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# Racial disparity in exposure to housing cost burden in the United States: 1980–2017

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## ABSTRACT

This article uses the Panel Study of Income Dynamics to analyse Black–White differences in housing cost burden exposure among renter households in the USA from 1980 to 2017, expanding understanding of this phenomenon in two respects. Specifically, we document how much this racial disparity changed among renters over almost four decades and identify how much factors associated with income or housing costs explain Black–White inequality in exposure to housing cost burden. For White households, the net contribution of household, neighbourhood and metropolitan covariates accounts for much of the change in the probability of housing cost burden over time. For Black households, however, the probability of experiencing housing cost burden continued to rise throughout the period of this study, even after controlling for household, neighbourhood and metropolitan covariates. This suggests that unobserved variables like racial discrimination, social networks or employment quality might explain the increasing disparity in cost burden among for Black and White households in the USA.

## ARTICLE HISTORY


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## KEYWORDS

Housing cost; racial inequality; cost burden

Existing scholarship notes material racial disparities in housing access, housing quality and neighbourhood conditions. For example, research on residential attainment has consistently observed Black–White inequality in households' likelihood of moving into and out of high-poverty neighbourhoods (Crowder and South, 2005; South and Crowder, 1997). However, relatively few studies have investigated the degree to which there is racial inequality in housing cost burden, that is, spending 30% or more of household income on housing costs. The research that does exist, like the Joint Center for Housing Studies' *The State of the Nation's Housing* series, documents significant and persistent racial disparities in the prevalence of housing cost burden (Fernald, 2018). However, an important open question is whether this Black–White gap persists after adjusting prevalence estimates for characteristics of households and

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 Supplemental data for this article can be accessed [here](#).

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broader contexts that are salient to both household income and typical housing costs. Given serious consequences like constrained expenditures on other necessities, it is important for housing researchers and practitioners to understand what factors contribute to elevated risk and racial inequality in exposure to housing cost burden.

In this article, we seek to expand the understanding of this phenomenon in two respects. First, we provide detailed estimates of the racial disparity in housing cost burden among renters in the USA over 35 years. Second, we use regression models to identify the extent to which factors associated with income or housing costs explain Black–White inequality in exposure to housing cost burden across our panel of data. This study relies on longitudinal data from the Panel Study of Income Dynamics (PSID) since the 50-year history of this survey provides the unique opportunity to measure racial disparity in housing cost burden over multiple decades, an analysis that is absent from existing literature. In particular, we use household responses from the PSID for the period from 1980 to 2017 in order to examine prevalence of housing cost burden and the primary explanations for this condition. The following research questions are the focus of this study:

1. How has the racial disparity in housing cost burden changed over time?
2. To what extent do sociodemographic characteristics, neighbourhood context and metropolitan location explain the racial disparities in income and housing cost that drive patterns of housing cost burden?

## Literature review

Housing affordability is one of the most pressing social issues in the USA. When housing costs consume a disproportionately high percentage of household income, other household consumption is constrained, including expenditures on necessities such as food, clothing, healthcare and education (Fernald, 2018). Because of concerns associated with the negative effects of high housing costs, scholars have identified a variety of ways to measure housing affordability. The two primary methods of measuring housing affordability include the ratio approach and the residual income approach (Stone, 2006), with the most common measure of housing cost burden based on the ratio approach (Padley and Marshall, 2019). A household is deemed to be in a state of housing cost burden if housing costs (including utility payments) exceed 30% of pre-tax household income. When housing costs exceed half of income, a household is severely cost burdened.

## Housing cost burden overview

Existing research on housing cost burden primarily provides prevalence estimates based on cross-sectional data. These descriptive statistics, found in publications such as Harvard University's Joint Center for Housing Studies, *State of the Nation's Housing* series, have helped to underscore the growing problem of housing affordability in the USA. As of 2016, nearly half of all renters were cost burdened and just over 20% of homeowners faced similar burdens (Fernald, 2018). The high prevalence

of housing cost burden among US renters has not always been the case. The share of renter households with cost burdens has risen steadily from approximately 24% in 1960 to roughly half of households in 2016 (Fernald, 2018). Unsurprisingly, housing cost burdens are not evenly distributed throughout society. Among low-income households earning less than \$15,000 per year, over 80% face housing cost burdens (Fernald, 2018).

Research on the prevalence of housing cost burden in countries other than the USA is similarly limited but provides insight into how some of the same dynamics, that is, rising housing costs and weak housing assistance, found in other developed countries are relevant to outcomes like the share of households reporting difficulty making ends meet or that housing costs are a burden to their household's economic health. For instance, Brandolini *et al.* (2013) focussed on household perceptions of housing costs as a burden using the European Union-Survey on Income and Living Conditions (EU-SILC) and found that most countries (France, Italy and UK) had no change in prevalence of housing costs reported as heavy burden between 2005 and 2010 waves of data, while Spain showed a slight uptick and Germany experienced a slight decline. However, Deidda (2015) investigated housing cost burden across the same five European countries using a variety of definitions and observed that housing costs constituted a 'non-negligible' burden in each. Finally, Baker *et al.* (2016) noted that lack of housing affordability was important to the residential mobility of some Australians from more vulnerable groups to less advantaged destinations. These studies highlight how the importance of housing cost burden is not specific to the USA given tight housing markets and financialization of housing observed across other developed countries (Wetzstein, 2017), even if there is limited reference to differences in housing cost burden by race or ethnicity in this existing literature.

While significant differences in housing cost burden emerge based on household income, research demonstrates that there are strong racial disparities throughout the housing system in the USA. There is a nearly 30 percentage point difference in the homeownership rate between White and Black households (Fernald, 2018). As a result, Black households are highly dependent on the rental market to secure adequate and affordable housing. According to Fernald (2018), the prevalence of cost burden among Black households is 18 percentage points higher than for White households. This difference is not simply an artefact of racial disparities in income, because housing cost burden among Black households is higher than for White households within the same income bands (Fernald, 2018). The race-based gaps in housing cost burden are most pronounced for households that earn between \$15,000 and \$45,000 per year (Fernald, 2018).

The primary sources of data used to measure housing cost burden in the USA are cross-sectional. Therefore, our understanding of the changing nature of housing cost burden in the USA is not based on household changes over time, but rather on repeated cross-sectional measures. A small set of studies have used longitudinal data to understand the dynamics of housing cost burden. Two studies have used the Survey of Income and Program Participation (SIPP) to examine the duration of exposure to housing cost burden among renter households and estimated the rate of exit from a rent burdened state (Colburn and Allen, 2018; Susin, 2007). Generally,

research findings indicate that households experiencing housing cost burden exit at relatively high rates over a short period of time, but that a notable proportion of households chronically face housing cost burdens (Colburn and Allen, 2018). Given the panel structure of the SIPP data, longitudinal analyses may only be constructed for discrete three to four-year periods of time, thus limiting the scope of analysis. The long duration of the PSID used in this study will allow for longitudinal analyses of housing cost burden over multiple decades.

A focus on the housing cost burden of renter households is warranted given that housing represents the largest expenditure in the budgets of most households in the USA (Quigley and Raphael, 2004). Simple intuition suggests that as the percentage of household budgets devoted to housing costs increases, households with constrained budgets must alter their consumption patterns in response. Descriptive analysis confirms this intuition and finds that severely cost burdened households with children have lower food, transportation and health care expenditures than non-cost burdened households (Fernald, 2018). Other research demonstrates that housing cost burden is associated with more limited investments in the cognitive development of children, with this impact on spending creating a possible pathway for effects of housing affordability on the behaviour and health of children (Newman and Holupka, 2014).

Effects of housing cost burden may be indirect and based on decisions households make to alleviate or manage housing cost burden. For example, adding people to a household to help pay rent may result in overcrowding, which has a negative relationship with academic achievement for minors (Lopoo and London, 2016). To the extent that housing cost burdened households are more susceptible to higher rates of mobility and eviction, it is also possible to see housing cost burden as a precursor to the negative outcomes associated with these phenomena (Desmond and Kimbro, 2015).

### ***Household income dynamics and racial variation***

Studying the dynamics of housing cost burden over time necessitates a deeper understanding of how the two components of cost burden change. Changes in the cost of housing (numerator) and the household income (denominator) have independent effects on housing cost burden. In real terms, American workers have experienced stagnant earnings since the early 1970s, with real hourly wages increasing about 9% between 1973 and 2013 compared to an increase of productivity of nearly 75% over the same time period (Mishel *et al.*, 2015). Income stagnation has been particularly pronounced in the lower half of the income distribution, with real income for the bottom 50% of the distribution remaining essentially unchanged between 1980 and 2014 (Piketty *et al.*, 2018). This income stagnation has occurred at a time of growing income inequality in the USA, with the top of the income distribution taking a larger share of income at the turn of the twenty-first century than at any time since before World War II (Piketty and Saez, 2003). Other evidence indicates that this increasing income inequality has created a larger housing affordability problem for households in the lower end of the income distribution (Dong, 2018), with increases in income for wealthy households contributing to higher rents and greater crowding for households headed by a high school dropout (Matlack and Vigdor, 2008).

Household income differences between Whites and African Americans are extreme but have narrowed slightly in recent years. In 2016, Blacks at the 90th percentile of the income distribution for Blacks earned only 68% as much as Whites in the 90th percentile of the income distribution for Whites, a statistic that is unchanged compared to 1970 (Kochhar and Cilluffo, 2018). At the median of the income distributions, Blacks earned 65% of Whites, compared to 59% in 1970 (Kochhar and Cilluffo, 2018). The scale of the racial disparity is substantial: in 2016 the median household income of Blacks was \$39,500 compared to \$65,000 for non-Hispanic Whites (Chetty *et al.*, 2020). The income gap persists because of low rates of intergenerational economic mobility among Blacks. Holding parental income constant, the large income disparity that emerges between Whites and Blacks is driven primarily by differences in wages and employment rates for White and Black men (Chetty *et al.*, 2020).

### **Housing markets**

The preceding sections outline how housing costs and household income—the two inputs into the housing cost burden calculation—vary both temporally and by race. To understand the dynamics of housing cost burden over time, one must also consider another source of variation: housing markets. Housing markets are cyclical and, by definition, local. Accordingly, setting and context have profound impacts on market conditions and the cost of housing.

Existing research highlights a range of factors, at a national level, that influence national housing markets and how they change over time. One thread of research explores the positive relationship between economic activity, the business cycle and housing prices (Catté *et al.*, 2004; Gelain *et al.*, 2018; Quigley, 1999). Cross-national research highlights variation in the relationship between the business cycle and housing prices based on the elasticity of housing supply. Countries with inelastic housing supply exhibit greater price fluctuations than in countries with a more flexible housing stock (Catté *et al.*, 2004). Another set of research explores the increase in housing demand based on population growth and household foundation (Mulder, 2006; Zabel, 2004). Lee & Painter (2013) provided a link between these two threads of research by exploring how the Great Recession affected household formation.

A second category of research explores within-country variation in housing markets. Numerous scholars have highlighted how the local regulatory environment and zoning regulations affect the supply of housing (Gyourko and Molloy, 2015; Quigley and Rosenthal, 2005; Saiz, 2010). Further studies highlight a range of local conditions that help explain variation in housing costs, household income, population growth, real estate characteristics, transportation and commute factors, construction costs and interest rates (De Bruyne and Van Hove, 2013; Jud and Winkler, 2002; Potepan, 1996). Multiple features of metropolitan housing markets may influence spatial variations in housing costs (Bogdon and Can, 1997; Glaeser *et al.*, 2006; Stutz and Kartman, 1982) and, to the extent that these features shift over time, may help to explain trends in housing cost burden. These metropolitan-level factors may also help to explain racial disparities in housing cost and housing cost burden given sharp

variations in the concentration of racial and ethnic groups across metropolitan areas (National Research Council, 2001).

Patterns of housing cost burden and changes therein, may be affected by patterns of racial residential segregation in metropolitan areas. To the extent that segregation reflects a willingness of White households to overpay for residential separation from non-Whites (Cutler *et al.*, 1999), location in a highly segregated metropolitan area may be associated with higher housing cost burden for White households. Segregation is likely to reflect, at least in part, discriminatory practices and other social processes that restrict the supply of residential options faced by Black households (Krysan and Crowder, 2017), thereby increasing their housing costs. At the same time, segregation tends to be associated with lower Black wages and economic stability (Collins and Margo, 2000; Dickerson, 2009), putting greater upward pressure on housing cost burden for Black households. Given these potential effects, explaining race-specific patterns of housing cost burden requires attention to variations in segregation across metropolitan areas and uneven declines in segregation in recent decades (Krysan and Crowder, 2017).

Past research also highlights potentially significant neighbourhood-level drivers of housing costs and racial differences in housing-cost burden. A large body of research points to significant racial differences in neighbourhood attainment, with White households more likely than Black households to be located in, and remain in, low-poverty neighbourhoods (Crowder and South, 2005; Sampson and Sharkey, 2008). As a result, White households may face neighbourhoods with relatively tight housing markets and high rents that increase the risk of housing cost burden. One potential repercussion is that trends in housing cost burden, and racial differences in burden, may be driven by neighbourhood housing conditions.

## Data and methods

We analyse data from the Panel Study of Income Dynamics (PSID) for the years 1980–2017. The PSID started in 1968 with a national sample of approximately 5000 US families (about 18,000 individuals). These families were interviewed annually between 1968 and 1997, and biennially since then. We omit responses from 1968 to 1980 since we are only able to obtain a census tract level measure of median rent for waves from 1980 onward. New families have been added to the panel as children and other members of original panel families form their own households. We focus only on household heads self-identifying as either Black or White since members of other racial and ethnic groups were too few, particularly in the early years of the PSID, to afford a comparable analysis. Given sharp differences in housing cost dynamics by tenure, we focus on families in each interview year reporting that they rent their dwelling. Housing cost burden for homeowners has very different implications given how housing expenses interact with tax obligations, the use of homes as investment vehicles, and the fact that monthly mortgage bills include payments for both interest and principal. Finally, our analysis uses PSID households that live within metropolitan areas. The resulting number of household-wave observations in our analysis is 32,164.



## Measures

We define housing cost burden at each PSID interview by comparing the family's total taxable income—including wage and Social Security Income for all family members—to the average rent paid by the household over the course of the year.<sup>1</sup> We define a household as housing cost burdened in a given observation period if average annual rent for the year is at least 30% of the family's annual taxable income. To facilitate analysing trends in either rental cost or income over time separately, all annual rent and income values are adjusted for inflation using the Consumer Price Index with 2017 as the base year. When assessing cost burden in a given period, however, this inflation adjustment has no direct bearing on the estimate. Finally, the annual rent payment measure was not offered during the 1988 and 1989 interview waves, so for these periods we impute interpolated values for households observed in both 1987 and 1990.

Our analyses use the PSID's detailed information about household composition to adjust estimates of housing cost burden prevalence by factors theoretically relevant to a household's earnings or housing cost. These measures include: the age of the head of household, the sex of the head of household, the educational attainment of the head of household, the marital status of the head of household, whether the respondent is a new head of household at the time of the interview, the number of persons within the head of household's family unit, the employment status of the head of household, whether the head of household supports any dependents outside of his/her family unit, and the number of rooms in the family's housing unit.

We also draw on the PSID's restricted geolocation data to append neighbourhood and metropolitan characteristics to each household's interview at a given wave, allowing us to understand the local and broader contexts in which each household resided at a given point in time. We use census tracts to operationalize neighbourhood units, and Core-Based Statistical Areas (CBSAs) as our definition of metropolitan areas. We draw on decennial Census estimates from the Neighborhood Change Database (NCDB) for waves between 1980 and 2010, and American Community Survey estimates for 2013–2017 for interview years after 2010. Using the geographically normalized NCDB for measuring neighbourhood compositions mitigates biases due to changing areal units over time, and aggregating neighbourhood measures to metropolitan summaries at each period ensures that metropolitan areas are consistently defined over time too. Linear interpolation allows us to approximate values for neighbourhood or metropolitan measures at interview waves that occurred during intercensal years. All measures of neighbourhood or metropolitan contexts are time-varying.

Neighbourhood level measures used in our analyses include: tract median rent (chained to CPI using 2017 dollars), the logged population of the tract, the tract poverty rate, the tract proportion of owner-occupied housing units, the tract proportion of vacant housing units, the tract proportion of single family home housing units and the tract proportion of housing units built in 1970 or later. These measures capture variations between neighbourhoods in the relative availability and cost of rental housing units, factors relevant to the cost of housing for a given household.

Metropolitan level measures used in our analyses include: metropolitan median rent, the logged metropolitan population, the metropolitan proportion of housing



units built in 1970 or later, the metropolitan unemployment rate and the Black–White dissimilarity index (D). The Black–White index of dissimilarity is our measure of metropolitan racial residential segregation and captures the deviation of neighbourhoods’ racial compositions from the composition of the metropolitan area. These covariates cover factors relevant to market-level differences in housing cost, labour market strength and relative market accessibility for Black and White households. Descriptive statistics on all measures used in the following analyses are available in Appendix.

### **Analytic framework**

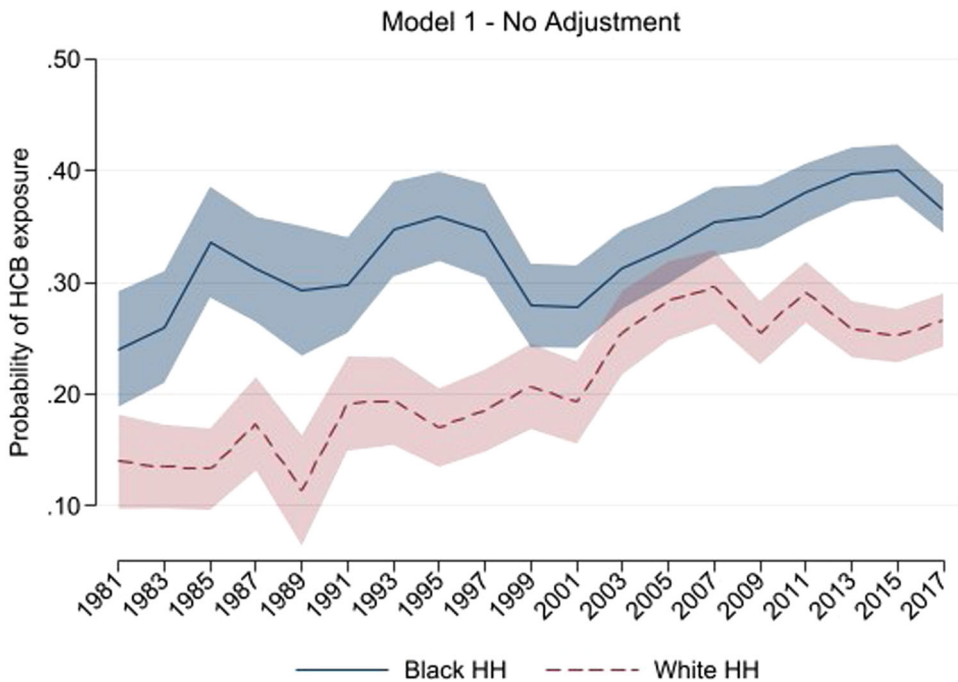
We estimate separate linear probability models (LPM) for Black and White households’ housing cost burden exposure for our empirical analyses.<sup>2</sup> These models predict whether a household was cost burdened for the year in which the interview took place based on nested sets of covariates. Model 1 specification only includes fixed effects (i.e. dummies) for time periods in order to provide an unadjusted estimate of housing cost burden prevalence among White or Black households at each period. Model 2 specifications add adjustment for household characteristics measured at the time of the household’s interview. Next, Model 3 incorporates controls for characteristics of the neighbourhood context of a household. Finally, Model 4 specifications add adjustment for the metropolitan characteristics in which a household resides. All models use standard errors clustered at the household-level to account for both heteroskedasticity in model errors and serial correlation of households across the span of the panel. We present unweighted estimates as our primary set of results since our model covariates account for the sampling design of the PSID (Solon *et al.*, 2015; Winship and Radbill, 1994).

We present predicted probabilities and average marginal effects (i.e. linear model coefficients) to facilitate interpretation and comparison of covariates between our models. We visualize predicted probabilities by interview period to illustrate changes in the likelihood of Black and White households experiencing housing cost burden across time. These time-series figures incorporate 95% confidence interval bands to graphically indicate significant differences between White and Black households and for change over time relative to 1980.

### **Findings**

Figure 1 presents the probability of White and Black households experiencing housing cost burden at each wave of the PSID since 1980.<sup>3</sup> These estimated probabilities are based on the Model 1 stratified logistic regressions that predict whether a Black or White household experienced cost burden conditioned only on fixed effects for time periods. Model 1’s specification is intended to provide a summary of how Black and White households’ risk of experiencing housing cost burden changed from 1980 to 2017.

In 1981, the first period covered in Figure 1, the estimated probability of a Black household experiencing cost burden is about 0.24, compared to 0.14 for White households. These estimates for 1981 are significantly different from each other, and the



**Figure 1.** Predicted probability of housing cost burden exposure by race (Model 1).

prediction series for Black and White households remain different at a 95% confidence level throughout the remaining periods in [Figure 1](#).<sup>4</sup> By the midpoint of each series in 1999, the racial gap had narrowed modestly to 0.07. The difference in cost burden exposure probability between Black and White households continued to decline modestly until 2005, when the racial gap was the smallest observed over the span of the panel. Following the 2007 wave, however, the estimated probabilities for Black households diverge from the series for White households, with the racial gap in exposure probability widening to its largest magnitude (about 0.15) since the mid-1990s by the 2015 period.

First, the dynamics highlighted in this figure are consistent with existing research on cost burden prevalence in terms of the upward trajectory over time and inequality between Black and White households (Fernald, 2018). These estimates are lower than those found in other studies since utility costs, expenses typically included as a housing cost in previous cost burden research, are excluded from our measure because of data limitations. Second, the predictions from Model 1 show that Black households were significantly more likely than White households to experience housing cost burden in every observation period covered in this analysis. At the same time, there is evidence of cyclical variation in the size of the racial gap over time. Specifically, the gap widened during expansionary periods in the mid-1980s and again in the mid-1990s, before converging in the early 2000s. In the period after the Great Recession the housing cost burden gap between Whites and Blacks has widened again. One potential explanation for this dynamic is that when the economy expands, White incomes increase more quickly than the incomes of Black households. While we observe that the greatest racial gaps in housing cost burden occur during times of

economic expansion, the gap did not expand during the expansion of the mid-2000s. We suspect that the highly unusual nature of the housing market during the 2003–2007 expansion may explain this deviation from the other expansionary periods, but explaining this dynamic is beyond the scope of this article. On balance, the evidence suggests that expansionary periods place Black households at elevated risk for housing cost burden when compared to White households.

The next part of our analysis concerns the relative importance of different household, neighbourhood and metropolitan characteristics to the trends and racial gap in cost burden exposure described in Model 1. Table 1 provides the average marginal effect (AME) of each covariate on the probability of either Black or White households experiencing cost burden during a given interview period. For proportion measures and our indicator of Black-White segregation with ranges of [0,1], the AME describes the change in exposure probability associated with moving from complete absence to complete presence of the characteristic (i.e. a one-unit change in the covariate). All of the following regression specifications include fixed effects for time period like Model 1.

Model 2 incorporates controls for household characteristics measured at the time of each interview. The findings from Model 2 underscore the importance of differences in household composition for variations in the likelihood of a Black or White household experiencing housing cost burden in a given wave of the panel. For instance, marital status, employment and education are all relevant to the risk of a household being cost burdened. When compared to the reference category (married/cohabitating) covariates for widowed, separated, divorced and single all suggest a significantly increased probability of housing cost burden. This increased risk of housing cost burden associated with the marital status variables is evident for both Black and White households. The strong effect of these covariates is likely because marital status has implications for both household income and housing costs.

Like marital status, employment variables have a significant association with a household's risk of housing cost burden for both White and Black households. Being unemployed or not participating in the labour force (student/spouse/retired/other variable) increases the probability of experiencing housing cost burden by 15–22 percentage points across the three models. This result is expected given the positive relationship between employment and income. Finally, greater education is associated with lower predicted housing cost burden for both Black and White households. Four additional years of education lowers the probability of experiencing housing cost burden by 6–10 percentage points depending on model specification and race of the household.

Model 3 introduces neighbourhood level covariates to adjust estimates of housing cost exposure probability for differences in neighbourhood contexts. First, this model demonstrates the expected importance of tract-level median rents—as local rents increase so does the probability of experiencing rent burden. The average marginal effect of an additional \$100 for tract median rents is relatively comparable between Black households (1.8 percentage points) and White households (1.5 percentage points). The remaining neighbourhood variables, however, show differences between Black and White households in terms of their association with a household's risk of being cost burdened. Among Black households, tract-level poverty rates show no consistent association with household risk of housing cost burden, though higher vacancy

**Table 1.** Average marginal effects (AME) for linear probability models of housing cost burden exposure among Black and White PSID HHs by household, neighbourhood and metropolitan characteristics.

	Model 2		Model 3		Model 4	
	Black	White	Black	White	Black	White
Age	−0.004*** (0.001)	−0.001 (0.001)	−0.004*** (0.001)	−0.002** (0.001)	−0.004*** (0.001)	−0.002** (0.001)
Female	0.049*** (0.014)	0.049*** (0.014)	0.059*** (0.013)	0.046*** (0.013)	0.056*** (0.013)	0.046*** (0.013)
Education (years)	−0.024*** (0.003)	−0.016*** (0.002)	−0.024*** (0.003)	−0.020*** (0.002)	−0.024*** (0.003)	−0.019*** (0.002)
Divorced	0.128*** (0.020)	0.110*** (0.018)	0.117*** (0.020)	0.127*** (0.017)	0.120*** (0.019)	0.129*** (0.017)
Separated	0.144*** (0.020)	0.071*** (0.021)	0.136*** (0.020)	0.080*** (0.020)	0.141*** (0.020)	0.083*** (0.020)
Single	0.180*** (0.017)	0.139*** (0.015)	0.169*** (0.017)	0.134*** (0.015)	0.169*** (0.016)	0.135*** (0.015)
Widowed	0.156*** (0.043)	0.242*** (0.080)	0.144*** (0.042)	0.256*** (0.077)	0.145*** (0.041)	0.260*** (0.078)
New HoH at t	0.021* (0.010)	0.059*** (0.010)	0.021* (0.010)	0.064*** (0.010)	0.022* (0.010)	0.066*** (0.010)
N in family unit	−0.003 (0.004)	0.021*** (0.005)	−0.004 (0.004)	0.019*** (0.005)	−0.004 (0.004)	0.018*** (0.004)
Student/spouse/retired/other	0.214*** (0.014)	0.229*** (0.018)	0.213*** (0.014)	0.232*** (0.017)	0.210*** (0.014)	0.233*** (0.017)
Unemployed	0.185*** (0.013)	0.153*** (0.019)	0.178*** (0.013)	0.154*** (0.018)	0.174*** (0.012)	0.152*** (0.018)
Has dependents outside FU	−0.080*** (0.011)	−0.068*** (0.010)	−0.083*** (0.011)	−0.069*** (0.010)	−0.083*** (0.011)	−0.069*** (0.010)
N of rooms in HU	0.001 (0.003)	−0.008* (0.003)	−0.002 (0.003)	−0.002 (0.003)	−0.002 (0.003)	0.000 (0.003)
Tract median rent (\$100s)			0.018*** (0.002)	0.015*** (0.002)	0.017*** (0.003)	0.008*** (0.002)
Log(tract population)			0.038*** (0.011)	0.009 (0.009)	0.031** (0.011)	0.008 (0.009)
Tract poverty rate			0.060 (0.049)	0.234*** (0.068)	−0.000 (0.049)	0.209** (0.070)
Tract prop. HU own-occ			−0.052 (0.041)	−0.091* (0.043)	−0.040 (0.041)	−0.083 (0.044)
Tract prop. HU vacant			0.275*** (0.080)	0.058 (0.075)	0.175* (0.082)	0.067 (0.074)
Tract prop. HU SFH			0.077** (0.027)	0.013 (0.031)	0.043 (0.031)	0.031 (0.033)
Tract prop. HU built ≥ 1970			0.093*** (0.018)	0.026 (0.016)	0.120*** (0.022)	0.021 (0.021)
Log (metro population)					−0.003 (0.007)	−0.002 (0.006)
Metro median rent (\$100s)					0.003 (0.004)	0.017*** (0.004)
Metro prop. HU built ≥ 1970					0.272*** (0.061)	0.027 (0.043)
Metro prop. workers unemployed					1.645*** (0.371)	0.493 (0.303)
Black-white segregation (D)					0.291*** (0.077)	0.057 (0.054)
Includes year dummies?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17960	14204	17960	14204	17960	14204

Standard errors in parentheses.

\* $p < 0.05$ .\*\* $p < 0.01$ .\*\*\* $p < 0.001$ .

rates are associated with modestly elevated risks of housing cost burden. In contrast, neighbourhood poverty and vacancy rates are reversed in terms of their salience for the risk of housing cost burden among White households—tract-level poverty has a significant association with White household's risk of experiencing housing cost burden, while vacancy rates show a non-significant association.

The conflicting relationship between the poverty and vacancy variables on White and Black households speaks to the complex relationship between race and housing in the USA. Due to continued racial segregation in many US metropolitan areas, Black households are disproportionately more likely to live in high-poverty neighbourhoods than White households, even after adjusting for socioeconomic status (Crowder and South, 2005). For example, in Philadelphia the average middle-class Black resident lived in a high-poverty neighbourhood (20.4%) at the time of the 2000 decennial census (Pattillo, 2005). In other words, differences in the average neighbourhood poverty rate of Black and White households are inherently linked to racial segregation patterns experienced by Black and White households. Black households with substantial variation in household incomes live in high poverty neighbourhoods, making the poverty rate a less salient predictor of housing cost burden for Blacks. In contrast, a White household's risk of experiencing housing cost burden is directly associated with neighbourhood poverty rates, suggesting a greater correspondence of ecological neighbourhood quality with their household economic resources. Among Black households, our results suggest that vacancy rates are more closely associated with risk of housing cost burden than poverty rates, though the substantive importance for this particular measure is somewhat limited given the variable's modest effect size.

Model 4 introduces a set of metropolitan-level measures to understand the relationship between housing market characteristics and Black and White households' relative risks of housing cost burden exposure. Like some of the neighbourhood-level covariates, the relationship between our measures of metropolitan context and the risk of cost burden varies between Black and White households. First, metropolitan-level median rents have a positive association with the probability of housing cost burden among White households, but no consistent relationship with the likelihood of cost burden among for Black households. This suggests that, after controlling for local rents, higher typical costs of housing in a metropolitan area are only likely to raise White households' likelihood of cost burden, while Black households in a high cost metropolitan area are no more or less likely to experience housing cost burden than Black households in lower cost metropolitan areas. One potential explanation for this latter finding is that the relative cost of the housing in the metro is not particularly salient for Black households given that they are more likely concentrated in neighbourhoods with lower quality housing in all cases.

Second, the proportion of the housing stock that was built after 1970, the unemployment rate and the degree of racial segregation within the metropolitan area are significantly associated with greater risk of housing cost burden among Black households. One potential explanation for the importance of post-1970 housing for cost burden among Black households is that a larger proportion of newer housing stock suggests a more expensive housing market overall in the city. In contrast, a city with an older housing stock has greater variation in the distribution of rents, with a

larger proportion of housing becoming affordable to lower income households through a filtering process. Therefore, Black households with lower incomes may disproportionately struggle to find affordable housing in cities with a large share of newer housing. Similarly, higher unemployment rates are strongly associated with an elevated probability of housing cost burden exposure for Black households. This suggests that weaker labour markets have exacerbated racial inequality in housing cost burden through effects on black households' incomes, whether due to unemployment itself or a higher likelihood of employment being in a low-wage sector.

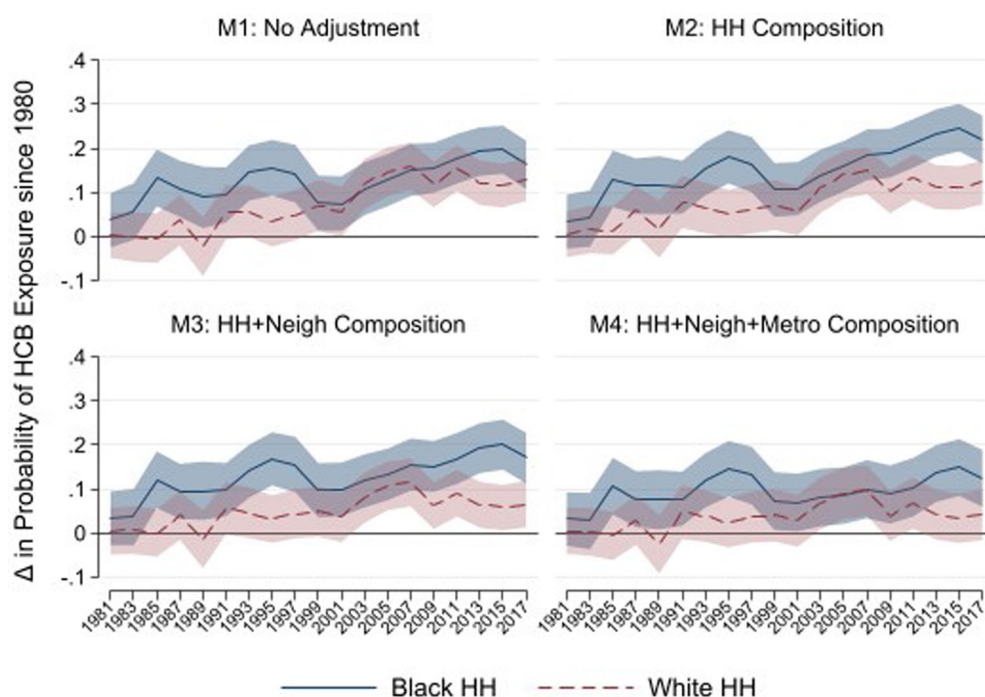
Further, metropolitan-level racial segregation has a positive and significant association with the probability of Black households experiencing housing cost burden, but no association with the probability among White households. This measure of segregation captures the human capital disadvantages that accumulate in cities with high levels of racial segregation, along with the racial inequalities in exposure to high-poverty contexts that segregation creates (Sampson and Sharkey, 2008). Poorer educational outcomes and less access to employment are important segregation-related disadvantages contributing to lower incomes and thereby higher risk of experiencing housing cost burden. In addition to disadvantaging levels of human capital, more segregated metropolitan areas may also relegate Black households to a more limited portion of the housing stock, thereby increasing their difficulty at finding affordable housing opportunities and raising the likelihood of experiencing housing cost burden.

The next step of our analysis is to understand how much of the change over time observed in [Figure 1](#) (and Model 1) is accounted for by controlling for household, neighbourhood and metropolitan characteristics in the logistic regressions. Thus, in [Figure 2](#) we provide estimates of the average difference in exposure probability associated with each interview wave for the four model specifications. When confidence interval bands for a given series do not intersect the baseline at 0, the model indicates a significantly greater probability of cost burden exposure relative to 1980. For example, the estimate of housing cost burden for White households in Model 3 in 2017 is virtually identical to 1980, with the intersection of the 95% confidence interval bands with the baseline demonstrating that any small difference was not statistically significant. We describe each model independently to identify how the passage of time and various model specifications change the probability of experiencing housing cost burden relative to 1980 by race.

Predicted probabilities from Model 1 indicate that the likelihood of experiencing cost burden in 1980 was 0.255 for Black households and 0.158 for White households. Model 1 shows that beginning in 1985 and continuing through 2017, Black households were significantly more likely to experience housing cost burden than in 1980. This conclusion is based on Black household's confidence interval in [Figure 2](#) not overlapping the horizontal line at 0 after 1985. White households show a significantly greater likelihood of experiencing housing cost burden by 2001 (relative to 1980 levels), and this remains true for the duration of the panel after this interview wave (i.e. the confidence interval for White households in [Figure 2](#) did not overlap 0 after 2001).

Model 2 tells a similar story to Model 1, but the inclusion of household covariates produces somewhat larger gaps over time in [Figure 2](#) for the respective probabilities of Black and White households experiencing housing cost burden relative to 1980.





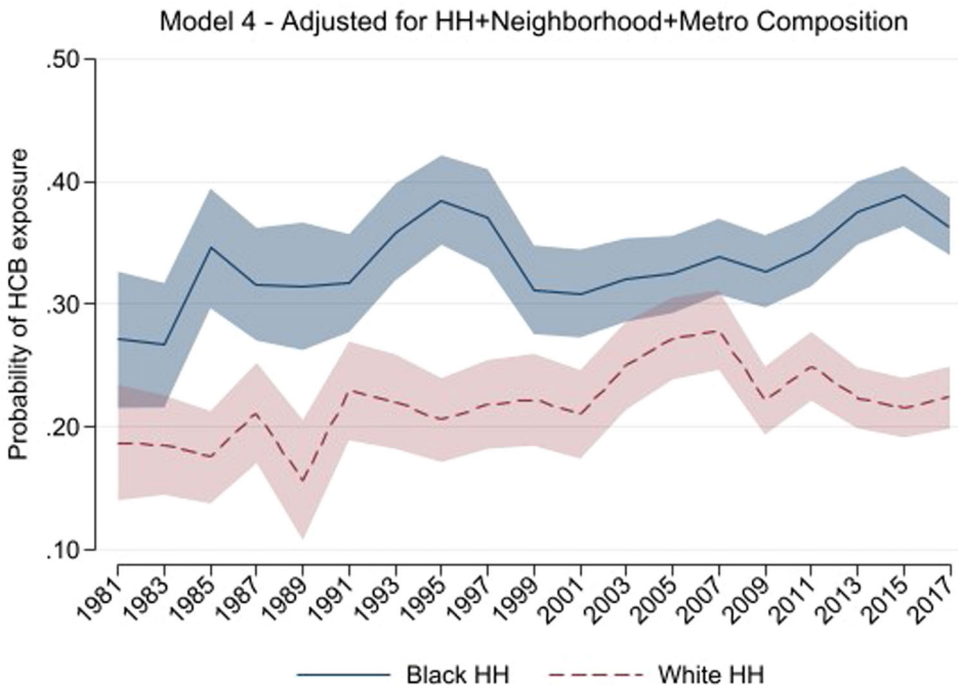
**Figure 2.** Model comparison of the average marginal effect of time.

Though the prediction for White cost burden prevalence does not differ much between Model 1 and Model 2, the difference between White and Black households becomes larger in the early part of the 2010s during the post-recession recovery. This widening of the racial difference in cost burden exposure stems from the Black cost burden prevalence prediction increasing by about 5%.

Model 3 includes neighbourhood composition variables, which together with household characteristics, explain the change over time in [Figure 2](#) observed for White households up until 2003. For Black households, there is a trend of increasing prevalence across the panel beginning in 1985 similar to the findings from Model 1 and Model 2. Finally, predictions from Model 4 in [Figure 2](#) incorporate measures of metropolitan characteristics and accounts for most of the change over time observed among White households. Outside of some change occurring around the Great Recession, the estimated likelihood of a White household experiencing cost burden in recent periods is only modestly higher than 1980 and significant at the  $p < 0.10$  level. In contrast, there is about a significant, 50% relative change in the probability of a Black household experiencing housing cost burden in 2017 compared to 1980. This significant change over time remains unexplained by household, neighbourhood and metropolitan characteristics we account for in our models.

We conclude the results section with a discussion of [Figure 3](#). This figure presents time-series estimates for the probability of housing cost burden by race based on the specification in Model 4 that includes household, neighbourhood and metropolitan covariates. The first takeaway is that the probability of housing cost burden for Black households is significantly higher than for White households at every measurement





**Figure 3.** Predicted probability of housing cost burden exposure by race (Model 4).

period. Second, the racial gap experiences two periods of significant widening—in the mid-1990s and beginning in 2009 and persisting throughout the remainder of the panel. A third important takeaway is that the recovery after the 2007–2009 Great Recession produced the most significant race-based gaps in the probability of housing cost burden over the course of this panel. The recovery period provided favourable conditions when it comes to experiencing housing cost burden for White households, while no such benefit is evident for Black households. This pronounced widening of racial gaps in housing affordability is an important trend that requires further investigation and explanation.

## Conclusion

In sum, these results provide new evidence of the racial inequity in US housing markets. For White households, the household, neighbourhood and metropolitan covariates account for much of the change in the probability of housing cost burden over time. For Black households, however, the probability of experiencing cost burden continued to rise throughout the period of almost four decades covered in this study. This finding suggests that unobserved variables like racial discrimination, social networks or the quality of one's employment might explain the increasing prevalence of cost burden for Black households in the USA.

A recent example highlights how discrimination may produce higher levels of housing cost burden for Black households. It is well documented that Black households disproportionately bore the consequences of the 2007–2009 foreclosure crisis.

Existing research notes that Black households were disproportionately represented in the pool of households that were sold subprime mortgages and were more likely to experience foreclosure than similarly situated White households controlling for a range of household and demographic attributes (Rugh and Massey, 2010). The subsequent chain of events is well-documented in the literature that chronicled the foreclosure crisis and its immediate aftermath. The high levels of foreclosure forced many households into the rental market, thus increasing the demand for rental housing (Collinson, 2011; Kroll, 2013). At the same time, there was a stall in housing construction, particularly among multi-family housing, thus constraining the supply of rental housing at the exact time that more units were needed (DiPasquale, 2011). The unsurprising result was an increase in the cost of rental housing as increased demand was not met with a commensurate increase in supply. Given the disproportionality in foreclosure by race, more Black households, on a relative basis, were thrust into the inhospitable rental housing market and thus faced increasing housing cost burdens.

Beyond the widening Black-White disparity in exposure to housing cost burden, our results show that the metropolitan characteristics salient to household exposures varied by race. Specifically, the age of a market's housing stock, the unemployment rate and level of racial residential segregation within metropolitan areas were relevant for explaining variations in Black households' likelihood of experiencing a period of housing cost burden; in contrast, White households' propensity of exposure to cost burden was directly associated with the median rent level of their metropolitan area.

There are a few limitations to our study worth acknowledging. First, and perhaps foremost, we are not able to operationalize a measure of housing cost burden in exactly the same manner as existing research like that by the Joint Center for Housing Studies. Specifically, our estimated levels of cost burden prevalence among Black and White households differ some from prior research based on decennial Census or American Community Survey (ACS) data. This difference in estimates between data sources is driven by the fact that Census and ACS data consider household utility payments in estimating a level of gross rent to compare to household income. While the PSID is a data source with rich information about household composition and socioeconomic status, some items like the utility payment measure were not asked consistently until recent waves, hindering our capacity to support a long-term analysis of cost burden dynamics with consideration for utilities as a part of a household's typical housing costs.

Another limitation of our study concerns our ability to only investigate racial differences in exposure to housing cost burden and trends therein among Black and White households. Existing socioeconomic disadvantages and high residential segregation in metropolitan areas with considerable Latino populations (cf. Logan and Stults, 2011) together suggest that Latino households might be facing a similar increase in cost burden prevalence like our results indicated with Black households. While the PSID has made strides in expanding its sample over time to provide a suitable reference to the greater US population, the relatively recent addition of Latino subsample to the PSID in the mid-1990s inherently constrains our long-term investigation of cost burden dynamics to Black and White households. Future research will benefit from exploring analytic strategies that can provide traction for understanding the cost

burden trends among Latinos and other ethnoracial groups not captured in our study.

Finally, there may be some limits to the external validity of these findings beyond the USA. To the extent that housing market conditions and socioeconomic disparities in cities in Europe or Australia mirror conditions in the USA, there may be widening gaps in housing cost burden between minority and majority populations in these places. Accordingly, the general finding in this paper about widening differences in housing cost affordability may hold in countries other than the USA and at the very least is an important topic for future research. However, differences between countries in the provision of social housing and other forms of housing assistance importantly contribute to some limits in terms of the present study's implications for countries other than the USA.

The findings in this paper highlight the persistent housing affordability challenges that Black households face in the USA. Because so many factors influence household income and housing costs, no single policy response is likely to address the racial gaps in housing cost burden. For example, stronger enforcement of housing discrimination laws is a necessary, but likely insufficient, policy response given structural discrimination that has limited education, employment and housing access of Black households for generations. This descriptive analysis provides a basis from which to conduct additional research that will provide greater clarity on various sources of racial disadvantage that may help identify the responses that are needed to address persistent racial gaps in housing cost burden.

There are three extensions of this research that would expand our collective understanding of racial disparities in housing cost burden in the USA. First, as noted above, our model specifications explain most of the variation in housing cost burden for White households since 1980, but for Black households, significant changes over time remain unaccounted for using our full set of control covariates. Investigating additional explanations and testing interactions between household and contextual measures would therefore help to reduce the unexplained increase in the probability of housing cost burden among Black households over the last four decades, as well as potentially shed light on why factors like the median rent in metropolitan areas matter differently for Black and White households. A second research opportunity is to follow the lead of the poverty dynamics literature (e.g. Quillian, 2003) and analyse the dynamics of housing cost burden over time using spell analysis. This research will provide information about entries into and exits out of cost burden as well as the duration of housing cost burden spells. Understanding these dynamics will generate novel evidence about the heterogeneity of this phenomenon. Third, further research should decompose the housing cost burden variable to understand the relative importance of income and housing costs over time. This analysis will help identify the driving factors of critical periods when the prevalence of housing cost burden or racial gaps, change materially. Disaggregating the cost burden fraction into its component parts will help us identify the drivers of changes in housing cost burden. For example, we will use these data to explain periods where the gap expands (mid-1980s, mid-1990s and post-Great Recession) and also to explain why the gap was constant during the housing boom expansion of the mid-2000s. Identifying the relative

contributions of income and housing costs to the housing cost burden fraction is needed to generate a deeper understanding of racial gaps in housing cost burden and the reason for their persistence.

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## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Notes

1. Unlike other studies of housing cost burden, this study excludes utility costs from the total housing cost calculation. This exclusion is due to the fact that utility payments are omitted from the PSID from 1983 to 1998 (Li *et al.*, 2010). As a result, both the prevalence and average rent burden figures presented in this study are lower than other measures that include utility costs as part of the household housing cost calculation.
2. Logistic regression models produced substantively identical results to linear probability models given our focus on average predictions and marginal effects. Accordingly, we present LPMs for interpretability and to facilitate comparisons between model specifications given the limitations therein associated with coefficients from non-linear regressions (Allison, 1999).
3. We present marginal predictions for odd years in order to keep a consistent x-axis unit amidst the PSID's change in 1997 from one-year interview intervals to two-year intervals.
4. Significant differences at the  $p < .05$  level are denoted by the confidence interval for one series not overlapping the point estimate for the other series.

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