibit 13

Return on Education by Races and Survey Years



Notes: Coefficients on education dummies in permanent income regressions in AHS 1989 and 2013 are reported. The base level is no high school. educ1 = some high school. educ2 = high school graduate. educ3 = some college. educ4 = college graduate. educ5 = graduate education. Income has been inflation-adjusted to 1989 dollars. The dependent variable of the regressions is the Box-Cox transformation value (lambda = 0.5) of the household income.

40 The F-tests to examine education dummies jointly in permanent income regressions in 1989 and 2013 show that they are statistically different from zeros at 1-percent confidence level.

41 These findings in AHS data are consistent with the literature on education returns and income inequality. For a historical overview of the literature see Lemieux (2008) and Wachter and Ding (2016). For additional sources on education and inequality in the United States, income and otherwise, see Hout (2012).

Exhibit 14

Distribution of Education Profile, 1989 v. 2013

	AHS	educ0	educ1	educ2	educ3	educ4	educ5	Total
Black	1989	19.40	13.68	35.77	17.76	7.94	5.44	100
Hispanic		33.76	10.06	29.49	14.80	6.68	5.21	100
Asian		10.50	3.61	24.84	13.89	27.13	20.02	100
White		11.23	7.76	36.22	19.17	14.39	11.21	100
Total		13.50	8.46	35.52	18.64	13.48	10.40	100
		educ0	**educ1**	**educ2**	**educ3**	**educ4**	**educ5**	**Total**
Black	2013	3.97	12.01	30.01	32.95	13.82	7.25	100
Hispanic		24.71	11.53	26.17	23.28	9.93	4.38	100
Asian		6.12	3.80	16.89	16.19	32.61	24.40	100
White		3.36	5.35	25.20	29.12	22.46	14.52	100
Total		6.32	7.01	25.61	28.3	20.1	12.65	100

Notes: educ0 = no high school. educ1 = some high school. educ2 = high school graduate. educ3 = some college. educ4 = college graduate. educ5 = graduate education.

5 Conclusion

Homeownership rates for Blacks and Hispanics as of 2018 are similar to or lower than 1970 levels, 2 years after the passage of the Fair Housing Act. From the mid-1990s to their peaks in 2004–2005, after several decades of no increases, homeownership rates increased from low-40 percent levels to about 50 percent, for Black and Hispanic households, and for Asian households, from low-50 percent levels to 60 percent. In the aftermath of the crisis, homeownership rates declined, to low-40 percent, mid-40 percent, and mid-50 percent levels, for Black, Hispanic, and Asian households, respectively, and majority-minority homeownership disparities increased.

In this article, we decompose the attribution of minority-majority homeownership gaps, using AHS data, to differences in household endowments, particularly permanent income, and to unobserved residual factors. We find that the pattern of changing homeownership rates is consistent with estimated changes in the impact of permanent income by group. The findings on the changes in the levels and impacts of permanent income on homeownership suggest a weaker ability of minorities to achieve consumption smoothing through self and social insurance than their White counterparts, particularly, in 2013 when gaps widened significantly.

Permanent income differences are found to be associated with homeownership outcomes, in 1989, 2005, and 2013, and may affect access to homeownership through income, asset and credit effects. We also find an increasing gap in homeownership from 2005 to 2013 for Black households which is unexplained, and which may be consistent with an increased impact of tightened credit, relative to White households, in this period, as well as due to other institutional factors which we cannot observe. For Hispanic and Asian households, we find that citizenship is an important contributor to White-minority homeownership gaps for the years for which we have data (2005 and 2013), consistent with the literature.

Permanent income and unmeasured wealth differences and their impact on the ability to access homeownership especially through intergenerational down payment assistance, may be continuing effects of discrimination.[42] Differences in wealth and credit quality may also result from the effects of historical inequalities in the ability of minority families to access and build wealth through homeownership.

Persistently lower homeownership outcomes contribute to limiting households' ability to withstand negative shocks in times of economic crisis. In addition, differential access to homeownership is both influenced by and has long-lasting impacts on intergenerational wealth building. Policies that impact access to homeownership are currently under reconsideration. The CRA is currently undergoing revision and GSE reform is also under consideration, both with important implications for homeownership outcomes. As the United States becomes a minority-majority nation, within the next three decades, policies that effectively address homeownership gaps will be important to lessen longstanding wealth disparities that limit homeownership opportunity.

42 Limited attention is paid to the credit and wealth of Asian groups. Bricker et al. (2017) conducted a comprehensive survey on family finance of different races and ethnicities using Survey of Consumer Finance. Asian households are pooled with other and multiple race groups, accounting for 30 percent of the other races other than Black and Hispanic.

Appendix

Exhibit A1.1

Logit Models of Tenure Choice: Pooled Sample (with Citizenship), 2005

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Household income	1.6e-06***					
	(27.617)					
Permanent income		3.1e-06***	2.0e-06***	2.0e-06***	2.2e-06***	1.7e-06***
		(37.204)	(18.394)	(18.355)	(20.936)	(15.777)
Transitory income		8.6e-07***	1.3e-06***	1.3e-06***	1.3e-06***	1.3e-06***
		(14.381)	(21.381)	(21.101)	(21.604)	(20.971)
Price-rent ratio	– .0034***	– .0032***	– .0027***	– .0027***	– .0027***	– .0027***
	(– 69.829)	(– 65.559)	(– 57.499)	(– 56.926)	(– 57.354)	(– 56.558)
Value-rent ratio	.003***	.0028***	.0023***	.0024***	.0023***	.0023***
	(97.730)	(86.360)	(70.359)	(71.610)	(71.179)	(71.335)
Naturalized	– .047***	– .052***	– .071***	– .052***	– .05***	– .021*
	(– 5.150)	(– 5.682)	(– 8.227)	(– 6.047)	(– 5.658)	(– 2.336)
Non-citizen	– .24***	– .24***	– .19***	– .16***	– .18***	– .13***
	(– 27.421)	(– 27.347)	(– 22.691)	(– 17.834)	(– 20.184)	(– 14.484)
Age			.0049***	.0049***	.005***	.0047***
			(47.331)	(46.546)	(47.601)	(45.058)
Family size			– .0053***	– .0053***	– .0071***	– .0032*
			(– 3.396)	(– 3.343)	(– 4.519)	(– 2.036)
Married			.11***	.11***	.11***	.11***
			(20.693)	(21.297)	(20.636)	(21.415)
Gender			.023***	.025***	.024***	.024***
			(5.873)	(6.529)	(6.147)	(6.198)
Black			– .057***			– .07***
			(– 10.850)			(– 13.118)
Hispanic				– .055***		– .082***
				(– 9.064)		(– 12.981)
Asian					– .073***	– .11***
					(– 6.794)	(– 10.089)
-2Log L	36,152	35,584	32,431	32,466	32,501	32,215
chi2	12,703	13,272	16,424	16,389	16,354	16,640
N	39,884	39,884	39,884	39,884	39,884	39,884

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. Dependent variable is the binary indicator of homeownership. Reported coefficients are marginal probability. Naturalized = 1 means a household head is foreign-born but naturalized, while Non-Citizen = 1 means a household head is foreign-born and is not a U.S. citizen.*

Exhibit A1.2

Logit Models of Tenure Choice: Pooled Sample (with Citizenship), 2013

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Household income	1.1e-06***					
	(20.163)					
Permanent income		2.9e-06***	2.1e-06***	2.3e-06***	2.5e-06***	1.9e-06***
		(32.429)	(18.927)	(19.880)	(22.352)	(16.067)
Transitory income		4.2e-07***	7.2e-07***	7.2e-07***	7.4e-07***	7.1e-07***
		(7.618)	(13.083)	(13.021)	(13.292)	(12.892)
Price-rent ratio	– .0045***	– .0042***	– .0036***	– .0036***	– .0036***	– .0036***
	(– 49.620)	(– 46.644)	(– 42.085)	(– 41.286)	(– 41.308)	(– 41.552)
Value-rent ratio	.004***	.0036***	.0028***	.0028***	.0028***	.0028***
	(79.833)	(68.053)	(51.952)	(52.387)	(52.012)	(52.615)
Naturalized	– .057***	– .063***	– .078***	– .06***	– .061***	– .034***
	(– 5.990)	(– 6.713)	(– 8.910)	(– 6.663)	(– 6.613)	(– 3.567)
Non-citizen	– .23***	– .23***	– .18***	– .15***	– .16***	– .13***
	(– 23.110)	(– 23.266)	(– 18.952)	(– 14.727)	(– 16.553)	(– 12.132)
Age			.0064***	.0064***	.0065***	.0062***
			(47.714)	(47.271)	(48.170)	(45.551)
Family size			– .0031	– .0029	– .0047*	– .00072
			(– 1.603)	(– 1.489)	(– 2.382)	(– 0.366)
Married			.091***	.094***	.09***	.095***
			(13.786)	(14.081)	(13.457)	(14.436)
Gender			.013**	.018***	.016***	.014**
			(2.720)	(3.587)	(3.292)	(2.948)
Black			– .083***			– .098***
			(– 12.892)			(– 14.962)
Hispanic				– .051***		– .084***
				(– 6.885)		(– 10.913)
Asian					– .046***	– .087***
					(– 3.846)	(– 7.120)
-2Log L	26,798	26,216	23,513	23,629	23,661	23,377
chi2	7,688	8,268	10,971	10,855	10,823	11,107
N	26,370	26,370	26,370	26,370	26,370	26,370

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. Dependent variable is the binary indicator of homeownership. Reported coefficients are marginal probability. Naturalized = 1 means a household head is foreign-born but naturalized, while Non-Citizen = 1 means a household head is foreign-born and is not a U.S. citizen.*

Exhibit A2.1

Logit Models by Group (with Citizenship), 2005

	Model 1	Model 2	Model 3	Model 4	Model 5
Permanent income	1.2e-06***	4.8e-06***	3.3e-06***	2.6e-06***	2.2e-06***
	(9.839)	(11.147)	(9.079)	(5.247)	(20.492)
Transitory income	1.1e-06***	2.0e-06***	2.0e-06***	1.5e-06***	1.3e-06***
	(15.827)	(8.526)	(9.560)	(6.014)	(21.492)
Price-rent ratio	– .0025***	– .0039***	– .0029***	– .0026***	-.0027***
	(– 42.144)	(– 21.755)	(– 26.452)	(– 14.671)	(-57.465)
Value-rent ratio	.0022***	.0031***	.0025***	.0025***	.0023***
	(57.745)	(28.895)	(26.968)	(17.511)	(71.051)
Naturalized	– .082***	– .059*	.049**	.056*	-.068***
	(-5.617)	(– 1.972)	(2.747)	(2.050)	(-7.979)
Non-citizen	– .18***	– .13***	– .084***	– .12***	-.19***
	(– 10.001)	(– 4.280)	(– 5.746)	(– 4.156)	(-22.075)
Age	.0042***	.0075***	.0057***	.0016*	.005***
	(36.919)	(21.999)	(14.381)	(2.109)	(47.835)
Family size	– .0055**	– .0024	– .0028	.0032	-.0068***
	(– 2.706)	(– 0.568)	(– 0.700)	(0.402)	(-4.335)
Married	.13***	.012	.11***	.078**	.11***
	(21.011)	(0.651)	(6.759)	(2.630)	(20.734)
Gender	.025***	.032*	.0068	.0018	.024***
	(5.765)	(2.473)	(0.531)	(0.078)	(6.201)
-2Log L	22,483	4,203	4,338	1,120	32,547
chi2	10,142	2,073	1,937	657	16,308
N	29,673	4,527	4,527	1,319	39,884

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. Dependent variable is the binary indicator of homeownership. Reported coefficients are marginal probability. Model 1: non-Hispanic-White-only sample. Model 2: Black-only sample. Model 3: Hispanic-only sample. Model 4: Asian-only sample. Model 5: pooled sample.*

Exhibit A2.2

Logit Models by Group (with Citizenship), 2013

	Model 1	Model 2	Model 3	Model 4	Model 5
Permanent income	1.2e-06***	4.9e-06***	3.4e-06***	2.5e-06***	2.4e-06***
	(9.390)	(13.037)	(9.485)	(5.457)	(22.065)
Transitory income	5.8e-07***	1.1e-06***	1.1e-06***	5.7e-07***	7.3e-07***
	(9.477)	(5.924)	(6.204)	(3.324)	(13.214)
Price-rent ratio	– .0031***	– .0049***	– .0039***	– .0042***	– .0036***
	(– 28.226)	(– 20.070)	(– 18.872)	(– 13.250)	(– 41.489)
Value-rent ratio	.0026***	.0035***	.0028***	.0038***	.0028***
	(40.508)	(25.248)	(17.811)	(16.738)	(52.015)
Naturalized	– .11***	– .045	.056**	.057	– .073***
	(– 7.158)	(– 1.704)	(3.006)	(1.818)	(– 8.351)
Non-citizen	– .19***	– .12***	– .058***	– .1**	– .17***
	(– 9.013)	(– 3.688)	(– 3.418)	(– 3.042)	(– 17.918)
Age	.0056***	.0081***	.0073***	.0043***	.0065***
	(36.108)	(21.693)	(16.632)	(5.821)	(48.365)
Family size	– .0033	– .0029	.006	– .0034	– .0045*
	(– 1.268)	(– 0.603)	(1.289)	(– 0.399)	(-2.286)
Married	.13***	– .029	.056**	.0073	.09***
	(15.988)	(– 1.504)	(3.099)	(0.235)	(13.591)
Gender	.011	.014	.034*	.012	.016***
	(1.868)	(1.001)	(2.333)	(0.507)	(3.329)
-2Log L	14,999	3,519	3,648	1,110	23,676
chi2	6,000	1,736	1,290	595	10,808
N	17,869	3,833	3,601	1,239	26,370

*Notes: t-statistics in parentheses * p< 0.05, **p < 0.01, ***p < 0.001. Dependent variable is the binary indicator of homeownership. Reported coefficients are marginal probability. Model 1: non-Hispanic-White-only sample. Model 2: Black-only sample. Model 3: Hispanic-only sample. Model 4: Asian-only sample. Model 5: pooled sample.*

Exhibit A3.1

Group Effect on Tenure Choice (no Citizenship), 2013

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Permanent income	1.7e-06***	1.2e-06***	1.6e-06***	1.3e-06***	1.3e-06***	1.2e-06***
	(13.254)	(9.112)	(12.902)	(9.112)	(10.135)	(9.119)
Transitory income	6.9e-07***	6.3e-07***	7.1e-07***	6.4e-07***	6.2e-07***	6.2e-07***
	(11.368)	(9.880)	(11.761)	(9.880)	(10.517)	(9.889)
Price-rent ratio	– .0036***	– .0033***	– .0034***	– .0034***	– .0033***	– .0033***
	(– 35.791)	(– 29.306)	(-36.014)	(– 29.306)	(-32.345)	(– 29.590)
Value-rent ratio	.0028***	.0027***	.0027***	.0028***	.0028***	.0027***
	(47.308)	(39.595)	(44.816)	(39.595)	(44.135)	(40.297)
Age	.0061***	.0057***	.006***	.0058***	.0056***	.0057***
	(42.034)	(35.119)	(40.661)	(35.115)	(36.735)	(35.655)
Family size	– .0039	– .0044	– .0031	– .0045	– .0039	– .0043
	(– 1.705)	(– 1.645)	(-1.386)	(– 1.645)	(– 1.566)	(– 1.645)
Married	.1***	.13***	.11***	.13***	.11***	.12***
	(13.901)	(15.653)	(15.297)	(15.652)	(15.036)	(15.700)
Gender	.011*	.011	.013*	.011	.01	.011
	(1.968)	(1.828)	(2.437)	(1.828)	(1.833)	(1.829)
Race	– .1***	– .17***	– .13***	– .18***	– .13***	– .14*
	(– 15.857)	(– 3.922)	(– 18.836)	(– 4.519)	(– 12.968)	(– 2.209)
Perm. inc. *Race		3.3e-06***		1.9e-06***		8.3e-07
		(8.374)		(5.436)		(1.871)
Temp. inc. *Race		3.8e-07*		3.8e-07*		– 1.0e-07
		(2.088)		(2.188)		(-0.587)
Price-rent ratio *Race		– .0014***		.000021		– .00074*
		(– 4.737)		(0.090)		(– 1.973)
Value-rent ratio *Race		.00057**		– .00037*		.0011***
		(3.164)		(– 2.204)		(3.672)
Age *Race		.0019***		.00059		– .00079
		(4.209)		(1.295)		(– 1.093)
Fam. size *Race		.00073		.0061		.0004
		(0.143)		(1.311)		(0.047)
Married *Race		– .16***		– .086***		– .12***
		(– 8.047)		(– 4.977)		(– 4.130)
Gender *Race		.0011		.011		.0031
		(0.078)		(0.814)		(0.139)
-2Log L	18,801	18,675	18,866	18,822	16,329	16,286
chi2	8,571	8,697	8,133	8,178	6,533	6,576
N	21,702	21,702	21,470	21,470	19,108	19,108

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. Dependent variable is the binary indicator of homeownership. Reported coefficients are marginal probability.* Race *is an indicator of races (Black, Hispanic or Asian). Model 1-2: White-black pooled sample. Model 3-4: White-Hispanic sample. Model 5-6: White-Asian pooled sample.*

Exhibit A3.2

Group Effect on Tenure Choice (no Citizenship), 2005

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Permanent income	1.5e-06***	1.2e-06***	1.5e-06***	1.2e-06***	1.2e-06***	1.1e-06***
	(12.472)	(9.299)	(13.065)	(9.299)	(10.379)	(9.302)
Transitory income	1.2e-06***	1.1e-06***	1.2e-06***	1.1e-06***	1.1e-06***	1.1e-06***
	(18.038)	(15.953)	(18.805)	(15.952)	(17.223)	(15.973)
Price-rent ratio	– .0028***	– .0027***	– .0026***	– .0027***	– .0026***	– .0026***
	(– 49.276)	(– 43.215)	(– 52.235)	(– 43.198)	(– 46.264)	(– 43.703)
Value-rent ratio	.0023***	.0023***	.0023***	.0023***	.0022***	.0022***
	(64.703)	(56.415)	(64.231)	(56.376)	(60.768)	(57.500)
Age	.0047***	.0044***	.0045***	.0044***	.0042***	.0043***
	(42.751)	(36.482)	(40.867)	(36.470)	(37.213)	(36.803)
Family size	– .005**	– .0061**	– .0064***	– .0061**	– .0052**	– .0059**
	(– 2.794)	(– 2.910)	(– 3.692)	(– 2.910)	(– 2.667)	(– 2.910)
Married	.11***	.13***	.12***	.13***	.12***	.13***
	(20.061)	(20.957)	(21.834)	(20.955)	(20.785)	(21.016)
Gender	.025***	.026***	.021***	.026***	.024***	.025***
	(6.219)	(5.890)	(5.246)	(5.890)	(5.727)	(5.891)
Race	– .074***	– .17***	– .12***	– .2***	– .15***	– .18***
	(– 14.241)	(– 5.093)	(– 21.620)	(– 7.239)	(– 15.999)	(– 3.652)
Perm. inc. *Race		2.7e-06***		1.9e-06***		1.2e-06*
		(6.960)		(5.834)		(2.544)
Temp. inc. *Race		5.1e-07*		5.9e-07**		2.6e-07
		(2.482)		(3.139)		(1.120)
Price-rent ratio *Race		– .00057**		.0004**		.00033
		(– 3.088)		(3.123)		(1.635)
Value-rent ratio *Race		.00029*		– .00028**		.000088
		(2.365)		(– 2.710)		(0.497)
Age *Race		.0019***		.00054		– .002**
		(5.308)		(1.488)		(– 3.046)
Fam. size *Race		.0033		.00058		.0084
		(0.805)		(0.154)		(1.168)
Married *Race		– .12***		– .054***		– .077**
		(– 7.458)		(– 3.812)		(– 2.932)
Gender *Race		– .004		– .027*		– .018
		(– 0.352)		(– 2.480)		(– 0.906)
-2Log L	26,959	26,855	27,083	27,027	23,843	23,800
chi2	13,208	13,311	12,983	13,040	10,719	10,763
N	34,200	34,200	34,200	34,200	30,992	30,992

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. Dependent variable is the binary indicator of homeownership. Reported coefficients are marginal probability.* Race *is an indicator of races (Black, Hispanic or Asian). Model 1-2: White-Black pooled sample. Model 3-4: White-Hispanic sample. Model 5-6: White-Asian pooled sample.*

Exhibit A3.3

Group Effect on Tenure Choice (no Citizenship), 1989

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Permanent income	3.0e-06***	2.6e-06***	2.9e-06***	2.6e-06***	2.7e-06***	2.5e-06***
	(17.298)	(14.036)	(16.689)	(14.041)	(15.369)	(14.047)
Transitory income	2.0e-06***	1.9e-06***	2.0e-06***	1.9e-06***	2.0e-06***	1.9e-06***
	(20.248)	(18.663)	(20.397)	(18.675)	(19.730)	(18.690)
Price-rent ratio	– .0044***	– .0042***	– .0043***	– .0042***	– .0042***	– .0042***
	(– 63.716)	(– 56.860)	(– 62.237)	(– 57.231)	(– 59.105)	(– 57.724)
Value-rent ratio	.0034***	.0034***	.0034***	.0034***	.0034***	.0033***
	(78.043)	(70.674)	(75.561)	(71.388)	(74.395)	(72.351)
Age	.0049***	.0046***	.0047***	.0046***	.0046***	.0046***
	(40.585)	(35.872)	(39.039)	(35.970)	(36.674)	(36.098)
Family size	.0078***	.0084***	.006***	.0084***	.0073***	.0083***
	(4.980)	(4.716)	(3.757)	(4.716)	(4.293)	(4.716)
Married	.088***	.094***	.092***	.094***	.092***	.093***
	(20.083)	(19.934)	(20.515)	(19.953)	(20.003)	(19.978)
Gender	.04***	.043***	.042***	.043***	.041***	.043***
	(8.852)	(9.027)	(9.034)	(9.028)	(8.679)	(9.030)
Race	– .06***	– .018	– .1***	– .099*	– .15***	– .24**
	(– 10.708)	(– 0.511)	(– 14.555)	(– 2.553)	(– 12.275)	(– 3.220)
Perm. inc. *Race		4.8e-06***		3.7e-06***		5.1e-06***
		(7.557)		(5.513)		(5.057)
Temp. inc. *Race		5.4e-07		1.2e-06**		1.5e-06**
		(1.511)		(3.058)		(2.606)
Price-rent ratio *Race		– .0018***		– .00025		– .00018
		(– 6.153)		(– 0.915)		(– 0.385)
Value-rent ratio *Race		.00012		– .00041*		.00037
		(0.712)		(– 2.086)		(1.094)
Age *Race		.0024***		.0017***		.000063
		(5.689)		(3.511)		(0.065)
Fam. size *Race		– .0026		– .011*		– .013
		(– 0.677)		(– 2.573)		(– 1.726)
Married *Race		– .062***		– .031		– .061
		(– 4.748)		(– 1.828)		(– 1.874)
Gender *Race		– .043**		– .023		– .075*
		(– 3.190)		(– 1.348)		(– 2.262)
-2Log L	32,551	32,425	30,991	30,927	29,146	29,100
chi2	16,904	17,029	15,736	15,800	14,427	14,473
N	39,429	39,429	37,607	37,607	35,760	35,760

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. Dependent variable is the binary indicator of homeownership. Reported coefficients are marginal probability.* Race *is an indicator of races (Black, Hispanic or Asian). Model 1-2: White-Black pooled sample. Model 3-4: White-Hispanic sample. Model 5-6: White-Asian pooled sample.*

Exhibit A3.4

Group Effect on Tenure Choice (with Citizenship), 2005

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Permanent income	1.5e-06***	1.2e-06***	1.4e-06***	1.2e-06***	1.3e-06***	1.2e-06***
	(13.001)	(9.790)	(12.268)	(9.607)	(10.884)	(9.795)
Transitory income	1.2e-06***	1.1e-06***	1.2e-06***	1.1e-06***	1.1e-06***	1.1e-06***
	(17.830)	(15.803)	(18.267)	(15.852)	(17.002)	(15.847)
Price-rent ratio	– .0027***	– .0026***	– .0025***	– .0027***	– .0025***	– .0025***
	(– 47.342)	(– 41.626)	(– 50.408)	(– 42.150)	(– 44.573)	(– 42.141)
Value-rent ratio	.0023***	.0023***	.0022***	.0023***	.0022***	.0022***
	(64.384)	(56.160)	(63.531)	(56.106)	(60.028)	(57.173)
Age	.0047***	.0044***	.0045***	.0044***	.0042***	.0042***
	(42.528)	(36.467)	(40.207)	(36.284)	(36.870)	(36.617)
Family size	– .0044*	– .0057**	– .004*	– .0059**	– .0047*	– .0056**
	(– 2.469)	(– 2.724)	(– 2.291)	(– 2.806)	(– 2.405)	(– 2.736)
Married	.11***	.13***	.12***	.13***	.12***	.13***
	(20.081)	(20.927)	(22.234)	(20.927)	(20.917)	(20.975)
Gender	.026***	.026***	.023***	.026***	.023***	.025***
	(6.313)	(5.775)	(5.764)	(5.832)	(5.565)	(5.787)
Race	– .069***	– .17***	– .085***	– .16***	– .08***	– .099*
	(– 13.157)	(– 5.046)	(– 13.533)	(– 5.849)	(– 7.089)	(– 1.980)
Perm. inc. *Race		2.7e-06***		1.3e-06***		1.2e-06*
		(7.094)		(3.921)		(2.515)
Temp. inc. *Race		5.0e-07*		4.7e-07*		2.0e-07
		(2.435)		(2.517)		(0.849)
Price-rent ratio *Race		– .00056**		.0004**		.00035
		(– 3.037)		(3.131)		(1.712)
Value-rent ratio *Race		.0003*		– .00029**		6.0e-06
		(2.421)		(– 2.805)		(0.033)
Age *Race		.0017***		.00027		– .0024***
		(4.958)		(0.733)		(– 3.678)
Fam. size *Race		.0041		.0064		.011
		(1.007)		(1.700)		(1.538)
Married *Race		– .12***		– .036*		– .052
		(– 7.368)		(– 2.477)		(– 1.933)
Gender *Race		.0019		– .016		– .025
		(0.167)		(– 1.400)		(– 1.218)
-2Log L	26,788	26,690	26,906	26,877	23,666	23,624
chi2	13,379	13,477	13,161	13,190	10,897	10,939
N	34,200	34,200	34,200	34,200	30,992	30,992

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. Dependent variable is the binary indicator of homeownership. Reported coefficients are marginal probability.* Race *is an indicator of races (Black, Hispanic or Asian). Model 1-2: White-Black pooled sample. Model 3-4: White-Hispanic sample. Model 5-6: White-Asian pooled sample. Unreported control variables: Naturalized, Non-Citizen.*

Exhibit A3.5

Group Effect on Tenure Choice (with Citizenship), 2013

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Permanent income	1.7e-06***	1.3e-06***	1.5e-06***	1.3e-06***	1.3e-06***	1.2e-06***
	(13.386)	(9.346)	(12.187)	(9.233)	(10.449)	(9.343)
Transitory income	6.6e-07***	6.0e-07***	6.7e-07***	6.2e-07***	5.8e-07***	5.9e-07***
	(10.955)	(9.513)	(11.283)	(9.682)	(10.050)	(9.546)
Price-rent ratio	– .0034***	– .0032***	– .0033***	– .0033***	– .0032***	– .0031***
	(– 34.054)	(– 27.988)	(– 34.831)	(– 28.513)	(– 31.057)	(– 28.302)
Value-rent ratio	.0028***	.0027***	.0026***	.0027***	.0027***	.0026***
	(47.265)	(39.397)	(44.184)	(39.415)	(43.474)	(40.071)
Age	.0061***	.0057***	.006***	.0058***	.0056***	.0056***
	(41.900)	(35.216)	(40.380)	(35.021)	(36.485)	(35.617)
Family size	– .0028	– .0035	– .00052	– .004	– .0029	– .0035
	(– 1.230)	(– 1.317)	(– 0.235)	(– 1.490)	(– 1.173)	(– 1.341)
Married	.1***	.13***	.11***	.13***	.12***	.13***
	(14.338)	(15.887)	(15.896)	(15.795)	(15.420)	(15.939)
Gender	.011*	.011	.016**	.011	.011	.011
	(2.078)	(1.867)	(2.921)	(1.864)	(1.891)	(1.891)
Race	– .096***	– .17***	– .093***	– .14***	– .05***	– .029
	(– 14.911)	(– 3.888)	(– 11.860)	(– 3.589)	(– 3.893)	(– 0.458)
Perm. inc. *Race		3.2e-06***		1.4e-06***		9.2e-07*
		(8.264)		(4.045)		(2.030)
Temp. inc. *Race		3.9e-07*		2.9e-07		– 1.5e-07
		(2.144)		(1.704)		(-0.845)
Price-rent ratio *Race		– .0014***		.000044		– .00078*
		(– 4.698)		(0.186)		(-2.079)
Value-rent ratio *Race		.00062***		– .00044**		.00092**
		(3.470)		(– 2.599)		(3.152)
Age *Race		.0017***		.00053		– .0012
		(3.889)		(1.164)		(– 1.594)
Fam. size *Race		.0015		.012*		.0029
		(0.289)		(2.563)		(0.342)
Married *Race		– .15***		– .069***		– .11***
		(– 7.718)		(– 3.941)		(– 3.546)
Gender *Race		.0027		.021		.000093
		(0.191)		(1.563)		(0.004)
-2Log L	18,645	18,525	18,753	18,718	16,167	16,134
chi2	8,727	8,847	8,247	8,281	6,696	6,729
N	21,702	21,702	21,470	21,470	19,108	19,108

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. Dependent variable is the binary indicator of homeownership. Reported coefficients are marginal probability.* Race *is an indicator of races (Black, Hispanic or Asian). Model 1-2: White-Black pooled sample. Model 3-4: White-Hispanic sample. Model 5-6: White-Asian pooled sample. Unreported control variables: Naturalized, Non-Citizen.*

Exhibit A3.6

Probability of Homeownership (with Citizenship), 2005

	White	diff	Black	White	diff	Hispanic	White	diff	Asian
Actual	0.761		0.495	0.761		0.507	0.761		0.601
Difference		0.266			0.254			0.160	
Estimated	0.867		0.520	0.867		0.535	0.867		0.689
Difference		0.348			0.332			0.177	
Endowment		0.218			0.215			0.081	
Residual		0.130			0.117			0.096	

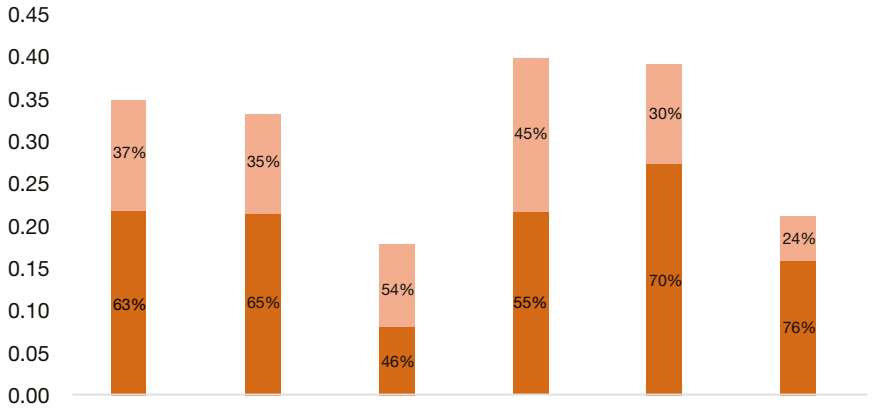
Exhibit A3.7

Probability of Homeownership (with Citizenship), 2013

	White	diff	Black	White	diff	Hispanic	White	diff	Asian
Actual	0.727		0.438	0.727		0.438	0.727		0.546
Difference		0.289			0.288			0.181	
Estimated	0.816		0.419	0.816		0.426	0.816		0.606
Difference		0.398			0.391			0.210	
Endowment		0.218			0.274			0.160	
Residual		0.180			0.117			0.050	

Exhibit A3.8

Decomposition of Ethnic Homeownership Gap with Respect to White Households (with Citizenship)



	Black	Hispanic	Asian	Black	Hispanic	Asian
	2005			2013		
Residual	0.13	0.117	0.096	0.18	0.117	0.05
Endowment	0.218	0.215	0.081	0.218	0.274	0.16

Notes: The data used for comparison are AHS 2005 and 2013. Endowment controlled includes Permanent Income, Transitory Income, Price-Rent Ratio, Value-Rent Ratio, Age, Family Size, Married, Gender, citizenship status.

Exhibit A4.1

Disparity in Homeownership: 2005 v. 2013

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
ahs13	– .036***	– .036***	– .036***	– .045***	– .045***	– .042***
	(– 8.452)	(– 8.457)	(– 8.587)	(– 11.644)	(– 11.773)	(– 10.935)
Race	– .27***	– .25***	– .16***	– .11***	– .11***	– .078***
	(– 37.521)	(– 35.950)	(– 13.186)	(– 17.284)	(– 15.736)	(– 6.640)
ahs13 *Race	– .021*	– .032**	– .012	– .044***	– .035***	.0078
	(– 1.991)	(– 3.016)	(– 0.682)	(– 4.929)	(– 3.843)	(0.518)
R^2	0.049	0.046	0.009	0.321	0.316	0.289
N	55,902	55,670	50,100	55,902	55,670	50,100

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. The dependent variable in the linear probability model is household's tenure choice (owning = 1).* Ahs13 *is a binary indicator of AHS 2013. Model 1-3 (or 4-6) are White-Black, White-Hispanic, and White-Asian pooled samples, respectively.* Race *= Black (Model 1 and 4).* Race *= span (Model 2 and 5).* Race *= Asian (Model 3 and 6). Unreported variables controlling endowment in Model 4-6: Permanent Income, Transitory Income, Price-Rent Ratio, Value-Rent Ratio, Age, Family Size, Married, Gender. Income is adjusted to 2005 dollars.*

Exhibit A4.2

Coefficient on Permanent Income: 2005 v. 2013

	White	Black	Hispanic	Asian
ahs13	– .13***	– .053	– .092	– .097
	(– 5.339)	(– 0.959)	(– 1.840)	(– 1.085)
Permanent Income	7.9e-07***	5.9e-06***	4.1e-06***	3.9e-06***
	(4.595)	(9.252)	(7.409)	(4.674)
ahs13* Permanent Income	6.0e-07*	2.6e-06**	2.0e-06*	3.8e-07
	(2.163)	(2.745)	(2.265)	(0.316)
R^2	0.283	0.362	0.328	0.381
N	47,542	8,360	8,128	2,558

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. The dependent variable in the linear probability model is household's tenure choice (owning = 1).* ahs05 *and* ahs13 *are indicators of AHS 2005 and 2013 respectively. Unreported variables controlling endowment: Transitory Income, Price-Rent Ratio, Value-Rent Ratio, Age, Family Size, Married, Gender. Time-varying marginal effect of endowment is allowed. Income in 2013 have been adjusted to 1989 dollars.*

Exhibit A5.1

Disparity in Homeownership: 1989 v. 2005 v. 2013

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
ahs05	.056***	.056***	.056***	.17***	.16***	.16***
	(16.036)	(16.084)	(16.243)	(45.743)	(45.327)	(44.021)
ahs13	.022***	.022***	.022***	.12***	.11***	.11***
	(5.506)	(5.522)	(5.577)	(30.986)	(30.374)	(30.670)
Race	– .24***	– .27***	-.21***	– .11***	– .16***	– .17***
	(– 34.751)	(– 31.380)	(– 14.137)	(– 18.492)	(– 20.672)	(– 13.077)
ahs05 *Race	– .025**	.02	.049*	.01	.0062	– .0018
	(– 2.585)	(1.753)	(2.542)	(1.222)	(0.647)	(– 0.112)
ahs13 *Race	– .048***	– .015	.027	– .037***	– .032**	.0055
	(– 4.638)	(– 1.268)	(1.391)	(– 4.103)	(– 3.111)	(0.325)
R^2	0.041	0.038	0.009	0.326	0.319	0.300
N	99,781	97,401	89,699	95,331	93,277	85,860

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. The dependent variable in the linear probability model is household's tenure choice (owning = 1).* ahs05 *and* ahs13 *are indicators of AHS 2005 and 2013 respectively. Model 1-3 (or 4-6) are White-Black, White-Hispanic, and White-Asian pooled samples, respectively.* Race *= Black (Model 1 and 4).* Race *= Span (Model 2 and 5).* Race *= Asian (Model 3 and 6). Unreported variables controlling endowment in Model 4-6: Permanent Income, Transitory Income, Price-Rent Ratio, Value-Rent Ratio, Age, Family Size, Married, Gender. Income in 2013 have been adjusted to 1989 dollars.*

Exhibit A5.2

Disparity in Homeownership: 1989 v. 2013

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
ahs13	.019***	.019***	.019***	.14***	.13***	.14***
	(4.392)	(4.407)	(4.437)	(34.211)	(33.636)	(33.714)
Race	– .24***	– .27***	– .21***	– .098***	– .14***	– .16***
	(– 32.813)	(– 29.930)	(– 13.452)	(– 15.960)	(– 18.717)	(– 12.757)
ahs13 *Race	– .05***	– .016	.032	– .037***	– .034***	.0049
	(– 4.605)	(– 1.291)	(1.581)	(– 4.149)	(– 3.345)	(0.289)
R^2	0.036	0.034	0.007	0.340	0.332	0.316
N	61,131	59,077	54,868	61,131	59,077	54,868

*Notes: t-statistics in parentheses * p < 0.05, ** p < 0.01, *** p<0.001. The dependent variable in the linear probability model is household's tenure choice (owning = 1). Ahs13 is an indicator of AHS 2013. Model 1-3 (or 4-6) are White-Black, White-Hispanic, and White-Asian pooled samples, respectively. Race = Black (Model 1 and 4). Race = span (Model 2 and 5). Race = Asian (Model 3 and 6). Unreported variables controlling endowment in Model 4-6: Permanent Income, Transitory Income, Price-Rent Ratio, Value-Rent Ratio, Age, Family Size, married, Gender. Income in 2013 have been adjusted to 1989 dollars.*

Exhibit A6.1

Descriptive Statistics for Hedonic Regressions, 2013

	Owners		Renters			Owners		Renters	
	mean	sd	mean	sd		mean	sd	mean	sd
btyear	49.081	25.680	53.275	25.218	**west**	0.158	0.365	0.206	0.405
cellar	0.302	0.459	0.086	0.280	**ccity**	0.247	0.431	0.480	0.500
garage	0.796	0.403	0.354	0.478	**boston_lawrence_ salem**	0.010	0.098	0.013	0.114
rooms	6.504	1.676	4.456	1.395	**buffalo_niagara_falls**	0.003	0.052	0.003	0.056
bedrms	3.133	0.891	2.013	0.961	**dallas_fort_worth**	0.009	0.096	0.015	0.120
baths	1.761	0.752	1.233	0.476	**denver_boulder**	0.006	0.074	0.009	0.092
airsys	0.717	0.450	0.484	0.500	**hartford_new_ britain_middletown**	0.002	0.043	0.003	0.050
cracks	0.037	0.189	0.064	0.245	**kansas**	0.004	0.060	0.005	0.069
bigp	0.014	0.119	0.028	0.164	**los_angeles_ anaheim_riverside**	0.031	0.172	0.057	0.231
ifblow	0.074	0.261	0.075	0.263	**miami_fort_lauderdale**	0.008	0.090	0.012	0.107
ifsew	0.012	0.109	0.016	0.126	**ny_nj_long_island**	0.052	0.222	0.128	0.334
ifdry	0.019	0.135	0.036	0.185	**pittsburgh_beaver_ valley**	0.006	0.075	0.004	0.067
howh	8.521	1.508	7.722	1.849	**portland_vancouver**	0.004	0.062	0.005	0.073
hown	8.257	1.728	7.668	2.033	**providence_ pawtucket_fall_river**	0.003	0.055	0.004	0.066
northeast	0.271	0.444	0.302	0.459	**saint_louis_alton**	0.005	0.073	0.005	0.073
midwest	0.299	0.458	0.253	0.435	**seattle_tacoma**	0.006	0.080	0.009	0.095
south	0.272	0.445	0.239	0.427	**bc_value**	122.331	37.169	94.286	42.080

Notes: For owners, bc_value = Box-Cox transformation value (lambda = 0.3) of the property value. For renters, bc_value = Box Cox transformation value (lambda = 0.6) of the gross rent.

Exhibit A6.2

Descriptive Statistics for Hedonic Regressions, 2005

	Owners mean	sd	Renters mean	sd		Owners mean	sd	Renters mean	sd
btyear	41.528	25.185	46.764	25.086	**west**	0.203	0.402	0.255	0.436
cellar	0.268	0.443	0.057	0.231	**ccity**	0.229	0.420	0.459	0.498
garage	0.772	0.420	0.311	0.463	**boston_lawrence_salem**	0.011	0.103	0.016	0.125
rooms	6.546	2.071	4.343	1.530	**buffalo_niagara_falls**	0.003	0.054	0.004	0.060
bedrms	3.098	0.884	1.945	0.928	**dallas_fort_worth**	0.010	0.100	0.018	0.134
baths	1.741	0.737	1.203	0.462	**denver_boulder**	0.006	0.076	0.008	0.089
airsys	0.687	0.464	0.474	0.499	**hartford_new_britain_middletown**	0.003	0.052	0.004	0.060
cracks	0.037	0.188	0.071	0.256	**kansas**	0.001	0.023	0.000	0.022
bigp	0.014	0.117	0.034	0.181	**los_angeles_anaheim_riverside**	0.033	0.179	0.066	0.248
ifblow	0.090	0.286	0.094	0.291	**miami_fort_lauderdale**	0.010	0.100	0.013	0.113
ifsew	0.010	0.099	0.017	0.131	**ny_nj_long_island**	0.044	0.205	0.096	0.295
ifdry	0.026	0.158	0.046	0.210	**pittsburgh_beaver_valley**	0.006	0.078	0.007	0.081
howh	8.495	1.458	7.633	1.883	**portland_vancouver**	0.004	0.065	0.006	0.078
hown	8.273	1.646	7.619	2.039	**providence_pawtucket_fall_river**	0.003	0.056	0.006	0.078
northeast	0.186	0.389	0.219	0.413	**saint_louis_alton**	0.006	0.078	0.007	0.081
midwest	0.249	0.432	0.201	0.401	**seattle_tacoma**	0.007	0.083	0.012	0.107
south	0.362	0.481	0.325	0.468	**bc_value**	121.891	37.744	81.109	31.724

Notes: For owners, bc_value = Box-Cox transformation value (lambda = 0.3) of the property value. For renters, bc_value = Box Cox transformation value (lambda = 0.6) of the gross rent.

Exhibit A6.3

Descriptive Statistics for Hedonic Regressions, 1989

	Owners mean	sd	Renters mean	sd		Owners mean	sd	Renters mean	sd
btyear	32.372	21.305	34.362	23.110	**west**	0.193	0.395	0.244	0.430
cellar	0.318	0.466	0.070	0.256	**ccity**	0.271	0.444	0.491	0.500
garage	0.734	0.442	0.288	0.453	**boston_lawrence_salem**	0.014	0.118	0.022	0.146
rooms	5.552	3.499	3.563	3.303	**buffalo_niagara_falls**	0.004	0.061	0.005	0.071
bedrms	2.411	2.582	1.294	2.624	**dallas_fort_worth**	0.010	0.101	0.017	0.129
baths	1.040	2.237	0.579	2.327	**denver_boulder**	0.007	0.084	0.009	0.092
airsys	0.438	0.496	0.304	0.460	**hartford_new_britain_middletown**	0.003	0.056	0.004	0.063
cracks	0.033	0.179	0.087	0.282	**kansas**	0.000	0.000	0.000	0.000
bigp	0.030	0.170	0.070	0.255	**los_angeles_anaheim_riverside**	0.042	0.201	0.071	0.257
ifblow	0.164	0.409	0.161	0.429	**miami_fort_lauderdale**	0.012	0.109	0.014	0.117
ifsew	0.019	0.137	0.025	0.158	**ny_nj_long_island**	0.061	0.240	0.108	0.311
ifdry	0.037	0.190	0.059	0.235	**pittsburgh_beaver_valley**	0.008	0.091	0.007	0.082
howh	8.621	1.568	7.565	2.050	**portland_vancouver**	0.005	0.073	0.008	0.087
hown	8.365	1.855	7.427	2.404	**providence_pawtucket_fall_river**	0.004	0.064	0.007	0.082
northeast	0.212	0.409	0.243	0.429	**saint_louis_alton**	0.008	0.086	0.008	0.090
midwest	0.256	0.436	0.217	0.413	**seattle_tacoma**	0.009	0.095	0.013	0.111
south	0.339	0.473	0.296	0.456	**bc_value**	94.725	25.405	56.416	19.251

Notes: For owners, bc_value = Box-Cox transformation value (lambda = 0.3) of the property value. For renters, bc_value = Box Cox transformation value (lambda = 0.6) of the gross rent.

Exhibit A7.1

Hedonic Price Regressions for Renters and Owners, 2013

	(1) Owners		(2) Renters	
btyear	0.0752***	(7.391)	– 0.00387	(– 0.213)
cellar	2.970***	(5.610)	– 0.512	(– 0.353)
garage	8.518***	(14.360)	6.167***	(6.513)
rooms	4.981***	(22.263)	3.333***	(5.519)
bedrms	– 0.442	(– 1.110)	– 1.666	(– 1.946)
baths	12.24***	(31.487)	16.86***	(16.393)
airsys	6.766***	(11.833)	7.650***	(7.927)
cracks	– 5.379***	(– 4.440)	– 1.835	(– 1.098)
bigp	– 3.207	(– 1.656)	– 3.791	(– 1.549)
ifblow	1.530	(1.804)	2.575	(1.718)
ifsew	– 5.749**	(– 2.835)	– 8.500**	(– 2.800)
ifdry	– 2.118	(– 1.298)	3.311	(1.578)
howh	1.293***	(7.057)	– 1.086***	(– 4.040)
hown	1.911***	(12.026)	2.062***	(8.593)
ccity	0.698	(1.279)	2.737**	(3.263)
Northeast	21.03***	(28.472)	19.98***	(13.718)
Midwest	– 1.078	(– 1.657)	7.514***	(6.203)
West	21.50***	(26.362)	20.78***	(14.465)
Boston-Lawrence-Salem, MA-NH	25.88***	(10.605)	3.643	(0.956)
Buffalo-Niagara Falls, NY	– 25.28***	(– 5.559)	– 24.32**	(– 3.268)
Dallas-Fort Worth, TX	– 3.075	(– 1.288)	1.050	(0.321)
Denver-Boulder, CO	– 2.223	(– 0.741)	– 2.206	(– 0.512)
Hartford_New Britain-Middletown, CT	– 8.128	(– 1.452)	– 6.007	(– 0.731)
Kansas City, MO-KS	– 1.851	(– 0.496)	– 4.435	(– 0.786)
Los Angeles-Anaheim-Riverside, CA	22.84***	(15.925)	12.08***	(6.229)
Miami-Fort Lauderdale, FL	9.813***	(3.986)	22.11***	(6.138)
New York-Northern New Jersey-Long Island, NY-NJ-CT	24.72***	(21.461)	21.13***	(13.173)
Pittsburgh-Beaver Valley, PA	– 24.81***	(– 8.134)	– 22.02***	(– 3.760)
Portland-Vancouver, OR-WA	3.678	(1.030)	– 0.329	(– 0.061)
Providence-Pawtucket-Fall River, RI-MA	1.610	(0.358)	– 10.02	(– 1.709)
Saint Louis-East Saint Louis-Alton, MO-IL	0.116	(0.037)	4.506	(0.846)
Seattle-Tacoma, WA	14.61***	(5.186)	6.829	(1.622)
Constant	16.30***	(9.248)	32.50***	(11.633)
Adjusted R^2	0.3908		0.1650	
N	17,084		97,46	

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. For owner's equation, the dependent variable is Box-Cox transformation value (lambda = 0.3) of the property value. For renter's equation, the dependent variable is Box Cox transformation value (lambda = 0.6) of the gross rent.*

Exhibit A7.2

Hedonic Price Regressions for Renters and Owners, 2005

	(1) Owners		(2) Renters	
btyear	0.0251**	(3.027)	– 0.0803***	(– 6.456)
cellar	4.822***	(11.029)	– 2.308*	(– 2.036)
garage	11.07***	(24.574)	6.683***	(10.772)
rooms	2.639***	(23.459)	1.479***	(5.434)
bedrms	2.815***	(10.518)	0.781	(1.684)
baths	12.79***	(41.547)	12.97***	(19.664)
airsys	6.287***	(13.969)	8.237***	(12.880)
cracks	– 4.683***	(– 4.883)	– 2.612*	(– 2.521)
bigp	1.265	(0.828)	0.373	(0.257)
ifblow	2.009**	(3.288)	1.842*	(2.098)
ifsew	– 1.644	(– 0.942)	– 3.872*	(– 2.014)
ifdry	– 2.796*	(– 2.531)	1.818	(1.509)
howh	1.700***	(11.385)	– 0.218	(– 1.263)
hown	1.151***	(8.848)	1.268***	(8.086)
ccity	2.176***	(5.015)	3.171***	(5.912)
Northeast	12.84***	(19.390)	15.62***	(15.128)
Midwest	0.840	(1.666)	5.644***	(7.231)
West	26.96***	(48.033)	19.22***	(22.898)
Boston-Lawrence-Salem, MA-NH	31.95***	(17.901)	19.32***	(8.503)
Buffalo-Niagara Falls, NY	– 21.67***	(– 6.584)	– 13.68**	(– 3.171)
Dallas-Fort Worth, TX	– 3.077	(– 1.713)	3.240	(1.603)
Denver-Boulder, CO	– 5.325*	(– 2.376)	– 6.818*	(– 2.414)
Hartford_New Britain-Middletown, CT	6.850*	(2.032)	3.340	(0.800)
Kansas City, MO-KS	– 12.39	(– 1.691)	-11.46	(– 1.080)
Los Angeles-Anaheim-Riverside, CA	29.99***	(27.639)	9.478***	(8.016)
Miami-Fort Lauderdale, FL	26.97***	(15.274)	16.78***	(7.689)
New York-Northern New Jersey-Long Island, NY-NJ-CT	28.93***	(28.939)	20.86***	(17.153)
Pittsburgh-Beaver Valley, PA	– 21.43***	(– 8.990)	– 10.56***	(– 3.341)
Portland-Vancouver, OR-WA	– 7.429**	(– 2.788)	– 2.700	(– 0.797)
Providence-Pawtucket-Fall River, RI-MA	17.11***	(5.589)	– 1.751	(– 0.529)
Saint Louis-East Saint Louis-Alton, MO-IL	0.0268	(0.012)	– 1.460	(– 0.483)
Seattle-Tacoma, WA	8.656***	(4.005)	6.513**	(2.621)
Constant	23.43***	(16.768)	33.71***	(19.394)
Adjusted R^2	0.3993		0.2179	
N	28,232		12,383	

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. For owner's equation, the dependent variable is Box-Cox transformation value (lambda = 0.3) of the property value. For renter's equation, the dependent variable is Box Cox transformation value (lambda = 0.6) of the gross rent.*

Exhibit A7.3

Hedonic Price Regressions for Renters and Owners, 1989

	(1) Owners		(2) Renters	
btyear	– 0.0316***	(– 5.136)	– 0.0956***	(– 13.474)
cellar	4.811***	(17.738)	– 0.227	(– 0.425)
garage	8.983***	(33.255)	4.790***	(14.663)
rooms	3.337***	(30.894)	2.130***	(11.187)
bedrms	0.324	(1.665)	– 0.733**	(– 2.579)
baths	6.952***	(32.274)	7.463***	(20.155)
airsys	4.195***	(15.778)	7.029***	(19.890)
cracks	– 1.682*	(– 2.521)	– 1.766***	(– 3.408)
bigp	– 0.769	(– 1.097)	– 1.357*	(– 2.382)
ifblow	0.593*	(2.153)	0.952**	(2.958)
ifsew	– 1.274	(– 1.561)	– 1.075	(– 1.283)
ifdry	– 0.763	(– 1.296)	0.764	(1.359)
howh	1.257***	(15.199)	– 0.355***	(– 4.652)
hown	0.750***	(11.068)	0.379***	(6.072)
ccity	1.275***	(4.936)	0.506	(1.846)
Northeast	12.20***	(29.245)	13.64***	(25.937)
Midwest	– 2.479***	(– 7.692)	4.310***	(10.720)
West	13.54***	(35.570)	12.83***	(28.222)
Boston-Lawrence-Salem, MA-NH	21.82***	(22.024)	13.70***	(13.514)
Buffalo-Niagara Falls, NY	– 7.937***	(– 4.388)	– 10.64***	(– 5.786)
Dallas-Fort Worth, TX	2.691*	(2.401)	3.699***	(3.511)
Denver-Boulder, CO	– 8.602***	(– 6.349)	– 5.535***	(– 3.799)
Hartford_New Britain-Middletown, CT	17.07***	(8.838)	7.787***	(3.662)
Los Angeles-Anaheim-Riverside, CA	19.04***	(30.301)	12.17***	(19.953)
Miami-Fort Lauderdale, FL	11.28***	(11.058)	12.81***	(11.583)
New York-Northern New Jersey-Long Island, NY-NJ-CT	21.76***	(38.910)	10.58***	(17.625)
Pittsburgh-Beaver Valley, PA	– 14.14***	(– 11.255)	– 6.104***	(– 3.660)
Portland-Vancouver, OR-WA	– 12.86***	(– 8.318)	– 0.875	(– 0.572)
Providence-Pawtucket-Fall River, RI-MA	11.35***	(6.434)	– 0.488	(– 0.304)
Saint Louis-East Saint Louis-Alton, MO-IL	2.329	(1.798)	– 2.361	(– 1.635)
Seattle-Tacoma, WA	– 1.709	(– 1.450)	2.866*	(2.354)
Constant	29.31***	(34.759)	30.06***	(34.123)
Adjusted R^2	0.4536		0.3103	
N	28,505		14,699	

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. For owner's equation, the dependent variable is Box-Cox transformation value (lambda = 0.3) of the property value. For renter's equation, the dependent variable is Box Cox transformation value (lambda = 0.6) of the gross rent.*

Exhibit A8.1

Descriptive Statistics for Permanent Income Models, 2013

	Pooled		Renters		Owners	
	mean	sd	mean	sd	mean	sd
bc_zinc2	470.5985	235.4490	378.5215	188.1332	521.8439	243.4096
educ1	0.0703	0.2557	0.0973	0.2963	0.0550	0.2280
educ2	0.2564	0.4366	0.2660	0.4419	0.2509	0.4336
educ3	0.2850	0.4514	0.2976	0.4572	0.2778	0.4479
educ4	0.2000	0.4000	0.1700	0.3756	0.2170	0.4122
educ5	0.1252	0.3310	0.0823	0.2748	0.1496	0.3567
age1424	0.0353	0.1845	0.0843	0.2778	0.0075	0.0861
age2529	0.0668	0.2496	0.1305	0.3369	0.0305	0.1720
age3034	0.0832	0.2762	0.1267	0.3327	0.0585	0.2347
age3544	0.1752	0.3801	0.2088	0.4065	0.1561	0.3630
age4554	0.1960	0.3969	0.1747	0.3798	0.2080	0.4059
age5564	0.1956	0.3967	0.1308	0.3372	0.2325	0.4224
age6574	0.1318	0.3383	0.0742	0.2621	0.1646	0.3708
hhgender	0.5121	0.4999	0.4492	0.4974	0.5478	0.4977
hhmar	0.4884	0.4999	0.2946	0.4559	0.5985	0.4902
cars	1.2549	0.9316	0.9178	0.8112	1.4464	0.9412
Black	0.1434	0.3504	0.2223	0.4158	0.0985	0.2980
Hispanic	0.1322	0.3387	0.2049	0.4037	0.0909	0.2874
Asian	0.0463	0.2102	0.0581	0.2340	0.0396	0.1951
othrace	0.2121	0.4088	0.3138	0.4641	0.1543	0.3613
west	0.1677	0.3736	0.2062	0.4046	0.1583	0.3651
south	0.2744	0.4462	0.2393	0.4267	0.2718	0.4449
midwest	0.2829	0.4504	0.2530	0.4347	0.2990	0.4578
frstho					0.5540	0.4971
downpay					0.8969	0.3041

Exhibit A8.2

Descriptive Statistics for Permanent Income Models, 2005

	Pooled		Renters		Owners	
	mean	sd	mean	sd	mean	sd
bc_zinc2	436.4449	219.8511	333.8073	169.3104	481.6365	224.3100
educ1	0.0870	0.2819	0.1170	0.3214	0.0738	0.2615
educ2	0.2715	0.4447	0.2770	0.4476	0.2691	0.4435
educ3	0.2816	0.4498	0.2844	0.4512	0.2803	0.4492
educ4	0.1830	0.3867	0.1505	0.3575	0.1973	0.3980
educ5	0.1020	0.3026	0.0631	0.2432	0.1191	0.3239
age1424	0.0528	0.2236	0.1338	0.3405	0.0171	0.1297
age2529	0.0721	0.2587	0.1400	0.3470	0.0422	0.2011
age3034	0.0860	0.2803	0.1196	0.3245	0.0712	0.2571
age3544	0.2043	0.4032	0.2105	0.4077	0.2015	0.4012
age4554	0.2114	0.4083	0.1574	0.3642	0.2351	0.4241
age5564	0.1603	0.3669	0.0959	0.2945	0.1886	0.3912
age6574	0.1051	0.3067	0.0592	0.2359	0.1254	0.3312
hhgender	0.5587	0.4965	0.4600	0.4984	0.6022	0.4895
hhmar	0.5310	0.4990	0.2908	0.4541	0.6368	0.4809
cars	1.2004	0.9121	0.8915	0.7889	1.3364	0.9294
Black	0.1137	0.3175	0.1879	0.3906	0.0810	0.2729
Hispanic	0.1110	0.3142	0.1791	0.3835	0.0810	0.2729
Asian	0.0330	0.1787	0.0431	0.2031	0.0286	0.1666
othrace	0.1687	0.3745	0.2658	0.4418	0.1259	0.3318
west	0.2031	0.4023	0.2553	0.4360	0.2030	0.4023
south	0.3798	0.4853	0.3250	0.4684	0.3623	0.4807
midwest	0.2291	0.4203	0.2010	0.4008	0.2486	0.4322
frstho					0.5801	0.4935
downpay					1.5797	1.9293

Exhibit A8.3

Descriptive Statistics for Permanent Income Models, 1989

	Pooled		Renters		Owners	
	mean	sd	mean	sd	mean	sd
bc_zinc2	341.8561	148.7028	283.7751	123.4257	372.3175	151.7351
educ1	0.0849	0.2787	0.1016	0.3021	0.0761	0.2652
educ2	0.3549	0.4785	0.3581	0.4795	0.3532	0.4780
educ3	0.1864	0.3894	0.1954	0.3966	0.1816	0.3855
educ4	0.1345	0.3411	0.1249	0.3306	0.1395	0.3465
educ5	0.1042	0.3055	0.0781	0.2684	0.1178	0.3224
age1424	0.0496	0.2172	0.1228	0.3282	0.0113	0.1056
age2529	0.0946	0.2926	0.1735	0.3787	0.0532	0.2245
age3034	0.1157	0.3198	0.1608	0.3673	0.0920	0.2891
age3544	0.2187	0.4134	0.2139	0.4100	0.2213	0.4151
age4554	0.1570	0.3638	0.1103	0.3133	0.1815	0.3855
age5564	0.1386	0.3456	0.0736	0.2612	0.1727	0.3780
age6574	0.1328	0.3393	0.0725	0.2593	0.1644	0.3706
hhgender	0.6723	0.4694	0.5487	0.4976	0.7370	0.4403
hhmar	0.6864	0.4640	0.4475	0.4973	0.8116	0.3910
cars	-0.7427	4.2039	0.2544	2.7316	0.9617	2.4533
Black	0.1077	0.3100	0.1678	0.3737	0.0762	0.2653
Hispanic	0.0642	0.2452	0.1062	0.3082	0.0422	0.2011
Asian	0.0209	0.1432	0.0307	0.1724	0.0158	0.1249
othrace	0.1382	0.3451	0.2167	0.4120	0.0970	0.2959
west	0.2055	0.4040	0.2443	0.4297	0.1931	0.3947
south	0.3376	0.4729	0.2956	0.4563	0.3390	0.4734
midwest	0.2361	0.4246	0.2174	0.4125	0.2561	0.4365
frstho					0.3490	0.4767
downpay					0.9256	0.2625

Exhibit A9.1

Permanent Income Regressions, 2013

	(1) Pooled		(2) Renters		(3) Owners	
educ1	10.78	(1.708)	0.359	(0.047)	10.18	(0.979)
educ2	50.45***	(9.672)	42.39***	(6.480)	39.92***	(4.736)
educ3	86.79***	(16.565)	69.61***	(10.518)	74.59***	(8.853)
educ4	171.9***	(31.264)	147.1***	(20.514)	155.6***	(17.887)
educ5	235.6***	(40.300)	195.2***	(23.568)	224.1***	(24.869)
age1424	14.55*	(2.057)	32.95***	(3.878)	64.05**	(2.986)
age2529	55.57***	(9.932)	76.07***	(9.809)	107.2***	(10.190)
age3034	85.07***	(16.259)	99.66***	(12.843)	128.3***	(15.486)
age3544	105.0***	(23.946)	88.79***	(12.327)	153.9***	(24.417)
age4554	109.1***	(25.507)	76.34***	(10.408)	149.9***	(25.336)
age5564	85.02***	(20.021)	47.10***	(6.217)	112.8***	(19.727)
age6574	25.49***	(5.604)	18.12*	(2.151)	31.72***	(5.248)
hhgender	31.97***	(13.635)	37.78***	(11.398)	26.30***	(7.737)
hhmar	110.5***	(44.176)	58.76***	(15.692)	110.0***	(29.907)
west	– 22.23***	(-6.346)	– 21.10***	(– 4.465)	-20.67***	(– 3.945)
south	– 37.89***	(– 12.197)	– 33.46***	(– 7.441)	– 52.17***	(– 11.381)
midwest	– 34.92***	(– 11.450)	– 41.41***	(– 9.272)	– 44.21***	(– 9.976)
cars	49.40***	(37.856)	45.03***	(21.314)	38.68***	(21.284)
Black	– 13.61	(– 1.660)	– 16.55	(– 1.729)	6.850	(0.488)
Hispanic	– 35.37***	(– 9.670)	– 12.22**	(– 2.728)	– 29.82***	(– 4.976)
Asian	10.14	(1.091)	1.371	(0.122)	23.36	(1.534)
othrace	– 38.67***	(– 5.027)	– 17.73*	(– 1.963)	– 35.68**	(– 2.755)
frstho					49.96***	(14.166)
downpay					31.88***	(5.859)
_cons	201.6***	(33.830)	198.7***	(23.824)	175.0***	(16.594)
adj. R^2	0.3669		0.2797		0.3561	
N	24,632		9,905		14,727	

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. The dependent variable is the Box-Cox transformation value (lambda = 0.5) of the household income.*

Exhibit A9.2

Permanent Income Regressions, 2005

	(1) Pooled		(2) Renters		(3) Owners	
educ1	14.32***	(3.301)	2.361	(0.431)	17.93**	(2.898)
educ2	54.18***	(14.675)	42.42***	(8.886)	48.13***	(9.254)
educ3	89.65***	(24.057)	64.59***	(13.324)	81.96***	(15.617)
educ4	170.4***	(42.950)	129.6***	(23.949)	160.8***	(29.258)
educ5	220.4***	(50.678)	156.6***	(23.613)	213.7***	(36.599)
age1424	13.08**	(2.836)	16.67**	(2.886)	88.38***	(8.991)
age2529	68.51***	(16.288)	63.99***	(11.159)	128.1***	(19.751)
age3034	95.78***	(23.830)	76.80***	(12.971)	141.4***	(26.067)
age3544	120.3***	(36.016)	77.27***	(14.389)	160.1***	(37.905)
age4554	120.6***	(36.377)	64.50***	(11.602)	153.9***	(37.592)
age5564	84.36***	(24.456)	41.29***	(6.804)	104.6***	(24.914)
age6574	22.37***	(5.998)	– 7.063	(– 1.037)	33.25***	(7.411)
hhgender	28.16***	(15.376)	40.82***	(15.641)	20.97***	(8.684)
hhmar	106.8***	(55.806)	61.69***	(20.945)	95.55***	(37.208)
west	– 0.00381	(– 0.001)	0.198	(0.052)	– 7.081	(– 1.952)
south	– 24.38***	(– 10.038)	– 26.18***	(– 7.418)	– 38.44***	(– 11.954)
midwest	– 21.68***	(– 8.243)	– 29.84***	(– 7.534)	– 35.07***	(– 10.319)
cars	39.40***	(39.735)	42.92***	(25.405)	29.56***	(24.028)
Black	– 18.13**	(– 2.853)	– 11.76	(– 1.573)	– 14.79	(– 1.538)
Hispanic	– 26.74***	(– 9.028)	– 8.275*	(– 2.236)	– 19.46***	(– 4.558)
Asian	– 10.42	(– 1.389)	– 12.09	(– 1.311)	– 8.982	(– 0.821)
othrace	– 26.19***	(– 4.464)	– 16.49*	(– 2.370)	– 4.993	(– 0.567)
frstho					40.04***	(16.618)
downpay					– 4.126***	(– 7.136)
_cons	165.6***	(37.906)	171.9***	(28.010)	179.0***	(29.036)
adj. R^2	0.3569		0.2782		0.3350	
N	40,771		13,029		27,742	

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. The dependent variable is the Box-Cox transformation value (lambda = 0.5) of the household income.*

Exhibit A9.3

Permanent Income Regressions, 1989

	(1) Pooled		(2) Renters		(3) Owners	
educ1	10.23***	(4.269)	3.505	(1.019)	11.94**	(3.242)
educ2	40.05***	(21.804)	33.77***	(12.298)	39.05***	(14.043)
educ3	65.42***	(31.540)	46.13***	(14.899)	67.58***	(21.336)
educ4	108.9***	(48.568)	87.77***	(25.585)	108.5***	(31.233)
educ5	131.9***	(55.415)	99.94***	(25.833)	133.5***	(36.840)
age1424	21.89***	(6.863)	17.73***	(4.216)	56.61***	(7.593)
age2529	60.06***	(22.423)	51.88***	(13.049)	87.20***	(19.828)
age3034	81.82***	(32.020)	61.38***	(15.372)	105.4***	(26.720)
age3544	94.92***	(41.036)	66.77***	(17.383)	106.0***	(30.102)
age4554	105.3***	(43.665)	65.46***	(15.688)	119.2***	(33.121)
age5564	73.96***	(30.996)	43.80***	(9.941)	80.50***	(22.953)
age6574	15.71***	(6.726)	6.105	(1.415)	20.68***	(6.031)
hhgender	41.99***	(33.046)	35.50***	(19.989)	38.87***	(18.977)
hhmar	46.08***	(34.533)	26.22***	(14.261)	34.68***	(15.491)
west	– 14.04***	(– 8.451)	– 15.12***	(– 6.354)	– 16.91***	(– 6.188)
south	– 28.72***	(– 19.236)	– 31.54***	(– 13.917)	– 34.97***	(– 14.919)
midwest	– 29.55***	(– 18.667)	– 37.26***	(– 15.373)	– 34.07***	(– 13.962)
cars	42.90***	(64.672)	42.52***	(37.928)	34.70***	(34.449)
Black	11.96*	(2.044)	0.464	(0.071)	28.64**	(2.661)
Hispanic	– 15.82***	(– 6.847)	– 11.22***	(– 3.904)	– 5.379	(– 1.347)
Asian	24.81***	(3.686)	– 6.961	(– 0.897)	56.64***	(4.656)
othrace	– 40.71***	(– 7.244)	– 22.86***	(– 3.676)	– 45.61***	(– 4.375)
frstho					14.90***	(8.173)
downpay					23.73***	(8.792)
_cons	128.2***	(50.322)	151.2***	(38.624)	123.3***	(25.815)
adj. R^2	0.4150		0.3318		0.3872	
N	34,308		15,414		18,894	

*Notes: t-statistics in parentheses *p < 0.05, **p < 0.01, ***p < 0.001. The dependent variable is the Box-Cox transformation value (lambda = 0.5) of the household income.*

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