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Does Homeownership Reduce Wealth Disparities for Low-Income and Minority Households?

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We use the U.S. Department of Housing and Urban Development's Housing Choice Voucher program as a setting to evaluate the interaction of homeownership and race on the wealth accumulation of low-income households. Using a within-treatment difference-in-differences framework, we establish that low-income households that receive assistance in owning a home experience increased wealth accumulation relative to their tenure as renters. These wealth gains are not present among low-income minority households. Our findings provide evidence that homeownership is a driver of wealth formation for low-income households and that homeownership does not inherently reduce racial disparities in wealth. (*JEL* G51, J15, R21).

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We use the U.S. Department of Housing and Urban Development's (HUD) Housing Choice Voucher (HCV) program as a setting to evaluate the causal effect of homeownership on wealth accumulation for low-income households, and to examine whether homeownership reduces or amplifies racial disparities in wealth amongst low-income households.

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In addition to providing low-income households with housing assistance for rental payments, HUD's HCV program also provides eligible low-income households with housing assistance for mortgage payments and homeownership expenses. Thus, our identification comes from tracing the wealth outcomes of low-income households that previously accessed housing assistance for tenancy and eventually became homeowners during the sample period ("switchers"). We use household-fixed effects to compare a household's wealth accumulation as a homeowner to its own wealth accumulation as a renter, and use variation in the wealth outcomes amongst households to measure the effect of homeownership on racial disparities in wealth. Important for our study, this identification strategy holds constant the many unobservable and confounding differences within households that are likely to affect wealth accumulation, while allowing wealth outcomes to vary by race.

Our sample comes from HUD's internal administrative database, referred to as the Public and Indian Housing Information Center (PIC), which provides annual coverage of HCV participants from 2000 to 2020. We find that the average low-income household in our study gains $3,300 of wealth as homeowners relative to their tenure as renters. We observe less wealth accumulation for minority-headed households that become homeowners ($1,500). The significantly lower wealth gains for minority households are consistent with recent evidence that homeownership does not reduce racial disparities in wealth (see, e.g., Wainer and Zabel 2020; Newman and Holupka 2016).

Consistent with recent findings in Bernstein and Koudijs (2021), we also find evidence that households increase their labor supply (i.e., wage earnings) in response to homeownership. However, our results suggest that labor market frictions likely limit this effect. Furthermore, we find strong evidence that the financial fragility of the household, neighborhood selection, and timing of the home purchase, significantly influence the wealth gains of homeowners in our sample. We observe that neighborhood selection is a particularly important channel through which minority-headed households experience lower wealth outcomes. For households that purchased homes in neighborhoods with lower shares of owner-occupied homes, the disparity in wealth accumulation between minority and White homeowners ($300 and $8,600, respectively) is statistically significant and represents an 84% increase over our baseline estimates. We also find that households that work with PHAs with higher utilization rates have higher wealth gains ($5,500 and $9,700 for minority and White households, respectively). The finding suggests that households serviced by PHAs with more resources accumulate more wealth.

The findings present the first large scale study of HUD's homeownership program. Importantly, the HCV program provides us with a unique economic setting that allows us to identify the causal impact of

homeownership on the wealth accumulation of low-income households. First, the households in our sample transition to homeownership on a quasi-random basis. Since households dedicate considerable time to preparing their financial resources to buy homes, it is challenging to draw causal inferences from the transition to homeownership. Indeed, the participating households in our study are required to complete homeownership counseling, are given access to credit counseling, and are discouraged from buying properties that require costly repairs.[1] However, households that meet a PHA's requirements for entering HUD's homeownership program are not guaranteed access to homeownership vouchers within any specific time frame. Thus, the timing of when the households in our study transition to homeownership is quasi-random. In this regard, the quasi-random timing of the transition aids our efforts to draw causal inferences from our within-treatment design.

Second, our setting and experimental design help to address concerns that the racial disparities in wealth gains that we document are attributable to confounding household- specific characteristics, like financial planning and saving habits, rather than homeownership. To assess whether and how low-income, minority homeowners have different outcomes relative to White homeowners, we apply a difference-in- differences (DiD) test to our within-treatment framework. We confirm minority and White households follow similar wealth dynamics before the transition to homeownership. These pre-trends are important for our study because we evaluate households that have access to the same level of housing assistance to buy or rent a home in the same area but may face different opportunities for wealth accumulation as a function of race. For example, recent research documents racial disparities in home appreciation and that many first-time Black homebuyers experience actual reductions in net wealth (Newman and Holpuka 2016). Moreover, our estimations have statistical power to detect homeownership's effect on racial disparities in wealth, as 63% and 37% of the 16,699 households in our sample are headed by people that identify as minority and White, respectively.

Last, we observe households' ZIP codes, as well as income, and financial assets, such as cash balances, before and after they transition to homeowners. We use the ZIP codes to evaluate the effects of neighborhood selection on wealth accumulation, which has been shown to significantly influence disparities in wealth and income for minority homeowners (Chetty, Hendren, and Katz 2016; Newman and Holupka 2016). We also use the ZIP codes to address some of the limitations of our data, such as not directly observing home equity values. We will discuss these data limitations in more detail below.

[1] Housing Choice Vouchers Fact Sheet | HUD.gov / U.S. Department of Housing and Urban Development (HUD), Am I eligible section, Paragraph 2, accessed at September 6, 2021.

While our economic setting provides advantageous identification, it also has limitations. One concern with the HUD reported assets is that they do not include households' liabilities. That is, we may not have the entire balance sheet of household net wealth: credit card debt, car loans, etc. Thus, the HUD data may overstate the wealth of homeowners by not taking into account mortgages, credit cards, auto loans, or other liabilities. Similarly, the HUD data do not report home equity and may therefore understate household wealth. We overcome the nonreporting of home equity by using Zillow to infer the value of the home given the ZIP code and year; then we impute home equity from the time of purchase. We also use average credit card and family debt values for low-income households (annual income less than $35,000) in the PSID to evaluate whether our results are robust to the inclusion of estimated liabilities. We verify that our findings remain economically and statistically consistent when we adjust our wealth measures for PSID liabilities. Thus, we alleviate the concern that unreported liabilities drive the wealth gains and racial disparities that we document.

Additionally, although public housing officials verify income, asset holdings, and family composition with applicants' employers, banks, the Internal Revenue Service, and other government agencies, another concern is that households may have incentives to underreport their assets. In other words, there may be measurement error of financial assets that could also bias the wealth gains that we observe. For example, if renters have an incentive to underreport their assets and homeowners do not, then when households transition to homeownership, we may observe mechanical changes in wealth that are simply due to better reporting.

We verify whether the potential misreporting is correlated with being a homeowner versus a renter. We make use of HUD's internal threshold of assets reaching $5,000 to assess whether homeowners strategically misreport asset levels. At $5,000, HUD includes 2% of the asset values or the actual income that comes from assets, whichever is higher, as reported income. It follows that if the wealth gains that we observe were driven by households strategically misreporting their asset holdings, one would expect to observe many households' asset holdings to bunch around $5,000. However, we do not find evidence of asset holdings bunching around $5,000. Therefore, we find it unlikely that the wealth gains that we document are driven by strategic misreporting.

Our study contributes new knowledge to several fields of financial scholarship. We document that low-income households that access the HCV Homeownership program experience sizeable wealth gains. The findings present the first large-scale evidence that HUD's homeownership assistance helps low-income households to accumulate wealth relative to their tenancy as renters. Although one of HUD's stated research goals is to help low-income families become more self-sufficient and financially

viable,[2] there is limited evidence that the homeownership programs promote financial inclusion. Therefore, we provide a critical insight into the efficacy of the relatively new homeownership voucher program.

We advance the literature on housing assistance by using homeownership vouchers to apply a within-treatment design. In examining differences in wealth outcomes between the periods in which households receive rental versus homeownership vouchers, we depart from the approach of much of the previous work on federal housing assistance programs that exclusively focus on rental vouchers.[3] Moreover, by departing from much of this prior research, we draw causal inferences of the wealth gains from homeownership for a large sample of low-income households. Thus, our findings provide valuable insight to policymakers and market participants seeking to address disparities in wealth accumulation, financial inclusion, and affordable housing.

We contribute to a growing literature on the financial inclusion of low-income minority homeowners. We establish that minority households that transition to homeownership through HUD's program realize wealth gains that are significantly smaller than White households. We observe that changes in the labor supply, neighborhood quality, financial fragility, PHA quality, and timing significantly influence the wealth gains of minority homeowners. Our findings are consistent with a recent body of evidence that suggests that households' race, timing, and neighborhood selection influences the benefits to homeownership (Newman and Holupka 2016; Wainer and Zabel 2020). Collectively, our results suggest that homeownership may not reduce racial disparities in wealth for low-income households.

We add to a deep empirical literature that studies the (often unintended) consequences of government housing policies that are targeted toward low-income families. Though these government housing intervention programs are intended to help low-income families to become more self-sufficient, it remains an open question whether the programs actually improve the financial viability of low-income households. In particular, the HCV Homeownership program is race-neutral, and consequently, it is not explicitly structured to address racial disparities in wealth or in mortgage and housing markets. It follows that understanding the ways in which homeownership can affect the ability of different households to accumulate wealth is essential in determining whether a policy serves the interest of economically and socially disadvantaged households.

Our longitudinal study sheds new light on how the interaction of race and homeownership can significantly increase disparities in the wealth

[2] See HUD's stated research priorities in goals 1 and 4: https://www.huduser.gov/portal/rp/research-priorities.html.

[3] See, for example, Collinson and Ganong (2018), Eriksen and Ross (2013), and Reeder (1985), among many others.

accumulation of low-income households. Thus, we provide additional evidence that the wealth gains of homeownership and economic outcomes, more generally, can systematically vary by households' race.[4] Similarly, our study is related to the recent literature that examines racial differences in the delivery of financial services. Specifically, we investigate whether government intervention can alleviate disparities investigated by other studies, such as mortgage approval rates and costs, car lending, and rent control (Diamond, McQuade, and Qian 2019; Ambrose, Conklin, and Lopez 2021; Bartlett et al. 2022; Bhutta and Hizmo 2021; Bhutta, Hizmo, and Ringo 2021; Butler et al. 2021; Giacoletti, Heimer, and Yu 2021).

In the following sections, we provide an overview of the HCV Homeownership Program, develop our hypotheses, discuss our data and empirical methodology, report our findings, and conclude.

1. Background on the HCV Homeownership program

In this section, we provide background information on HUD's HCV Homeownership program. First, we discuss how the program began and operates. Then we close by discussing the demographics of the households that take up mortgage assistance.

1.1 History of the HCV Program

The HCV program was introduced in response to the Great Depression when Congress enacted the U.S. Housing Act of 1937, which provided funding for HUD's local Public Housing Agencies (PHAs) to build and maintain housing for low-income residents. The current Section 8(y) HCV Program was introduced in 1974.[5] HCV assistance was initially limited to rental assistance until the Quality Housing and Work Responsibility Act of 1998 allowed HUD to consider providing assistance for homeownership. After a successful pilot study of 15 PHAs in 1999, the HCV Homeownership Program Final Rule 24 CFR § 982.625 was issued, effective October 12, 2000. In addition to providing low-income households with housing assistance for rental payments, this program provides eligible low-income households with assistance for mortgage payments and homeownership expenses.

The HCV program marked a shift in philosophy from providing government funds to operate and maintain housing for low-income households to providing assistance for rent payments for private housing in the

[4] Studies of racial differences in economic outcomes include Blanchflower, Levine, and Zimmerman (2003), Bertrand and Mullainathan (2004), Huffman and Cohen (2004), Lusardi, Michaud, and Mitchell (2017), and Chetty et al. (2020), among others.

[5] The U.S. Housing Act of 1937 was first amended in 1961 to create the Section 23 Leased Housing Program, which was then replaced by the Section 8(y) Housing Choice Voucher Program in 1974.

open market. Since October 2000, PHAs have also had the ability to offer housing assistance for homeownership with the Housing Choice Voucher Homeownership (HCV Homeownership) Program. PHAs are not required to offer an HCV Homeownership program. As of 2017, 671 of 3,300 (20%) of PHAs have active HCV Homeownership Programs. HUD funding does not designate whether the money should go toward rental or homeownership vouchers, and PHAs are not allowed to have separate budgets for the programs.

HUD reports that nearly 1.9 million low-income households participated in an HCV assistance program as of November 30, 2020.[6] Compared with the HCV tenant-based program, households in the HCV Homeownership program are more likely to be larger (2.7 members vs. 2.3) and have a higher average monthly total tenant payment (TTP) ($535 vs. $353). Furthermore, the heads of these households are less likely to be Latino (13% vs. 18%), more likely to be White (52% vs. 47% for the tenant-based program), and less likely to be Black (44% vs. 48%).

1.2 How does a household join the program?

The manner in which the HCV Homeownership Program implements homeownership assistance presents an excellent framework to identify the causal effect of homeownership on wealth accumulation for households with low incomes. PHAs are legally required to offer HCVs for rental assistance, but they have the option to provide them for homeownership assistance. If they do not offer HCVs for homeowners, then homeownership assistance is not available at the PHA through Section 8(y). Moreover, HUD guidelines do not designate how PHAs should allocate HCV funds between the rental and homeownership programs, nor do they permit the agencies to set aside a certain amount of funding for either program, ensuring that selection into the programs is not driven by agency funding decisions but by household choices. This is important for our study because the PHA determines access to the program, and the choice to participate in the program is determined by the household.

We observe households for their entire interaction with the HCV program, both before and after receiving a homeownership voucher. To be eligible for HCV Homeownership assistance, households must currently participate in the rental voucher program or meet eligibility standards for the HCV program. Assistance is intended for first- time homebuyers (those who have not owned a home in the past 3 years) and households with at least one disabled family member. Furthermore, the participants must not have previously defaulted on a mortgage, while receiving homeownership assistance, must be employed full-time, meet minimum

[6] As reported on the HUD "Resident Characteristics Report" website under the "All Voucher Funded Assistance" on December 16, 2020. See https://pic.hud.gov/pic/RCRPublic/rcrmain.asp

income requirements, and attend prehomeownership counseling.[7] Within HUD guidelines, PHAs have flexibility about which families to deem eligible for the HCV Homeownership Program. For example, some agencies focus on disabled residents, and others allow all first-time homebuyers (including disabled households) to be eligible.

HCV Homeownership Programs typically target first-time homeowners, have minimum income requirements, which are lower for disabled households, and require households to complete financial and homeownership counseling. Specifically, the program requires that households must be served by a PHA that administers a homeownership voucher program, have at least 2 years of continuous employment, participate in credit counseling, and qualify for mortgages that meet the underwriting standards of the participating lenders. Important for our study, the same maximum subsidy level exists for all households receiving an income-based HCV, regardless of whether they use the assistance for rental or mortgage payments. Also important, HUD has stringent definitions, reporting requirements, and verification processes for income and assets. For example, HUD considers an asset to be any item of value that may be turned into cash, excluding necessary personal property (e.g., primary home, personal-use car), and requires households to report the net cash value of their assets. Using HUD's well-defined asset data, supplemented with inferred liabilities and home equity from PSID and Zillow, we are able to examine wealth accumulation that is a direct result of homeownership as the households change from receiving a rental voucher to receiving a homeownership voucher.

Identification is a key advantage of our economic setting. Specifically, we overcome the typically unobservable confounding effects by looking at wealth changes within households as they transition from renters to homeowners. For example, in other settings (like with the PSID studies), one would need to make reasonable assumptions about how a household might alter its saving and working behavior - but with our study, we directly observe if the "treated" households experience changes in savings and income. Because of our rich data set and the programs' mandates, we are able to hold constant many of the confounding effects present in the literature.

1.3 How does a homeownership voucher differ from a rental voucher?

The amount of HCV Homeownership subsidies or Housing Assistance Payments are calculated by the PHA. To understand the Housing Assistance Payments, we first define some terms. The payment standard is

[7] At least 75% of the households receiving HCV assistance from a PHA must have income less than or equal to 30% of the HUD-determined median income for the area. Households with income greater than 50% of the median income are ineligible. Prehomeownership counseling includes information about financing and credit, household budgets, and home maintenance. See the HUD website for more information about the HCV Homeownership Program (https://www.hud.gov/program_offices/public_indian_housing/programs/hcv/about/fact_sheet).

the PHA-determined, maximum amount of subsidy before any renter contribution. Per HUD's Housing Choice Voucher Guidebook, most PHAs establish the payment standard as 90%-100% of the 40th percentile of the Fair Market Rent (FMR). The total tenant payment (TTP) is the minimum amount the renter or homeowner is responsible to pay toward housing costs. TTP is usually calculated as the higher of 30% of a household's monthly adjusted income or 10% of the household's monthly income (HUD 2019). The PHA determines the Housing Assistance Payments as either the payment standard minus TTP or the total homeownership expenses minus TTP, whichever is lower. Both the rental and homeownership voucher programs use the same payment standard. However, for the Homeownership Voucher option, the payment standard will not decline below the level determined at the time of the home purchase. In this regard, the manner in which the HCV Homeownership Program implements homeownership assistance presents an excellent framework to identify the causal effect of homeownership on wealth accumulation for households with low incomes.

The homeownership voucher and the rental voucher differ in several ways that may affect our study. First, households still have a minimum tenant payment, but they have a minimum subsidy from HUD. That minimum is 70% of fair-market rent within an area. There are also allowances made for additional homeownership expenses, such as maintenance and utility expenses. Households that participate in this program will have an incentive to report their wages, income, and earnings more comprehensively than when they had rental vouchers since these increased assets and income are helpful as they shop for mortgages. Given this potential for changes in reporting behavior, we check for any bunching of assets at $5,000. However, we fail to find evidence of any misreporting behavior. Finally, the homeownership voucher represents a significant commitment from HUD for 10 to 15 years of mortgage support, as long as the annual recertifications confirm the program requirements are met.

2. Theoretical Background

Considerable evidence shows that homeownership can increase households' financial flexibility, civic engagement, and social capital (see, e.g., Galster and Santiago 2008; Green and White 1997; Coulson and Li 2013, among many others). However, the evidence that homeownership facilitates wealth gains for low-income households is relatively limited. Using PSID to perform a longitudinal study of homeownership, Turner and Luea (2009) find that homeownership increases wealth amongst low- to middle-income households. Furthermore, researchers have argued that homeownership can encourage neighborhood improvements that are particularly valuable in low-income areas (Shlay 2006).

While the studies mentioned above suggest that homeownership can help low-income households to accumulate wealth, recent evidence indicates that these wealth benefits do not uniformly accrue across all low-income households. In particular, recent longitudinal studies that also use the PSID suggest that the year in which a home is purchased significantly influences whether the purchase is worthwhile for low- income households (Wainer and Zabel 2020) and that many first-time Black homebuyers experience reductions in their net wealth (Newman and Holupka 2016). Thus, this recent work establishes that purchasing a home may not reduce disparities in wealth for low-income households and that discrimination in access to housing and mortgage markets has the potential to deepen racial disparities in wealth amongst minority low-income homeowners.

Having established that the literature does not offer a clear prediction as to whether we should expect purchasing a home to increase or decrease the wealth accumulation of low-income households, we next develop our hypothesis of how access to the homeownership voucher can affect the wealth of participating households.

2.1 Why would utilizing a homeownership voucher affect the wealth of low-income households?

As discussed in the previous section, the HCV Homeownership Program is intended to help low- income households to avoid many frictions that have been shown to reduce homeowners' wealth. Accordingly, the few HUD-sponsored studies that evaluate the HCV program suggest that the programs' interventions help households avoid costly homeownership decisions (see Abbenante et al. 2006; Locke et al. 2006). For example, the studies show that participating households had low foreclosure and default rates and moved to marginally better neighborhoods with less poverty and more single-family homes.[8] The evidence that the HCV program can help households avoid costly homeownership frictions has clear implications for wealth accumulation, which we discuss below.

One implication of the HUD-sponsored studies is that participating households would experience improvements in wealth relative to their tenure as renters, as the evidence indicates that the homeowners were better able to steer clear of defaults and foreclosures. However, the HUD-sponsored studies do not directly assess the participants' wealth outcomes, which is the central focus of our study. Thus, the previously discussed literature on the wealth effects of homeownership amongst low-income households and the HUD-sponsored studies motivate our first hypothesis:

[8] While not evaluating the program's effectiveness, Strozier's (2019) study of 10 families that were considering using the HCV Homeownership option found that they felt positively about homeownership. However, she also found that the prospective participants did not have adequate information about the program.

Hypothesis 1: Homeowners who participate in the homeownership program experience increases in wealth during their tenure as homeowners relative to their tenure as renters.

We also note that because the program is intended to be race-neutral, another implication of the HUD-sponsored studies is that the homeownership program may not address the persistent differences in the wealth outcomes between minority and White households that can arise due to discrimination in housing and mortgage markets. We discuss this important and unintended consequence of the homeownership program next.

2.2 Why would minority homeowners have different outcomes?

The HCV Homeownership Program may not reduce racial disparities in wealth amongst low- income homeowners. Since the appreciation of house prices, which is integral to wealth accumulation, can vary by the racial composition of neighborhoods, minority households that utilize a homeownership voucher may be retaining homes that appreciate at lower rates. Consistent with this mechanism, a growing body of scholarship establishes that the households' race influences the benefits of homeownership (see, e.g., Emmons 2017; Johnson and Shapiro 2013). Using PSID data, Newman and Holupka (2016) find that first-time Black home buyers routinely saw reductions in net wealth, which the authors attribute to Black home buyers purchasing in predominantly Black neighborhoods that see little or no appreciation in value. Though not the main focus of their study, Wainer and Zabel (2020) also use PSID data and find evidence consistent with Black homeowners experiencing lower wealth gains as compared to White homeowners. The PSID evidence establishes that homeownership can amplify racial disparities in wealth.

The racial disparities documented in the PSID studies are corroborated by a study of 10 households in the Denver-based Home Ownership Program conducted by Santiago et al. (2010). The authors report that the wealth gains of households that participated in the Denver-based HCV program depended on the racial makeup of the neighborhoods and the time period during which the home was purchased. The anecdotal evidence shows that the wealth benefits of the HCV program can be limited for minority homeowners. Moreover, recent literature has documented racial discrimination in financial services vital to home buying and wealth accumulation. Specifically, evidence indicates that minorities have lower mortgage approval rates when purchasing a home, particularly before end-of-month quotas constrain lenders' subjectivity (Giacoletti, Heimer, and Yu 2021). Other studies suggest that minorities pay higher mortgage interest rates and higher fees (Ambrose, Conklin, and Lopez 2021; Bartlett et al. 2022). Thus, the

financial services, homeownership, and the PSID studies discussed above motivate our second hypothesis:

> Hypothesis 2: Minority homeowners who participate in the homeownership program experience lower increases in wealth relative to their tenure as renters than White homeowners who make a similar transition into homeownership.

Below, we discuss the channels through which the wealth outcomes of participating households can be affected: financial fragility, labor market supply, neighborhood selection, the quality of the local PHA, timing, and household-specific factors. We outline what our hypothesis predicts for each.

2.3 Channels for wealth: Financial fragility

As discussed in Section 2, although the HCV Homeownership Program requires that participating households meet minimum income requirements, there is significant variation in the income and housing costs of households that utilize homeownership vouchers. It follows that some households in our sample are likely to be more financially fragile than others. All else equal, financial fragility can significantly influence households' wealth accumulation in a number of ways. One possibility is that financial fragility could reduce a household's "financial cushion," which would lead the household to spend a greater proportion of its nonhousing wealth to cover expenses. In other words, financial fragility may directly reduce households' wealth accumulation. A telling example of this mechanism can be found in Lusardi, Schneider, and Tufano (2011), who provide survey evidence that 19% of U.S. households say they would meet the unexpected financial burden of coming up with $2,000 in 30 days "at least in part by selling or pawning possessions or taking payday loans" (p. 84). Another possibility is that financially fragile households may find it more difficult to maintain other financial obligations due to their mortgage costs. For example, a financially fragile household that is "overextended" given its income and housing expense may end up accumulating credit card debt or other debts as it pays for its nonhousing expenses. In this example, the accumulation of the nonmortgage debt would reduce household wealth.

Hence, we predict that when households transition from renters to homeowners, more financially fragile households will have lower wealth accumulation than less financially fragile households.

2.4 Channels for wealth: labor market supply

The households that utilize homeownership vouchers may experience gains in wealth relative to their tenure as renters if they increase their

labor supply as homeowners and reduce their nonhousing expenditures in order to pay their mortgages. The intuition is that homeowners may be willing to incur sacrifices to maintain ownership of their homes (i.e., increasing their labor supply and decreasing nonhousing expenditures) that they may be less willing to experience as renters. Recent evidence presented in Bernstein and Koudijs (2021) highlights the importance of this channel in facilitating the wealth accumulation of first-time home buyers. To study the effects of mortgage amortization on the wealth accumulation of first-time homebuyers, the authors make use of a 2013 policy change in the Netherlands that increased access to amortizing mortgages. The authors find that mortgage amortization led to little change in homeowners' liquid wealth (i.e., nonhousing financial assets) but produced nearly one-to-one increases in wealth accumulation. The results demonstrate that in order to make mortgage payments, homeowners can increase their labor supply. Within our setting, the increased labor supply could increase wage income or result in a nonworking adult within the household entering the labor market.

Thus, their findings predict that we would observe households increasing their labor market supply when they transition from renters to homeowners.[9]

2.5 Channels for wealth: neighborhood selection

In studies examining household wealth determinants, home equity typically plays an important role (Haurin and Rosenthal 2004; Poterba, Venti, and Wise 2011; Bernstein and Koudjis 2021, among others). Poterba, Venti, and Wise (2011) estimate that home equity accounts for approximately 25% of wealth at retirement. Rappaport (2010) examines the effectiveness of homeownership in wealth accumulation and finds that neighborhood quality affects the value of homes and hence the value of home equity. The literature also suggests that Black homeowners tend to purchase homes in neighborhoods that do not appreciate as much as neighborhoods where White homeowners purchase (Newman and Holupka 2016).

Hence, we expect that higher neighborhood quality will lead to better wealth outcomes but that minority households will experience a smaller wealth benefit relative to White households.

[9] We note that in anticipation of buying a home, households have a stronger incentive to report their income and financial assets, as compared to their reporting incentives as renters. As discussed in the previous section, unlike rental assistance, which adjust to changes in households' income annual income (i.e., decreasing as income increases), the level of homeownership assistance is fixed at the time of entry. In other words, because homeownership assistance does not decline in response to increased income, as is the case with HUD's rental assistance, households that transition to homeownership have a stronger incentive to increase their earnings. While this change in reporting incentives has the potential to confound the labor supply channel, as discussed in the introduction, we do not find evidence of strategic misreporting.

2.6 Channels for wealth: Quality of the local housing authority

There may exist significant variation in the capacity of the PHAs to "treat" households by offering the ownership voucher. In other words, the program's effectiveness may vary considerably by the organizational capacity of the local housing authority. Implementing the program requires considerable commitment of a local housing authority's personnel resources and coordination across many stakeholders that are external to HUD, including banks, other government agencies, and real estate agents. Given that some housing authorities are better resourced than others, we would expect the effectiveness of the program to vary by the organizational quality of each housing authority.

Thus, we expect that households that engage with better-resourced or more experienced housing authorities will have better wealth outcomes, holding all else equal.

2.7 Channels for wealth: Timing

Recent research has suggested that when a home is purchased significantly influences households' wealth accumulation. Using PSID data from the 1984 to 2013 survey waves, Wainer and Zabel (2020) find that renters who bought homes in the 1990s later experienced wealth gains, but renters who bought their homes from 2001 to 2007, just prior to the financial crisis, did not. Also, using PSID data, Newman and Holupka (2016) find that timing influenced the benefits for many first-time homebuyers and that the benefits significantly vary by race. Specifically, the authors show that first-time Black homebuyers that purchased during the subprime period typically lost more than twice the wealth that White first-time homebuyers lost. Finally, in a study of 15 metropolitan areas, Immergluck, Earl, and Powell (2019) use HMDA data to study the recovery of home prices from 2012 to 2017. They report that Black and Latino homebuyers experienced higher house price appreciation than White homebuyers in strong housing markets and lower appreciation rates in weaker markets. Collectively, the studies demonstrate that timing can significantly influence the wealth gains for homebuyers, particularly for minority homebuyers. Thus, the studies motivate our final prediction that, all else equal, the wealth gains of homeownership vary by when households transition to homeowners.

2.8 Channels for wealth: Household-specific factors

We note many other observable and unobservable time-invariant characteristics that can affect a household's wealth accumulation. We address these factors by including household fixed effects to hold constant the time-invariant characteristics that likely affect wealth accumulation.

3. Data

3.1 Wealth

The topic of accurately measuring wealth has been at the center of recent debates, particularly about wealth inequality. Smith, Zidar, and Zwick (2020) find that measurements of wealth, particularly of the wealthiest Americans, vary significantly by the estimation method. Therefore, to accurately assess the wealth benefits to homeownership, we must take great care in our definition of wealth. HUD data provide verified data on income but are less thorough with wealth data. Hence, we next discuss the process by which this study measures wealth for our sample.

The literature describes three methods to measure wealth (Kopczuk 2015, Smith, Zidar, and Zwick 2020):

1. Using data collected from estate tax filings and statistics about population mortality to create estimates of the wealth of living descendants (Mallet 1908; Kopczuk and Saez 2004);
2. Capitalizing income reported on tax returns to infer wealth (Giffen 1913; Stewart 1939; Saez and Zucman 2016; Smith, Zidar, and Zwick 2020);
3. Using wealth as reported in surveys like Panel Study of Income Dynamics (PSID) (Wolff 1998; Turner and Luea 2009, Bricker et al. 2016; Newman and Holupka 2016; Wainer and Zabel 2020).

This study uses the third method of wealth determination because it is the most appropriate for our sample of low-income residents for whom estate tax filings and tax returns may be less informative. Our primary data source is data reported on Form-50058 and aggregated in HUD's PIC database. As mentioned previously, one limitation of the Form-50058 data from HUD is that we observe liquid financial assets, but not liabilities and home equity. As home equity is a significant source of a homeowner's wealth, we supplement our HUD assets data with imputed home equity using Zillow's Home Value Index (ZHVI). However, a limitation to our wealth measurement is that it omits liabilities other than the home mortgage. To address this concern, we collect average credit card debt and family debt for low-income households from PSID to discern whether any wealth effects are robust to average levels of revolving and family debt. We take care to validate the assumptions within our measures of wealth. Specifically, we examine whether households that become homeowners experience changes in wealth accumulation relative to their tenancy as renters. Although public housing officials verify income and family composition with the Social Security Administration and the Internal Revenue Service, landlords are the primary parties responsible for verifying a household's assets. One concern is that

households may have incentives to misreport their assets. That is, there may be measurement error of financial assets that could also add noise to the wealth that we observe. For example, if households have an incentive to underreport their assets as renters, but not as homeowners, then when households transition to homeowners, we may observe mechanical changes in wealth that are simply due to the better reporting of assets.

As discussed in the introduction, we assess whether the potential misreporting is correlated with being a homeowner versus a renter by examining assets around an internal HUD reporting threshold that may influence the reporting of assets. For reported assets that exceed $5,000, HUD adds either the actual income received from the assets or 2% of the assets' value to total income. Therefore, assets over this threshold have the potential to reduce the amount of support for households that have rental vouchers. However, because of the program structure to continue mortgage support, this threshold is less relevant for homeownership voucher holders. We investigate whether there is a bunching of assets around this $5,000 threshold but find no evidence of misreporting of assets.

The literature shows that households have different levels of wealth based on unobserved factors, such as propensity to plan and "mental accounting" (Bernheim, Skinner, and Weinberg 2001; Ameriks, Caplin, and Leahy 2003). Therefore, our empirical design includes household fixed effects, which should mitigate this concern.

3.2 HUD data

Data on household characteristics and housing expenses are recorded in the Family Report (HUD Form-50058), administered annually by HUD's Office of Public and Indian Housing. Since 1993, complete and accurate annual submissions of HUD Form-50058 are required for a household to begin or continue participation of any kind in a HUD housing program. To align with the introduction of the homeownership voucher option, we requested and received uniquely anonymized household-level panel data for all agency, background, asset, income, total tenant payment, and residence characteristics reported in Sections 1, 3–9, 12, and 15 of HUD Form-50058 from January 2000 to December 2020 through a data license agreement with HUD.

In Sections 1 and 3–5, households report details about the age, race, and ability status of all individuals in the home, information about the household's current and prior addresses, and indicators for the type (style) and condition of the residence.

In Section 6, households report the net cash value of assets belonging to all individuals in the home, as well as any anticipated income from those assets. HUD considers an asset to be any item of value that may be turned into cash, excluding necessary personal property (e.g., personal-

use car, primary home). Common assets are savings and checking accounts, stocks, bonds, and other security investments, retirement accounts, and business equipment. Less typical assets include annuities, lump-sum settlements, trusts, and rental property. Households with assets that have a total net cash value of more than $5,000 are required to impute an annual asset income and add these anticipated earnings to their expected income calculations. Households with assets totaling less than $5,000 in net cash value have an imputed asset income of $0.

In Section 7, households report annual income from wages, welfare assistance, social security and social security insurance, pensions, and other sources (e.g., child support, Indian trust, unemployment benefits) for all adult individuals in the home. Reported incomes do not include benefits from the Supplemental Nutrition Assistance Program or income earned by a live-in aide.

HUD regulations mandate a strict multistep process to verify the accuracy and completeness of a household's asset and income reporting.[10] Self-reported wage income is validated against quarterly wage income reported on HUD's Enterprise Income Verification System (EIV). Self-reported nonwage income is supported with third-party documentation (e.g., check stubs, account statements) and validated by either the property owner for households receiving rental HCVs or the PHA for households receiving homeownership HCVs. Property owners have the same mandate as voucher recipients to accurately and completely verify all income sources. Moreover, property owners that fail to comply with HUD's reporting and verification mandates risk losing their ability to collect housing assistance payments from HUD. Accordingly, we expect that data on assets and income are reasonably accurate and are not significantly underreported.

Section 9 of HUD Form-50058 addresses an essential purpose of the annual family report, calculating a household's TTP obligation for the upcoming calendar year. TTP amounts are the portion of rental (mortgage) payments that households are responsible for contributing; HUD covers the remaining balance up to a preapproved fair market rate. TTP amounts are typically 30% of a household's adjusted gross income.

In Section 12, PHAs indicate basic characteristics about the units that tenant-based HCV recipients occupy (e.g., housing type and number of bedrooms), itemize the unit's utility allowance and gross rents, and indicate whether the household has relied on HCV portability to relocate to the PHA's jurisdiction. In Section 15, PHAs indicate new homeowner HCV relocations, detail whether the household has relied on HCV portability to relocate to the PHA's jurisdiction, and itemize the home's

[10] See the HUD Occupancy Handbook 5-1 6/07, chapter 5: Determining Income & Calculating Rent (available at https://www.hud.gov/sites/documents/DOC_35649.PDF).

utility allowance, maintenance and major repair allowances, HOA assessments, and gross homeownership expenses.

3.3 PSID

We utilize the PSID data to supplement our wealth measures because it samples a population that can provide useful information to estimate liabilities for the families included in the HUD data. The PSID was originally started in 1968 by the University of Michigan's Survey Research Center to study poverty and has a large number of low-income and Black families, making it an excellent source for wealth information with our low-income population sample (Cooper, Dynan, and Rhodenhiser 2019). Since the original 1968 sample of PSID families included few immigrants, a sample of Latino immigrants was added to the PSID in 1990. These new families are also represented in our sample.

PSID is not the only survey used in the literature to estimate wealth. The Survey of Consumer Finances (SCF) is an alternate source, but its characteristics make it less appropriate for our study. The main shortcoming is that it is a cross-sectional rather than longitudinal study. Since new families are selected in each wave, we would be unable to observe trends in wealth accumulation. The second shortcoming of SCF for our sample stems from its oversampling of high-income households. Although the highest-earning Forbes 400 are omitted by design, the SCF still has an abundance of high-income families. There are also concerns that because the surveys are self-reported, wealthy families may value privacy and be reluctant to report wealth accurately (Smith, Zidar, and Zwick 2020). By using PSID to estimate average credit card and family loan debt, we escape many of these issues and are able to investigate the mechanisms of any wealth accumulation amongst our sample of low-income households.

3.4 Zillow

To estimate the value of the home equity, we utilize Zillow's monthly ZIP-code-level of home values, Home Value Index (ZHVI). Since November 2019, ZHVI's values were retroactively recomputed using weighted averages to provide an accurate assessment of the market as a whole, including improvements made to existing housing. These new data provide us with an accurate measure of home appreciation to estimate home equity values.

3.5 Data set construction

We received anonymized data about households participating in the Housing Choice Voucher through HUD's data license program encouraging research. These data were collected via HUD's Form- 50058

and reside in HUD's PIC database. Our initial data set begins with 21,700 individual households that have participated in the HCV Homeownership program, covering 274,764 household-years from 2000 to 2020. To be able to obtain meaningful changes between time as renters and homeowners, we require each household to have a minimum of 3 years of observations, including at least 2 years as a renter in the HCV program. We also exclude households participating in other programs, such as Move to Work and Renovation Vouchers. Similarly, because pension, Medicare, and Social Security payments may contribute to wealth accumulation and confound the wealth effects of homeownership, we further limit the sample to heads of households that are below the earliest age to receive Social Security payments, 62 years old.[11] The final sample includes 16,699 unique households and 209,929 household-years and spans 2002 to 2020.

We report household, neighborhood, and PHA demographics in Table 1. Although the table shows statistics by renter and homeowner in panels B and C, respectively, recall that all households are homeowners at some point during the study period. Therefore, the full sample demographics reported in panel A provide some knowledge about the families that apply for and receive vouchers for homeownership under the HCV Homeownership program. The median household has two children under the age of 18 and is headed by a woman. The median household has an annual income of $18,100, primarily from wages. Since many PHAs prioritize households that include at least one disabled member, it is not surprising that we observe 29% of our sample as households with a disabled member. Finally, 63% of the households are headed by a racial or ethnic minority, and 37% are.

The univariate data provide support for our first hypothesis, that homeownership provides increases in wealth for low-income households. In panel A, the mean (median) household wealth increases from $1,400 ($0) as renters to $23,400 ($9,600) as homeowners. In panels B and C, we also find support for our second hypothesis, that minorities experience lower increases in wealth after purchasing a home than their White counterparts. Note that panel B reports demographics for households' last year as a renter, while panel C reports demographics for all of the years in which households are homeowners. Panel B indicates that prior to becoming homeowners, the mean (median) White household has a higher level of cash assets than their minority counterparts: $3,600 ($355) and $1,400 ($20), respectively. Panel C shows that this difference continues after the transition to homeownership, where White households have higher cash and home equity values. Taking the difference in wealth reported in panels B and C reveals that after participating in the HCV Homeownership

[11] Note that 62 years of age is also the HUD designation for "elderly head of household."

Table 1
Household, neighborhood, PHA demographics

	All households				All renters				All homeowners				$Diff_{W-M}$
	Count	Mean	P50	SD	Count	Mean	P50	SD	Count	Mean	P50	SD	Mean
Table 1 A. *All households by tenure*													
Households													
Renter tenure	209,931	7.048	6.000	3.877	102,881	8.405	8.000	4.149	107,050	5.745	5.000	3.076	2.660***
Homeowner tenure	209,931	7.829	7.000	4.394	102,881	6.215	5.000	4.017	107,050	9.379	10.000	4.177	−3.164***
HCV homeowner	209,931	0.510	1.000	0.500	102,881	0.000	0.000	0.000	107,050	1.000	1.000	0.000	−1.000
Minority	208,849	0.627	1.000	0.483	101,811	0.647	1.000	0.478	107,038	0.609	1.000	0.488	0.038***
Age of HoH	209,931	40.251	39.000	9.650	102,881	36.543	35.000	9.039	107,050	43.814	43.000	8.842	−7.271***
Children (n)	209,931	1.801	2.000	1.687	102,881	2.052	2.000	1.640	107,050	1.560	1.000	1.695	0.492***
Disability	209,931	0.293	0.000	0.455	102,881	0.247	0.000	0.431	107,050	0.337	0.000	0.473	−0.090***
Gender of HoH	209,930	0.832	1.000	0.374	102,880	0.837	1.000	0.369	107,050	0.827	1.000	0.378	0.010***
Wage earners (n)	209,931	0.753	1.000	0.620	102,881	0.699	1.000	0.573	107,050	0.804	1.000	0.659	−0.104***
Δ Wage earners (n)	189,287	0.019	0.000	0.447	83,719	0.033	0.000	0.463	105,568	0.008	0.000	0.433	0.026***
Wage ernr./hshld. (%)	209,931	27	25	27	102,881	23	25	23	107,050	30	25	30	−7***
Income & expenses													
Annual income	209,931	20,276	18,063	13,139	102,881	16,346	14,959	9,997	107,050	24,052	21,988	14,608	−7,707***
Annual wages	209,931	14,962	13,416	15,354	102,881	11,712	10,785	11,738	107,050	18,086	17,680	17,607	−6,374***
Δ Annual wages	189,287	1,139	0	8,948	83,719	1,427	0	8,137	105,568	912	0	9,537	515***
Tenant rent pmnt.	102,881	269	229	227	102,881	269	229	227	0	.	.	.	
Homeowner pmnt	106,830	834	757	389	0	.	.	.	106,830	834	757	389	
Wealth													
Other asset value	209,928	2,879	85	21,920	102,881	1,371	0	15,020	107,047	4,329	357	26,854	−2,958***
Home equity	99,679	20,486	9,157	43,537	0	.	.	.	99,679	20,486	9,157	43,537	
Wealth	209,931	12,606	497	40,313	102,881	1,371	0	15,020	107,050	23,404	9,630	52,271	−22,034***
Neighborhoods													
Income/PC	209,931	41,131	39,650	11,241	102,881	37,768	36,434	10,039	107,050	44,364	42,859	11,385	−6,597***
Employment rate	209,931	61.313	61.421	13.542	102,881	61.251	61.211	13.717	107,050	61.373	61.469	13.371	−0.121**
SFD prcnt	207,386	53.847	56.735	24.021	100,770	47.308	49.561	23.263	106,616	60.028	63.252	23.071	−12.719***
Share white	207,518	59.294	66.324	31.789	100,880	57.549	63.714	31.996	106,638	60.945	69.248	31.504	−3.396***
OOR prcnt	207,518	68.997	74.625	27.474	100,880	70.701	81.031	29.653	106,638	67.385	70.968	25.135	3.317***
Pvrty prcnt	207,500	19.611	16.317	13.680	100,883	19.922	16.436	13.949	106,617	19.317	16.186	13.415	0.605***

PHAs													
PHA utlzn	156,146	93.410	95.263	8.201	71,956	93.594	95.505	8.464	84,190	93.252	95.029	7.967	0.342***
PHA TotN (hshld)	156,146	5,803	2,571	9,270	71,956	5,930	2,507	9,951	84,190	5,693	2,654	8,643	237***
PHA TotHAP (M)	125,171	44.525	15.662	85.777	48,617	46.481	15.046	95.139	76,554	43.284	16.547	79.234	3.197***
Purchase timing													
Boom	48,214	1.000	1.000	0.000	14,801	1.000	1.000	0.000	33,413	1.000	1.000	0.000	
Bust	96,592	1.000	1.000	0.000	42,369	1.000	1.000	0.000	54,223	1.000	1.000	0.000	
Recovery	65,125	1.000	1.000	0.000	45,711	1.000	1.000	0.000	19,414	1.000	1.000	0.000	

Table 1 B. *As renters by race, one year before homeownership*

	All renters				White renters				Minority renters				Diff_{W-M}
	Count	Mean	P50	SD	Count	Mean	P50	SD	Count	Mean	P50	SD	Mean
Households													
Renter tenure	15,577	6.439	6.000	3.629	5,832	6.023	5.000	3.555	9,713	6.701	6.000	3.649	−0.678***
Minority	15,545	0.625	1.000	0.484	5,832	0.000	0.000	0.000	9,713	1.000	1.000	0.000	−1.000
Age of HoH	15,577	39.441	38.000	9.114	5,832	40.506	39.000	9.601	9,713	38.805	37.000	8.751	1.701***
Children (n)	15,577	1.969	2.000	1.652	5,832	1.856	1.000	1.949	9,713	2.032	2.000	1.434	−0.176***
Disability	15,577	0.291	0.000	0.454	5,832	0.422	0.000	0.494	9,713	0.212	0.000	0.409	0.210***
Gender of HoH	15,576	0.829	1.000	0.377	5,832	0.703	1.000	0.457	9,713	0.904	1.000	0.295	−0.200***
Wage earners (n)	15,577	0.823	1.000	0.565	5,832	0.728	1.000	0.604	9,713	0.878	1.000	0.528	−0.150***
Δ Wage earners (n)	15,001	0.054	0.000	0.411	5,617	0.039	0.000	0.384	9,355	0.063	0.000	0.426	−0.024***
Wage ernr./hshld. (%)	15,577	27	25	24	5,832	25	20	27	9,713	28	25	22	−3***
Income & expenses													
Annual income	15,577	21,908	20,836	10,726	5,832	19,677	18,116	10,360	9,713	23,258	22,397	10,722	−3,581***
Annual wages	15,577	16,763	17,686	13,457	5,832	13,436	12,775	13,281	9,713	18,739	19,758	13,142	−5,302***
Δ Annual wages	15,001	2,478	108	8,037	5,617	2,041	0	6,864	9,355	2,735	500	8,655	−694***
Tenant rent pmnt.	15,577	387	350	253	5,832	340	299	233	9,713	415	382	260	−74***
Wealth													
Other asset value	15,577	2,211	118	11,195	5,832	3,602	355	16,480	9,713	1,380	20	6,007	2,221***
Wealth	15,577	2,211	118	11,195	5,832	3,602	355	16,480	9,713	1,380	20	6,007	2,221***
Neighborhoods													
Income/PC	15,577	40,136	38,470	10,650	5,832	38,741	37,358	10,039	9,713	40,992	39,160	10,921	−2,250***
Employment rate	15,577	61.529	61.797	13.423	5,832	57.463	56.336	13.251	9,713	63.966	64.092	12.928	−6.502***
SFD prcnt	15,366	50.200	52.545	23.174	5,729	50.938	54.893	22.552	9,605	49.763	51.163	23.533	1.175***
Share white	15,373	59.274	66.000	31.469	5,733	83.164	89.983	17.887	9,608	44.994	45.157	29.075	38.169***
OOR prcnt	15,373	69.321	76.481	28.862	5,733	82.610	95.398	23.172	9,608	61.357	65.216	28.990	21.252***
Pvrty prcnt	15,374	19.526	16.415	13.297	5,732	17.810	13.693	14.304	9,610	20.563	18.351	12.555	−2.753***

(continued)

Table 1
Continued

Table 1 B. *As renters by race, one year before homeownership*

	All renters				White renters				Minority renters				$Diff_{W-M}$
	Count	Mean	P50	SD	Count	Mean	P50	SD	Count	Mean	P50	SD	Mean
PHAs													
PHA utlzn	12,430	93.748	95.494	7.410	4,647	94.845	96.273	6.556	7,759	93.088	94.741	7.804	1.757***
PHA TotN (hshld)	12,430	5,713	2,512	8,839	4,647	5,152	1,277	10,235	7,759	6,050	3,113	7,871	−898***
PHA TotHAP (M)	9,132	42.544	14.437	83.184	3,400	44.956	7.325	105.328	5,725	41.137	18.420	66.663	3.820**

Table 1 C. *As homeowners by race.*

	All homeowners				White homeowners				Minority homeowners				$Diff_{W-M}$
	Count	Mean	P50	SD	Count	Mean	P50	SD	Count	Mean	P50	SD	Mean
Households													
Renter tenure	107,050	5.745	5.000	3.076	41,864	5.403	5.000	3.006	65,174	5.964	5.000	3.100	−0.561***
Homeowner tenure	107,050	9.379	10.000	4.177	41,864	9.864	10.000	4.270	65,174	9.068	9.000	4.085	0.796***
HCV homeowner	107,050	1.000	1.000	0.000	41,864	1.000	1.000	0.000	65,174	1.000	1.000	0.000	0.000
Minority	107,038	0.609	1.000	0.488	41,864	0.000	0.000	0.000	65,174	1.000	1.000	0.000	−1.000
Age of HoH	107,050	43.814	43.000	8.842	41,864	44.857	45.000	9.067	65,174	43.144	42.000	8.627	1.713***
Children (n)	107,050	1.560	1.000	1.695	41,864	1.575	1.000	2.066	65,174	1.549	1.000	1.405	0.026**
Disability	107,050	0.337	0.000	0.473	41,864	0.477	0.000	0.499	65,174	0.247	0.000	0.432	0.230***
Gender of HoH	107,050	0.827	1.000	0.378	41,864	0.703	1.000	0.457	65,174	0.907	1.000	0.290	−0.204***
Wage earners (n)	107,050	0.804	1.000	0.659	41,864	0.719	1.000	0.685	65,174	0.858	1.000	0.635	−0.139***
Δ Wage earners (n)	105,568	0.008	0.000	0.433	41,332	0.007	0.000	0.402	64,225	0.008	0.000	0.451	−0.001
Wage ernr./hshld. (%)	107,050	30	25	30	41,864	27	20	31	65,174	32	29	28	−5***
Income & expenses													
Annual income	107,050	24,052	21,988	14,608	41,864	22,011	18,725	14,150	65,174	25,364	23,948	14,748	−3,353***
Annual wages	107,050	18,086	17,680	17,607	41,864	14,739	10,192	17,240	65,174	20,236	20,655	17,504	−5,497***
Δ Annual wages	105,568	912	0	9,537	41,332	811	0	8,153	64,225	977	0	10,329	−166***
Tenant rent pmnt.	232	394	336	345	69	349	259	341	163	414	369	346	
Homeowner pmnt	106,830	834	757	389	41,795	805	684	435	65,023	853	791	356	−48***
Wealth													
Other asset value	107,047	4,329	357	26,854	41,864	6,487	616	27,510	65,171	2,943	205	26,333	3,544***

Home equity	99,679	20,486	9,157	43,537	38,159	23,505	10,644	41,215	61,510	18,616	8,305	44,819	4,888***
Wealth	107,050	23,404	9,630	52,271	41,864	27,912	11,175	52,077	65,174	20,513	8,765	52,195	7,399***
Neighborhoods													
Income/PC	107,050	44,364	42,859	11,385	41,864	43,647	42,061	11,161	65,174	44,827	43,203	11,503	−1,180***
Employment rate	107,050	61.373	61.469	13.371	41,864	57.568	56.385	13.215	65,174	63.818	63.934	12.891	−6.250***
SFD prcnt	106,616	60.028	63.252	23.071	41,654	58.962	62.894	22.651	64,950	60.711	63.609	23.313	−1.750***
Share white	106,638	60.945	69.248	31.504	41,675	84.123	91.026	17.488	64,951	46.071	46.449	29.446	38.052***
OOR prcnt	106,638	67.385	70.968	25.135	41,675	75.347	79.640	22.717	64,951	62.275	65.566	25.279	13.072***
Pvrty prcnt	106,617	19.317	16.186	13.415	41,654	17.549	13.666	13.957	64,951	20.452	17.844	12.929	−2.902***
PHAs													
PHA utlzn	84,190	93.252	95.029	7.967	32,852	94.109	95.773	7.503	51,326	92.706	94.574	8.191	1.402***
PHA TotN (hshld)	84,190	5,693	2,654	8,643	32,852	4,998	1,440	9,694	51,326	6,139	3,271	7,866	−1,141***
PHA TotHAP (M)	76,554	43.284	16.547	79.234	29,830	40.764	9.313	92.974	46,720	44.894	20.826	69.003	−4.130***
Purchase timing													
Boom	33,413	1.000	1.000	0.000	14,511	1.000	1.000	0.000	18,893	1.000	1.000	0.000	0.000
Bust	54,223	1.000	1.000	0.000	20,409	1.000	1.000	0.000	33,811	1.000	1.000	0.000	0.000
Recovery	19,414	1.000	1.000	0.000	6,944	1.000	1.000	0.000	12,470	1.000	1.000	0.000	0.000

Table 1 reports summary statistics for the households and Public Housing Authorities that participate in (administer) HUD's Housing Choice Voucher (HCV) Program for Tenancy and Homeownership from 2000 to 2020. *Renter tenure*, the number of years that a household's Housing Choice Voucher (HCV) is applied to their renter (tenant) housing expense, before transitioning into homeownership. *Homeowner tenure*, the number of years that a household's Housing Choice Voucher (HCV) is applied to the mortgage on their primary residence. *HCV homeowner*, a treatment indicator set to one during each year that a household's Housing Choice Voucher (HCV) is applied to the mortgage on their primary residence, and set to zero when the same household's HCV is applied to their tenant rent payment. Observable household characteristics $X_{i,t-1}$ include: *Minority*, an indicator set to one if the head of household is a racial or ethnic minority and zero otherwise. *Age of HoH*, the age of the head of household. *Children (n)*, the count of the family members under the age of 18. *Disability*, an indicator variable set to one if at least one of the household's family members is classified as having a disability. *Gender HoH*, an indicator set to one if the head of household is a woman and zero otherwise. *Wage earners (n)*, an annual count of family members with nonzero wage income from employment. Δ *Wage earners (n)*, one year change in *Wage earners* within a household. *Wage ernr/hshld (%)*, the number of *Wage earners* scaled by the total number of family members in a household. *Annual income*, the sum of the household's income from all sources (i.e., wages, pensions, welfare, other) as reported and verified by HUD on Form-50058. *Annual wages*, the sum of the household's wage income from employment as reported and verified by HUD on Form-50058. Δ *Annual wages*, one year change in the household's Annual *Wages. Tenant rent pmnt*, household's tenant payment exclusive of any utility allowance. *Homeowner pmnt*, household's monthly homeownership payment (PITI & MIP if applicable). *Other asset value*, the total cash value of assets excluding home equity (other) at year *t*. *Home equity* is calculated as the net of estimated home values from Zillow's Home Value Index (ZHVI) and the mortgage debt inferred from the mortgage payment amount reported on Form-50058; assuming a 30-year FHA loan (3.5% down payment and average U.S. 30-year fixed rate interest rate at year *t*). *Wealth pre-hmwnr* the sum of the cash value of financial assets (*Other asset value*) as reported on HUD Form 50058 in the year before a household transitions to homeownership. *Wealth*, the sum of the cash value of financial assets (*Other asset value*) as reported on HUD Form 50058 plus *Home equity* at time *t*. Relative to the county in which a household is located: *Income/PC*, county-level total personal income from the Bureau of Economic Analysis scaled by the county's total population. *Employment rate (%)*, county level total employment (number of jobs) from the Bureau of Economic Analysis scaled by the county's total population. Relative to the Census Tract in which a household is located: *SFD prcnt*, the percentage of owner-occupied single-family detached homes in the tract. *Share White* is the percentage non-Hispanic White residents in the tract. *OOR prcnt*,the percentage of owner-occupied homes in the tract. *Pvrty prcnt*, the percentage of the tract's population below poverty level. For the Public Housing Authorities (Agencies) that administer the HCV Program: *PHA utlzn*, PHA's voucher utilization rate equal to the number of applied vouchers scaled by the number of HUD authorized vouchers. *PHA TNH*, the total number of households (n) served by the PHA. *PHA THAP (M)*, the total amount of assistance provided for households (M) administered by the PHA. For household's that transition into the HCV Homeownership Program: *Boom*, an indicator set to one for homes purchased 2001 to 2006. *Bust*, is an indicator set to one for homes purchased 2007 to 2012. *Recovery*, is an indicator set to one for homes purchased 2013 to 2020.
$^{*}p < .1$, $^{**}p < .05$, $^{***}p < .01$.

program, the mean (median) White household's wealth increases from the last year as a renter by $24,300 ($10,800). However, minority households experience a considerably smaller wealth increase of $19,100 ($8,700). Though these differences support our second hypothesis, we interpret the univariate evidence with caution. In particular, this univariate analysis does not compare households to themselves nor include household and economic controls, both of which are critical in identifying the factors that impact wealth outcomes and racial disparities. As such, we present our multivariate regressions later in the analysis.

Lastly, we also find early evidence of a mechanism that may reduce wealth accumulation from homeownership: neighborhood selection. For example, compared to White homeowners, minority households purchase homes in areas with higher poverty levels and a lower percentage of owner-occupied homes. They also buy homes in neighborhoods that are predominantly headed by minorities. These results suggest that neighborhood selection likely plays a role in any observed wealth disparities.

4. Methodology

In this next section, we describe our empirical strategy for investigating homeownership's ability to reduce wealth disparities among low-income and minority households.

4.1 Wealth measure

Our measure of wealth, $Wealth_{i,t}$, is calculated as the cash value of financial assets as reported from HUD plus home equity. We calculate financial assets from HUD Form-50058 and estimate home equity as the net of estimated home values from Zillow's Home Value Index (ZHVI) and the estimated mortgage debt inferred from the mortgage payment amount reported on Form-50058. Specifically, we construct our estimate of initial home value by calculating the loan amount implied by the household's average mortgage payment reported on Form-50058, assuming a 30-year FHA loan (3.5% down payment and average U.S. 30-year fixed rate interest rate from Federal Reserve Economic Data at year t). We use Zillow's ZHVI to estimate changes in home value. Home equity is then calculated as the difference between the annual adjusted home value and the outstanding mortgage.

4.2 Empirical design

Our first specification is a within-subjects treatment, ordinary least squares (OLS) panel regression with wealth for household i, as the dependent variable. The primary benefit of this design is that it avoids confounding effects due to variation in unobserved household

characteristics since the treatment and control are the same households. The variable of interest, $HCVHomeowner_t$, is a treatment indicator set to one during each year that a household's Housing Choice Voucher (HCV) is applied to the mortgage on their primary residence, and set to zero when the same household's HCV is applied to their tenant rent payment. Across all of our specifications, the treatment group, are households using homeownership HCVs, administered by local housing authority j in the year t, and the control group are the same households during the time they were using tenant HCVs. Observable household characteristics ($X_{i,t-1}$) include *Children*, the count of the family members under the age of 18 and *Annual income*, the sum of the household's income from all sources (e.g., wages, pensions, welfare, alimony, child support) as reported and verified by HUD on Form-50058. We include household fixed effects (v_i) to control for unobserved household characteristics that may influence the propensity to save (Bernheim, Skinner, and Weinberg 2001; Ameriks, Caplin, and Leahy 2003); *Head of Household Age* fixed effects to control for the age of the head of household; and year fixed effects. To control for local economic conditions, we include income per-capita defined as the county-level total personal income from the Bureau of Economic Analysis (BEA) scaled by the county's total population and the county-level total employment (i.e., number of jobs) also from BEA, scaled by the total population of the county, multiplied by 100 to be expressed as a percentage. We cluster at the PHA level in all our specifications to redress the concern that residuals are serially correlated within households that engaged with the same local housing authority (Bertrand, Duflo, and Mullainathan 2004).

$$Wealth_{i,t} = \beta_1 HCVHomeowner_t + \gamma_1 X_{i,t-1} + \nu_i + \rho_s + \varepsilon_{i,j,t} \quad (1)$$

We expand our model in (1) to examine how homeownership affects racial wealth disparities and estimate the following OLS panel regression model in a DiD framework. Because the HUD program is race-neutral when we estimate our main equation, Equation (1), minority households may have lower wealth and face worse real estate markets. Therefore, the overall economic effect of the program could seem positive on average, while still having large disparities for minority-headed households. Thus, we also use a DiD approach by asking whether there are differences for minorities that experienced the same homeownership transition in Equation (2). An indicator variable, *Minority*, takes the value of two if the head of household is a racial or ethnic minority and one otherwise.

$$\begin{aligned} Wealth_{i,t} = {} & \beta_1 HCVHomeowner_t + \beta_2 HCVHomeowner_t \\ & \times Minority + \beta_3 Minority + \gamma_1 X_{i,t-1} + \nu_i + \rho_s + \varepsilon_{i,j,t} \end{aligned} \quad (2)$$

4.3 Mechanisms for wealth accumulation

We examine the mechanisms behind the relation between homeownership and wealth in two dimensions: household-specific factors and factors that are outside the household's control. Mechanisms within the household's control include financial fragility, labor market substitution, and neighborhood selection. In the spirit of Bernstein and Koudijs (2021), we investigate the labor supply mechanism with a difference-in-differences of reported income before and after the voucher. We also explore differences in wealth accumulation associated with factors outside of the household's control, including PHA quality and timing of home purchase. By using cross-sectional cuts along these dimensions, we are able to establish which mechanisms contribute to wealth accumulation in these HCVH households. Next, we move on to discuss our main results and examination of mechanisms.

5. Results

In Table 2, we estimate Equations (1) and (2) to test our hypotheses. In column 1, we estimate Equation (1), and we find that within a given household, wealth increases by about $3,300 over the course of homeownership relative to renting. However, when we estimate Equation (2), we find evidence consistent with the transition to homeownership leading to racial disparities in wealth. Consistent with our second hypothesis, column 2 shows that relative to their tenure as renters, the wealth accumulation of minority and white households are $1,500 and $6,100, respectively, for a statistically significant difference of $4,500. Notably, column 2 shows that during their tenure as renters, the difference in wealth between minority and white households are statistically insignificant ($1,200). Our results suggest that low-income households that transition to homeownership experience significant wealth gains relative to renting and that homeownership leads minority households to accumulate significantly less wealth than White households.

The results presented in Table 2 are consistent with our hypothesis that homeownership can increase wealth accumulation and racial disparities in wealth. One possibility is that the wealth disparities we document are driven by the transition to homeownership. Another is that the differences in wealth outcomes between White and minority households are a continuation of their respective wealth dynamics as renters. In an effort to disentangle these distinct wealth dynamics, we next use additional time-series tests to identify *when* racial disparities in wealth emerge amongst the low-income households that transition to homeownership. Specifically, each year we compare the wealth of minority and White households relative to the event-time of becoming homeowners. We discuss our approach in detail, below.

Table 2
Wealth accumulation for low-income & minority households

	(1)	(2)
HCV homeowner	3,307.2***	6,093.1***
	(5.43)	(5.60)
HCV homeowner × Minority		−4,546.3***
		(−2.97)
Minority		−1,199.0
		(−0.68)
Annual income	0.163***	0.167***
	(3.46)	(3.56)
Children (n)	150.3	−46.13
	(0.25)	(−0.08)
Income/PC	1.321***	1.319***
	(6.66)	(6.60)
Employment rate	−258.8***	−258.6***
	(−2.84)	(−2.84)
Constant	−32,075.9***	−31,868.0***
	(−4.57)	(−4.51)
Observations	209,929	208,845
Adjusted R^2	.505	.506
Household FE	✓	✓
Year FE	✓	✓
HoH age FE	✓	✓
Clustered PHA	✓	✓
Mean wealth	12,606	12,670
Med. wealth	497	508
SD wealth	40,313	40,408

Table 2 reports the within-subjects treatment, ordinary least squares regression results for the wealth accumulation and wealth disparity of low-income minority and White households that transition to homeownership. Columns 1 and 2 report full sample estimates of Equation (1) and the interaction model from Equation (2), respectively. The variables of interest are *HCV homeowner* and its interaction term with *Minority*, an indicator set to one if the head of household is a racial or ethnic minority and zero otherwise. *HCV Homeowner*, is a treatment indicator set to one during each year that a household's Housing Choice Voucher (HCV) is applied to the mortgage on their primary residence, and set to zero when the same household's HCV is applied to their tenant rental payment. The dependent variable is *Wealth*, calculated annually as the cash value of financial assets as reported on HUD Form 50058 plus home equity. Home equity is calculated as the net of estimated home values from Zillow's Home Value Index (ZHVI) and the mortgage debt inferred from the mortgage payment amount reported on Form-50058; assuming a 30-year FHA loan (3.5% down payment and average U.S. 30-year fixed rate interest rate at year *t*). Summary statistics for the dependent variable are reported for all models. Observable household characteristics $X_{i,t-1}$ include: *Annual income*, the sum of the household's income as reported and verified by HUD on Form-50058; *Children (n)*, the count of family members under the age of 18; *Income/PC* and *Employment rate (%)*, annual county-level measures from the Bureau of Economic Analysis. The sample includes ex ante renter (tenant) and homeowner household-years for households that eventually transition from the HCV Program into the HCV Homeownership Program. All models include household fixed effects, year fixed effects, age of HoH fixed effects, and standard errors clustered by PHA. *t*-statistics are in parentheses.
*p <.1, **p <.05, ***p <.01.

Figure 1 presents evidence that the differences in wealth between minority and White households emerge during transitions to homeownership. The figure plots coefficient estimates for the year-by-year racial disparities in wealth relative to the event-year of becoming a homeowner. To estimate the plots, we modify Equation (2) estimated in Table 2, column 2, by replacing the homeownership indicator with indicator variables for each year relative to the transition year, and interact *Minority* with the event-year indicators. We trace households' wealth from the last

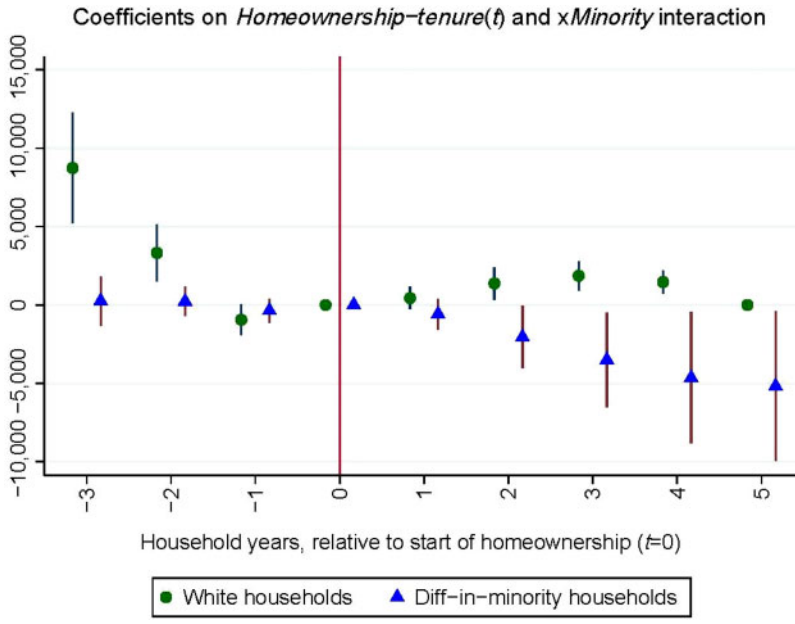

Figure 1
Differences in household wealth
Figure 1 presents evidence that the differences in wealth between minority and White households emerges during the transitions to homeownership. The figure plots coefficient estimates of the year-by-year racial disparities in wealth relative to the event-year of becoming a homeowner. To estimate the plots, we modify Equation 2 estimated in Table 2, Column 2, by replacing the homeownership indicator with indicator variables for each year relative to the transition year, and interact Minority with the event-year indicators. We trace households' wealth from their last 3 years as renters, through the first 5 years after becoming homeowners. In this specification, the interactions identify year-by-year differences in wealth between minority and White households that transition. The dependent variable is household wealth, and we include household fixed effects, year fixed effects, age of HoH fixed effects, economic controls, and standard errors clustered by PHA.

3 years as renters, through the first 5 years as homeowners. In this specification, the interactions identify year-by-year differences in wealth between minority and White households that transition. As before, the dependent variable is household wealth, and we include all the previous fixed effects, and economic controls. Figure 1 shows that the differences in wealth between minority and White households in each of the 3 years prior to them becoming homeowners are economically and statistically insignificant. The graph indicates that within the third year of homeownership minority households accumulate significantly lower wealth than White households ($2,100), and shows that the wealth disparities between minority and White homeowners become more pronounced over longer periods of tenure (i.e., 3 years onward). The evidence suggests that as renters the wealth of minority and White households follow similar pretends. Thus, the documented racial disparities in wealth occur when the households become homeowners, and not before.

5.1 Financial fragility

In Table 3, we use Equation (2) to examine whether financial fragility reduces the wealth accumulation of households that transition to homeowners. Although many of the households in our sample are likely to be categorized as financially fragile by standard measures (Lusardi, Schneider, and Tufano 2011), there still may be variation in financial fragility in our sample. For example, if households "stretch" to buy a more expensive home than they can afford, it may limit wealth accumulation and lead to increases in credit card debt or loans from family members. These more financially fragile families may receive different benefits to homeownership than those who did not stretch in this manner.[12] Accordingly, we use our measure of financial fragility, the ratio of the household's total housing expense to monthly income, to partition households into two groups based upon the household's status at the time of its transition to homeownership. We first split households by the sample median for the fragility ratio measure. Column 1 shows that within households that were more financially fragile (i.e., above the median), that minority and White household wealth increased by about $1,300 and $6,600, respectively. The $5,300 difference in the wealth accumulation between minority and White homeowners over the homeownership tenure is statistically significant and about a 17% increase in wealth disparity relative to the wealth accumulation in Table 2, column 2. The relative increase in wealth disparity is consistent with our prediction that financial fragility reduces wealth accumulation. Column 2 shows that for less financially fragile (i.e., below the median) households, the transition increased the wealth of minority and White homeowners by about $2,300 and $5,800, respectively, for a statistically significant difference of $3,500. The difference in the wealth accumulation between less financially fragile minority and White homeowners is about a 23% decrease in wealth disparity relative to the baseline estimate in Table 2, column 2, and also supports our prediction that financial fragility reduces wealth accumulation. Overall, the results suggest that more financially fragile households accumulate less wealth from the transition to homeownership and that financial fragility increases racial disparities in wealth.

[12] However, we do note that the HCVH program has some structural attributes that may limit the ability of households to stretch and buy a more expensive home than they can afford. (1) The voucher program requires households to have credit counseling prior to becoming homeowners. (2) The households' debt to income ratios still must conform to standard underwriters' limits, so it is unlikely that we have households that stretch beyond their means to afford a down payment, buy a home, etc. (3) The program manual states that households should avoid homes that have costly repairs or are too old, and HUD can provide some assistance for maintenance. Thus, within the defined structure of the HCVH setting, we do not expect households to accumulate significant debt in the run-up to the home purchase or to have the capacity to buy more home than they can afford.

Table 3
Financial fragility

	Financial fragility above (1)	Financial fragility below (2)
HCV homeowner	6,624.1***	5,809.4***
	(5.64)	(4.42)
HCV homeowner × Minority	−5,327.6***	−3,515.8*
	(−3.47)	(−1.84)
Minority	−301.6	−1839.6
	(−0.11)	(−0.98)
Annual income	0.213***	0.131***
	(3.22)	(3.02)
Children (n)	748.5	−773.9
	(1.04)	(−1.30)
Income/PC	1.764***	0.976***
	(5.47)	(5.94)
Employment rate	−379.2***	−168.8*
	(−2.88)	(−1.81)
Constant	−36,843.2***	−22,443.3**
	(−4.38)	(−2.56)
Observations	104,455	102,840
Adjusted R^2	.511	.507
Household FE	✓	✓
Year FE	✓	✓
HoH Age FE	✓	✓
Clustered PHA	✓	✓
Mean wealth	12,702	12,721
Med. wealth	592	459
SD wealth	43,328	37,372

Table 3 reports the effects of financial fragility on the wealth accumulation and wealth disparity of low-income minority and White households that transition to homeownership. Results for the within-subjects treatment, ordinary least squares regression from Equation (2) are reported across two levels of household financial fragility, measured at the time (year) that a household transitions to homeownership. Financial fragility is defined as the ratio of a household's total contribution to housing expenses scaled by total monthly income. Using the median level of financial fragility at the time (year) of transitions to homeownership, we split the sample into two group with above and below median financial fragility in columns 1 and 2, respectively. The variables of interest are *HCV homeowner* and its interaction term with *Minority*, an indicator set to one if the head of household is a racial or ethnic minority and zero otherwise. *HCV homeowner*, is a treatment indicator set to one during each year that a household's Housing Choice Voucher (HCV) is applied to the mortgage on their primary residence, and set to zero when the same household's HCV is applied to their tenant rental payment. The dependent variable is *Wealth*, calculated annually as the cash value of financial assets as reported on HUD Form 50058 plus imputed home equity. Summary statistics for the dependent variable are reported for all models. Table A1 in the appendix defines all other variables. The sample includes ex ante renter (tenant) and homeowner household-years for households that eventually transition from the HCV Program into the HCV Homeownership Program. All models include household fixed effects, year fixed effects, age of HoH fixed effects, and standard errors clustered by PHA. *t*-statistics are in parentheses.
*p <.1, **p <.05, ***p <.01.

5.2 Labor market supply

Next, in Table 4, we examine whether households transitioning from renters to homeowners adjust their labor supply. Following Bernstein and Koudijs (2021), we estimate Equation (2) with measures of households' labor supply as the dependent variables of our regressions. Our labor supply measures include households' total wage income, the annual change in total wage income, and the change in households' labor market participation as identified by the annual change in the number of working adults. We note that we also follow the Bernstein and Koudijs (2021)

Table 4
Labor market supply

	Wage income (1)	Δ wage income (2)	Δ wage earners (3)
HCV homeowner	3,273.9***	−1,635.1***	−0.0518***
	(7.63)	(−14.17)	(−9.13)
HCV homeowner × Minority	−253.5	−160.3	−0.0102*
	(−0.43)	(−1.20)	(−1.65)
Minority	397.5	59.24	0.000702
	(0.61)	(0.15)	(0.04)
Children (n)	110.0	67.09	−0.00137
	(0.41)	(1.31)	(−0.59)
Income/PC	0.143***	−0.00258	−0.000000602
	(4.15)	(−0.22)	(−1.29)
Employment rate	−5.391	11.93	0.00000243
	(−0.27)	(1.48)	(0.01)
Constant	1475.4	18.85	0.0124
	(1.09)	(0.03)	(0.48)
Observations	147,226	131,796	131,796
Adjusted R^2	.522	−.050	−.068
Household FE	✓	✓	✓
Year FE	✓	✓	✓
HoH age FE	✓	✓	✓
Clustered PHA	✓	✓	✓
Mean (y)	19,938	1,512	0
Med. (y)	19,159	171	0
SD (y)	14,943	10,105	0

Table 4 presents analyses of the labor market supply of low-income minority and White households that transition to homeownership. Following Bernstein and Koudijs (2021), we estimate the within-subjects treatment, ordinary least squares regression of Equation (2), using three measures of a households' labor supply as the dependent variables; *Annual wages*, *Wage earners (n)*, and Δ *Wage earners (n)* in columns 1 to 3, respectively. *Annual wages*, the sum of the household's wage income from employment as reported and verified by HUD on Form-50058. *Wage earners (n)*, an annual count of family members with nonzero wage income from employment. Δ *Wage earners (n)*, one year change in *Wage earners* within a household. The variables of interest are *HCV homeowner* and its interaction term with *Minority*, an indicator set to one if the head of household is a racial or ethnic minority and zero otherwise. *HCV homeowner*, is a treatment indicator set to one during each year that a household's Housing Choice Voucher (HCV) is applied to the mortgage on their primary residence, and set to zero when the same household's HCV is applied to their tenant rental payment. Summary statistics for the dependent variable are reported for all models. Table A1 in the appendix defines all other variables. The sample includes ex ante renter (tenant) and homeowner household-years for households that eventually transition from the HCV Program into the HCV Homeownership Program. All models include household fixed effects, year fixed effects, age of HoH fixed effects, and standard errors clustered by PHA. *t*-statistics are in parentheses.
*p <.1, **p <.05, ***p <.01.

approach in that we include households-years in which no wage income is reported. We exclude households with disabled persons from this part of the analysis. We make this restriction because the vast majority of the household-years with no reported wage income (78%) are from disabled households, and whom we would not expect to change their labor supply in response to the homeownership voucher. Thus, the sample of households in our labor supply regressions is slightly smaller (13,025) than in our baseline regression of Table 2, column 2 (16,699).

Nevertheless, we still find some support of the labor market prediction. Column 1 shows no statistically significant difference in wages between minority and White households and that the wages within a given

household are $3,300 higher relative to renting. This difference is statistically significant and about a 16% increase in wages relative to their mean value of $19,900, as reported below column 1. The evidence supports an increased labor supply channel in that households' wages are higher after the transition to homeownership. Column 2 shows that, on average, households' annual wages decrease by $1,600 as homeowners and that the difference in wage growth between minority and White households is not statistically significant. The evidence does not support the labor supply prediction and suggests that the wage growth of households that transition to homeownership may not be sufficient to reduce racial disparities in wealth, as minority and White households both experienced significant declines in wage growth relative to their tenure as renters. Consistent with the labor market dynamics potentially amplifying racial disparities in wealth, column 3 shows that when households transition, minority households experience significantly lower labor market participation relative to White households.

Collectively, the evidence supports the prediction that households increase their labor supply after becoming homeowners and suggests that labor market frictions play a role in the wealth disparities that we document in Table 2.

5.3 Neighborhood selection

Table 5 reports the effects of neighborhood selection on the wealth accumulation and wealth disparity of minority and White households, conditional on transitioning from being renters to homeowners. As before, to estimate Equation (2), we partition our sample into two groups (i.e., above and below median), but now we use the households' neighborhood characteristics to split the sample. In particular, each year, we independently sort neighborhoods by the following: the percentage of single family detached homes, the percentage of White households, the proportion of owner-occupied homes, and the poverty rate. The neighborhood characteristics are from the U.S. Census and matched to households' Census tract by HUD. Thus, we categorize all households (i.e., renters and homeowners) by their neighborhood's characteristics and then observe whether neighborhood selection influences households' wealth accumulation as they transition from renters to homeowners.

Column 1 shows that within the set of households that transition into neighborhoods that have above median percentages of single-family homes, that minority and White households accumulate about $280 and $3,400 in wealth relative to their tenure as renters, for a difference of $3,100. Columns 2 shows that transitioning into neighborhoods with relatively fewer single-family homes produces a larger racial disparity in wealth ($8,400), as minority households accumulate less wealth than

Table 5
Neighborhood quality

	Med. SFD % above vs. below		Med. White res. % above vs. below		Med. owner occpcy. % above vs. below		Med. poverty % above vs. below	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HCV homeowner	3,410.3***	8,660.2***	2,208.5**	10,512.9***	1,122.3	5,367.6**	10,311.5***	1,792.3
	(3.27)	(4.57)	(2.46)	(4.54)	(1.35)	(1.99)	(5.26)	(1.60)
HCV homeowner × Minority	−2,003.8	−8,445.0***	−1,076.6	−7,310.9***	767.1	−3,677.9	−10,320.7***	1,558.1
	(−1.56)	(−3.41)	(−0.68)	(−2.99)	(0.54)	(−1.14)	(−3.51)	(1.13)
Minority	−3,129.9*	−1,158.3	123.5	−5,717.2	−2,076.3	−950.5	1,092.7	−3,714.6
	(−1.76)	(−0.35)	(0.08)	(−1.39)	(−1.04)	(−0.45)	(0.44)	(−1.37)
Annual income	0.116***	0.200**	0.243***	0.0956***	0.192**	0.136***	0.200**	0.126**
	(4.23)	(2.57)	(2.60)	(3.59)	(2.42)	(2.96)	(2.58)	(2.18)
Children (n)	−1,492.3***	926.5	−14.26	−912.3***	−966.8***	65.47	1,075.6	−1,716.2***
	(−4.68)	(1.13)	(−0.03)	(−2.76)	(−2.74)	(0.07)	(1.55)	(−4.44)
Income/PC	1.671***	1.401***	1.388***	1.474***	1.654***	1.229***	1.273***	1.550***
	(6.38)	(5.32)	(5.64)	(6.21)	(5.11)	(6.41)	(4.56)	(5.49)
Employment rate	−252.6***	−355.5**	−54.36	−456.3***	−203.6*	−200.9**	−155.5	−271.4**
	(−2.65)	(−2.36)	(−0.52)	(−3.53)	(−1.80)	(−2.20)	(−1.00)	(−2.42)
Constant	−33,283.5***	−48,148.3***	−43,396.3***	−11,534.2	−43,723.1***	−24,842.0***	−32,972.1***	−20,948.8***
	(−4.79)	(−3.91)	(−6.23)	(−1.20)	(−5.19)	(−3.26)	(−2.82)	(−3.25)
Observations	102,747	102,027	102,821	102,661	102,431	102,787	101,945	102,856
Adjusted R^2	.605	.492	.504	.578	.536	.587	.544	.533
Household FE	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
HoH age FE	✓	✓	✓	✓	✓	✓	✓	✓
Clustered PHA	✓	✓	✓	✓	✓	✓	✓	✓

(continued)

Table 5
Continued

	Med. SFD % above vs. below		Med. White res. % above vs. below		Med. owner occpcy. % above vs. below		Med. poverty % above vs. below	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mean wealth	12,628	13,037	14,748	10,866	14,479	11,160	10,593	14,986
Med. wealth	807	377	1125	134	1,129	160	220	1047
SD wealth	35,087	45,691	42,345	38,775	40,495	40,750	38,503	42,615

Table 5 reports the effects of neighborhood selection on the wealth accumulation and wealth disparity of low-income minority and White households that transition to homeownership. As before, we parse our sample across measures of neighborhood quality and estimate the within-subjects treatment, ordinary least squares regression of Equation (2). For each year in the sample, we independently rank neighborhood characteristics from a household's U.S. Census tract and then split the sample into households with homes in neighborhoods that have above- and below- median levels (percentages) of: single family detached homes, White households, owner-occupied homes, and households below the poverty threshold. The variables of interest are *HCV homeowner* and its interaction term with *Minority*, an indicator set to one if the head of household is a racial or ethnic minority and zero otherwise. *HCV homeowner*, is a treatment indicator set to one during each year that a household's Housing Choice Voucher (HCV) is applied to the mortgage on their primary residence, and set to zero when the same household's HCV is applied to their tenant rental payment. The dependent variable is *Wealth*, calculated annually as the cash value of financial assets as reported on HUD Form 50058 plus imputed home equity. Summary statistics for the dependent variable are reported for all models. Table A1 in the appendix defines all other variables. The sample includes ex ante renter (tenant) and homeowner household-years for households that eventually transition from the HCV Program into the HCV Homeownership Program. All models include household fixed effects, year fixed effects, age of HoH fixed effects, and standard errors clustered by PHA. *t*-statistics are in parentheses.
$^{*}p < .1$, $^{**}p < .05$, $^{***}p < .01$.

white households that make the transition ($215 and $8,600, respectively). The racial disparities in wealth in columns 1 and 2 are statistically significant and represent a decrease of about 31% and an increase of about 85% of our baseline estimate from Table 2, column 2, respectively. The evidence supports our prediction that neighborhood selection significantly influences wealth accumulation and racial disparities in wealth.

In columns 3 and 4, we examine how households' wealth gains are influenced by their selection into neighborhoods with higher and lower percentages of White residents, respectively. The columns show that in neighborhoods with above median proportions of White residents that minority households accumulate no significant differences in wealth relative to White households that make the same transition. Among homeowners that transition into neighborhoods with lower percentages of White residents, minority households accumulate $7,300 less wealth than White households. The disparity in wealth is statistically significant and consistent with our prediction and with much of the literature. The evidence indicates that the racial composition of a neighborhood can have material effects on households' wealth accumulation.

Columns 5 and 6 present our cuts by the percentage of owner-occupied homes. We find support for the share of owner-occupied homes affecting wealth outcomes, but the influence seems unrelated to racial disparities in wealth. Column 5 shows that transitioning to homeownership in neighborhoods with relatively higher proportions of owner-occupied homes leads to no observable racial disparities in wealth outcomes, as neither minority nor White households experience significant changes in wealth relative to their tenure as renters. Column 6 shows that the transition to neighborhoods with relatively lower shares of owner-occupied homes has a larger effect on the wealth that households accumulate. Relative to renting, we observe that homeowners experience wealth gains about of about $5,400. The increase is statistically significant and equal for both minority and White households. Taken together, the findings demonstrate that the proportion of owner-occupied homes within a neighborhood can influence wealth accumulation, but may have a limited effect on racial disparities within our sample.

In columns 7 and 8 we present our final set of neighborhood cuts, which are by poverty rates within neighborhoods. In these tests, we observe the most pronounced effect of neighborhood selection on wealth disparities. In particular, column 7 shows that within households that are in neighborhoods with relatively higher proportions of poverty that minority and White households accumulate about -$9.2 and $10,300 of wealth relative to tenure as renters. The difference, approximately $10,300, is statistically significant. The disparity in wealth accumulation is about a 127% increase relative to our baseline estimate. Across all of our neighborhood splits, the finding stands as the sole setting that

observes significant wealth declines for minority households that transition to homeownership. Column 8 shows that transitioning to homeownership in relatively less impoverished neighborhoods eliminates the racial disparity in wealth accumulation between minority and White households, as neither group accumulates significant wealth relative to their tenure as renters and the difference is not statistically different from zero. The evidence presented clearly demonstrates that homeowners' neighborhood selection influences wealth accumulation and wealth disparities.

The results from the neighborhood selection tests support our prediction that neighborhood selection influences the wealth gains of homeownership and the disparities in wealth between minority and White households that transition to homeownership.

Thus far, our findings have shown that households' financial fragility, labor market supply, and neighborhood selection influence the wealth that households accumulate when they transition to homeowners and also the affects the disparities in wealth that minority and White households gain relative to their tenure as renters.

5.4 The quality of the local housing authority

Next, we turn our attention to variation in the PHAs' operational characteristics to investigate the institutional mechanisms that likely also affect the households in our study. In particular, we make use of PHAs' utilization rates to identify PHAs that may have relatively more operational capacity to administer the homeownership programs. As discussed earlier, the homeownership program requires significant coordination across many stakeholders, internal and external to the PHA. As such, we expect that households that happen to engage with PHAs that are better resourced or more experienced in managing programs will have relatively higher wealth outcomes. As before, each year, we split our sample by our measure of PHA utilization and then estimate Equation (2) to compare the wealth outcomes of minority and White households. Our PHA utilization measure is the number of vouchers in use divided by the number of vouchers that are authorized to the PHA, constructed using annual data from the Center on Budget and Policy Priorities (CBPP). We note that our sample is smaller in these tests, as our utilization data are only available from 2004 to 2017.

Table 6 presents the results from our PHA quality tests. We find strong support that PHA quality influences the wealth gains of households that transition to homeownership, and the evidence suggests that PHAs with utilization rates that are higher are associated with higher racial disparities in wealth. Column 1 shows that relative to their tenure as renters, minority and White households that engage with PHAs with relatively higher utilization rates gain about $5,500 and $9,800 in wealth,

Table 6
PHA quality

	PHA voucher utilization % above vs. below		w/ PHA FE above vs. below	
	(1)	(2)	(3)	(4)
HCV homeowner	9,774.3***	7,069.5***	9,715.1***	7,107.3***
	(7.22)	(7.02)	(6.96)	(6.93)
HCV homeowner × Minority	−4,241.5**	−1,938.7*	−4,459.2**	−1,880.3*
	(−2.12)	(−1.91)	(−2.17)	(−1.82)
Minority	1,388.6	−2,399.2	2,592.0	−2,872.6
	(0.74)	(−0.91)	(1.31)	(−0.93)
Annual income	0.171***	0.101**	0.170**	0.0949**
	(2.59)	(2.32)	(2.53)	(2.14)
Children (n)	674.5	−388.5	667.0	−312.2
	(1.19)	(−1.23)	(1.16)	(−0.96)
Income/PC	0.710***	0.745***	0.824***	0.964***
	(4.22)	(4.31)	(3.87)	(4.13)
Employment rate	−167.0*	−63.31	−183.6	−65.68
	(−1.74)	(−0.92)	(−1.23)	(−0.59)
Constant	−19,317.2***	−18,929.9**	−26,917.5**	−14,669.8
	(−2.97)	(−2.58)	(−2.12)	(−1.02)
Observations	75,528	76,497	75,528	76,497
Adjusted R^2	.430	.555	.430	.557
PHA FE			✓	✓
Household FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
HoH age FE	✓	✓	✓	✓
Clustered PHA	✓	✓	✓	✓
Mean wealth	8,601	6,713	8,601	6,713
Med. wealth	642	455	642	455
SD wealth	35,599	30,089	35,599	30,089

Table 6 reports the effects of PHA quality on the wealth accumulation and wealth disparity of low-income minority and White households that transition to homeownership. We split the sample across a measure of PHA utilization and estimate the within-subjects treatment, ordinary least squares regression of Equation (2). Using annual data from the Center on Budget and Policy Priorities (CBPP), PHA utilization (*PHA utlzn*) is defined as the number of active housing vouchers in use at a PHA scaled by the number of housing vouchers that were authorized for use by that PHA. We note that our sample is smaller in these tests as the CBPP utilization data are only available from 2004 to 2017. Households can relocate across PHAs, thus to control for effects due to differences in PHA quality when households relocate, we include PHA fixed effect in the model in columns 3 and 4. The variables of interest are *HCV homeowner* and its interaction term with *Minority*, an indicator set to one if the head of household is a racial or ethnic minority and zero otherwise. *HCV homeowner*, is a treatment indicator set to one during each year that a household's Housing Choice Voucher (HCV) is applied to the mortgage on their primary residence, and set to zero when the same household's HCV is applied to their tenant rental payment. The dependent variable is *Wealth*, calculated annually as the cash value of financial assets as reported on HUD Form 50058 plus imputed home equity. Summary statistics for the dependent variable are reported for all models. Table A1 in the appendix defines all other variables. The sample includes ex ante renter (tenant) and homeowner household-years for households that eventually transition from the HCV Program into the HCV Homeownership Program. All models include household fixed effects, year fixed effects, age of HoH fixed effects, and standard errors clustered by PHA. *t*-statistics are in parentheses.
*p <.1, **p <.05, ***p <.01.

respectively. The finding supports our prediction that engaging with PHAs' with higher operational capacity can lead to higher wealth gains for the participating households. The disparity in wealth, about $4,200, is statistically significant and about a 7% reduction of our baseline estimate in Table 2, column 2, and consistent with our prediction that minority

homeowners realize smaller wealth gains than white homeowners. Column 2 shows that minority and White households that transition at PHAs with relatively lower utilization rates gain about $5,100 and $7,100 in wealth relative to their tenure as renters, respectively. The wealth disparity between minority and White homeowners that transition is about $1,900 and statistically significant. The economic magnitude is about a 57% decrease of our baseline estimate in Table 2, column 2, and further demonstrates that PHAs' operational capacity influences households' wealth. The results suggests that relative to higher quality PHAs, PHAs with less operational capacity are associated with lower wealth gains and also lower wealth disparities between minority and White households.

Columns 3 and 4 report regressions coefficients from adding PHA-fixed effects to the equations estimated in columns 1 and 2, respectively. We include PHA fixed effects to control for time-invariant omitted characteristics across PHAs and unobservable local trends that may be common to households that engaged with local housing authority j in year t. Additionally, because households can relocate nationally by transferring their voucher to a different PHA, PHA fixed effects control for persistent differences in wealth accumulation rates between PHAs for households that relocate via a transfer. In these regressions, our identification comes from the set of households that are moving across PHAs, as the estimated models include fixed effects at the household and PHA level. The columns show the same pattern discussed above, as the estimated coefficients are nearly identical. The results further demonstrate that PHAs' operational capacity can influence households' wealth, and suggests that PHAs with higher utilization rates are associated with higher wealth accumulation, but less equitable wealth outcome become minority and White households.

5.5 Timing

In Table 7, we examine our final prediction that the timing of households' home purchase affects households' wealth gains and the difference in wealth gains between minority and White households that transition to homeownership. We break out our sample into cohorts that purchased within the same time period and then estimate Equation (2) within the subsamples. In particular, we define our cohorts as follows: the "boom," for those that bought from 2000 to 2006, the "bust," for those that bought from 2007 to 2012, and the recovery for those who bought from 2013 to 2020, the end of our sample.

Columns 1, 2, and 3 report the results for the boom, bust, and recovery periods, respectively. Consistent with the prediction that timing influences households' wealth gains, column 1 shows that minority homeowners that purchased during the boom experienced wealth declines of about $5,000 and is the largest decline in the wealth of minority homeowners

Table 7
Market timing

	Purchased in boom 2001-2006 (1)	Purchased in bust 2007-2012 (2)	Purchased in recovery 2013-2020 (3)
HCV homeowner	−2,660.9	12,171.6***	15,309.7***
	(−1.43)	(11.51)	(6.13)
HCV homeowner × Minority	−4,992.2**	−3,398.2***	−4,170.5
	(−2.43)	(−2.60)	(−1.24)
Minority	−914.8	−2,784.2	2,124.2
	(−0.28)	(−0.97)	(1.35)
Annual income	0.329**	0.224***	0.119**
	(2.26)	(5.35)	(2.35)
Children (n)	641.6	108.7	112.6
	(0.62)	(0.21)	(0.16)
Income/PC	2.653***	1.785***	0.488***
	(4.26)	(5.92)	(4.96)
Employment rate	−433.9	−468.8***	−30.04
	(−1.63)	(−3.21)	(−0.50)
Constant	−55,139.7***	−49,857.6***	−9,420.4**
	(−3.48)	(−4.39)	(−2.25)
Observations	47,995	96,020	64,830
Adjusted R^2	.440	.633	.483
Household FE	✓	✓	✓
Year FE	✓	✓	✓
HoH age FE	✓	✓	✓
Clustered PHA	✓	✓	✓
Mean wealth	13,163	11,731	13,696
Med. wealth	2761	420	302
SD wealth	46,507	39,091	37,321

Table 7 reports the effects of market timing on the wealth accumulation and wealth disparity of low-income minority and White households that transition to homeownership. We group the sample into cohorts of households that purchased homes within the same time periods: the boom, for homes purchased from 2000 to 2006, the bust, for homes purchased from 2007 to 2012, and the recovery, for homes purchased from 2013 to 2020. For each cohort (period), we estimate the within-subjects treatment, ordinary least squares regression of Equation (2). The variables of interest are *HCV homeowner* and its interaction term with *Minority*, an indicator set to one if the head of household is a racial or ethnic minority and zero otherwise. *HCV homeowner*, is a treatment indicator set to one during each year that a household's Housing Choice Voucher (HCV) is applied to the mortgage on their primary residence, and set to zero when the same household's HCV is applied to their tenant rental payment. The dependent variable is *Wealth*, calculated annually as the cash value of financial assets as reported on HUD Form 50058 plus imputed home equity. Summary statistics for the dependent variable are reported for all models. Table A1 in the appendix defines all other variables. The sample includes ex ante renter (tenant) and homeowner household-years for households that eventually transition from the HCV Program into the HCV Homeownership Program. All models include household fixed effects, year fixed effects, age of HoH fixed effects, and standard errors clustered by PHA. *t*-statistics are in parentheses.
*p <.1, **p <.05, ***p <.01.

that we identify in our study.The column shows that White households exhibited no significant change in wealth and the disparity in wealth outcomes is statistically significant. Column 2 shows that relative to renting, minority households that transitioned during the bust gained about $8,700 in wealth, and White households that did the same gained about $12,200, which corroborates our prediction that timing influences households' wealth accumulation. The significant difference in wealth outcomes ($3,400) represent about a 25% decrease relative to our baseline, and affirms the growing evidence that timing affects the differences in wealth outcomes between minority and White homeowners.

Column 3 shows that the wealth gains of both minority and White households that purchased during the recovery period were about $15,300, and not significantly different from one another. We note that these wealth gains are more than twice the magnitude of our baseline estimates from Table 2, column 2, which further demonstrates how much timing can influence wealth accumulation. Collectively, the variation in households' wealth gains and in wealth disparities strongly supports our prediction that timing influences wealth gains.

6. Robustness

6.1 Disability status

Because of the HCV program guidelines, disability status can affect the amount of support that households receive. Therefore, as a robustness check, we next examine whether our results are driven by these differences in families' disability status by using our DiD framework. Furthermore, given that the households in our sample have considerable variation in nonwage income, government assistance, and so forth, one concern with our empirical setting is that the findings may not be generalizable. To address this concern, we perform sensitivity analysis of our main results from Table 2, column 2. Specifically, we partition the sample into groups based on the households' disability status. We present these results in Table 8. The table shows that our findings are concentrated amongst households that do not have people with disabilities. In this regard, the results we present are generalizable, as they reflect the family structures that are most present in our data and applicable to low-income households more generally.

6.2 Liabilities

A concern with our results is that we do not observe households' liabilities within our data. For example, suppose members of a household that transitioned from renting to homeownership were able to get access to a credit card or some other type of debt. In this example, we would overstate the household's wealth as our data would not record such debts and would therefore inflate household wealth. Consequently, we would overstate the wealth gains from homeownership and also potentially misidentify the wealth disparities between the households for the same reason.

We take this concern seriously and address it as follows. As we state in the analysis, we use the PSID data to identify low-income households and then compare the average level of credit card debt or other nonmortgage debt, specifically family debt. In an effort to better account for the potential differences in access to consumer debt that are likely informed by households' race, we go a step further to compare the credit

Table 8
Disability status

	No disability (1)	Disability (2)
HCV homeowner	8,949.8***	1,651.7
	(6.50)	(1.25)
HCV homeowner × Minority	−7,208.2***	−1,946.8
	(−3.63)	(−1.20)
Minority	1,005.1	−4,156.0
	(0.48)	(−1.58)
Annual income	0.115***	0.442
	(2.96)	(1.62)
Children (n)	671.4	−1,954.8***
	(1.03)	(−3.83)
Income/PC	1.070***	1.769***
	(6.31)	(5.81)
Employment rate	−223.6**	−273.4**
	(−2.49)	(−2.48)
Constant	−22,136.1***	−36,433.6***
	(−3.03)	(−3.73)
Observations	146,520	61,143
Adjusted R^2	.538	.481
Household FE	✓	✓
Year FE	✓	✓
HoH age FE	✓	✓
Clustered PHA	✓	✓
Mean wealth	12,169	13,698
Med. wealth	353	1,110
SD wealth	39,434	42,306

Table 8 reports robustness checks of household disability status. We perform sensitivity analysis of our main within-subjects treatment, ordinary least squares regression results from Table 2, column 4, by separating the sample around the households' disability status. *Disability*, an indicator variable set to one if at least one of the household's family members is classified as having a disability. The variables of interest are *HCV Homeowner* and its interaction term with *Minority*, an indicator set to one if the head of household is a racial or ethnic minority and zero otherwise. *HCV Homeowner*, is a treatment indicator set to one during each year that a household's Housing Choice Voucher (HCV) is applied to the mortgage on their primary residence, and set to zero when the same household's HCV is applied to their tenant rental payment. The dependent variable is *Wealth*, calculated annually as the cash value of financial assets as reported on HUD Form 50058 plus imputed home equity. Summary statistics for the dependent variable are reported for all models. Table A1 in the appendix defines all other variables. The sample includes ex ante renter (tenant) and homeowner household-years for households that eventually transition from the HCV Program into the HCV Homeownership Program. All models include household fixed effects, year fixed effects, age of HoH fixed effects, and standard errors clustered by PHA. *t*-statistics are in parentheses.
*p <.1, **p <.05, ***p <.01.

card debt and family debt of minority and White households to the wealth gains that we estimate in our baseline regression of Table 2, column 2. We define PSID households that have an annual income less than $3,500 (the 90th income percentile of our sample) as low-income. Next, we take the average level of credit card and family debt and then sum them separately for minority and White households with low incomes. We find that the typical low-income minority and White households' PSID reported consumer debt are $618 and $1,400, respectively. Though this is a far from perfect exercise, we take some solace that the wealth gains we document would still be large, net of the unreported liabilities of a representative low- income household.

7. Conclusion

We provide the first large-scale empirical study of the HUD homeownership voucher program. We examine the causal effect of homeownership on the wealth accumulation of low-income households. We use a within-treatment and DiD framework to assess whether homeownership helps low-income households to accumulate wealth or increases the racial wealth disparities between minority households and White households. We find that households gain significant wealth throughout homeownership and that minority households have lower wealth gains than White households.

We find that households' financial fragility reduces the wealth households accumulate relative to renting. In addition, we find evidence consistent with an increased labor supply in response to transitioning to homeownership. However, we also find evidence that labor market frictions may play a role in the wealth disparities that we document, as minority households had comparable incomes but lower work force participation rates after they transition to homeownership.

We find strong evidence that neighborhood selection, PHA quality, and timing influence households' wealth accumulation and the differences in wealth gains between minority and White households. Our findings are concentrated in households without disabled persons, which are more likely to resemble the wealth, income, and housing dynamics that are representative off low-income households more generally. We find no evidence that the wealth gains are driven by strategic misreporting of assets, and our results remain economically material net of the liabilities of representative households that have low incomes.

Our results suggest that homeownership can significantly help households to accumulate wealth. However, our results also suggest that homeownership can make wealth disparities between minority and White households more pronounced.

Appendix

A Variable Descriptions

A. Household demographics

Renter tenure	The number of years that a household's Housing Choice Voucher (HCV) is applied to their renter (tenant) housing expense, before transitioning into homeownership
Homeowner tenure	The number of years that a household's Housing Choice Voucher (HCV) is applied to the mortgage on their primary residence
HCV homeowner	A treatment indicator set to one during each year that a household's Housing Choice Voucher (HCV) is applied to the mortgage on their

(continued)

Continued

A. Household demographics	
	primary residence, and set to zero when the same household's HCV is applied to their tenant rent payment
Minority	An indicator set to one if the head of household is a racial or ethnic minority and zero otherwise
Age of HoH	The age of the head of household
Children (n)	The count of the family members under the age of 18
Disability	An indicator variable set to one if at least one of the household's family members is classified as having a disability
Gender HoH	An indicator set to one if the head of household is a woman and zero otherwise
B. Household income, expenses, and wealth	
Wage earners (n)	An annual count of family members with nonzero wage income from employment
Δ *Wage earners (n)*	The one year change in *Wage earners* within a household
Wage ernr/hshld (%)	The number of *Wage earners* scaled by the total number of family members in a household
Annual income	The sum of the household's income from all sources (e.g., wages, pensions, welfare, alimony, child support) as reported and verified by HUD on Form-50058
Annual wages	The sum of the household's wage income from employment as reported and verified by HUD on Form-50058
Δ *Annual wages*	The one year change in the household's Annual *Wages*
Tenant rent pmnt	The household's tenant payment exclusive of any utility allowance
Homeowner pmnt	The household's monthly homeownership payment (PITI & MIP if applicable).
Other asset value	The total cash value of assets excluding home equity (other) at year *t*.
Home equity	Calculated as the net of estimated home values from Zillow's Home Value Index (ZHVI) and the mortgage debt inferred from the mortgage payment amount reported on Form-50058; assuming a 30-year FHA loan (3.5% down payment and average FHA interest rate at year *t*).
Wealth pre-hmwnr	The sum of the cash value of financial assets (*Other asset value*) as reported on HUD Form 50058 in the year before a household transitions to homeownership.
Wealth	The sum of the cash value of financial assets (*Other asset value*) as reported on HUD Form 50058 plus *Home equity* at time *t*.
C. Neighborhood attributes	
Income/PC	County-level total personal income from the Bureau of Economic Analysis scaled by the county's total population
Employment rate (%)	County-level total employment (number of jobs) from the Bureau of Economic Analysis scaled by the county's total population
Pvrty prcnt	The percentage of population below poverty level relative to the Census Tract in which a household is located
SFD prcnt	The percentage of owner-occupied single-family detached homes relative to the Census Tract in which a household is located
OOR prcnt	The percentage of owner-occupied homes relative to the Census Tract in which a household is located
Share white	The percent non-Hispanic White residents relative to the Census Tract in which a household is located
PHA utlzn	A PHA's voucher utilization equal to the number of applied vouchers scaled by the number of HUD authorized vouchers
PHA TNH	A PHA's total number of households (n)
PHA THAP (M)	A PHA's total amount of assistance provided for households (m)
Boom	An indicator set to one for homes purchased 2001-2006
Bust	An indicator set to one for homes purchased 2007-2012
Recovery	An indicator set to one for homes purchased 2013-2020

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