

Mortgage costs as a share of housing costs—placing the cost of credit in broader context

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Abstract

Housing affordability is a key policy concern and an important component of sustainable homeownership. It follows that reducing housing costs without increasing the risk of mortgage default is a critical approach to sustaining homeownership for current and future generations. In this paper, we breakdown the different elements of housing costs, specifically focusing on the nuances of mortgage costs. We use internal Fannie Mae data to establish a pro forma of housing costs for different owner-occupant borrower profiles over a typical ownership period (all homebuyers, first-time homebuyers (FTHB), and low-income first-time homebuyers (LI FTHB)). We find that the biggest contributors to overall housing costs are transactions costs, ongoing utility expenses, property taxes, home improvement costs, and the component of the mortgage interest rate that compensates investors for the time value of money, with utilities and home improvement costs particularly conspicuous for FTHBs and LI FTHBs. The guaranty fees charged by the GSEs and private mortgage insurance are estimated to be less than six percent of the cost of homeownership. These general patterns hold across racial and ethnic groups, although mortgage insurance alone is roughly six percent of total costs for Black and Hispanic FTHB and LI FTHB borrowers compared to two percent for FTHB and LI FTHB white borrowers. Overall, our findings suggest that non-mortgage housing costs are key areas that policymakers should focus on to reduce housing costs and foster sustained homeownership rates.

1. Introduction

Housing affordability is a central housing policy concern with broad implications for housing markets, sustainable homeownership, racial equity, and economic mobility in the United States. Accordingly, an important aspect of housing affordability is identifying the key drivers of housing costs and how to reduce them. For renters, housing costs are largely tied to utilities and the rent charged by landlords. However, the situation is much more complicated for homeowners, where the actual components of housing costs, and most saliently, mortgage costs, are often opaque and not well understood. In this paper, we provide insight and context into the breakdown of owner housing costs, specifically focusing on the various mortgage and transaction costs that households in the conventional conforming mortgage market face as they transition into and sustain homeownership.¹

Much has been written about the benefits of homeownership, particularly with respect to its role in supporting housing stability and wealth-building for low-income households (DiPasquale and Glaeser 1999; Goodman and Mayer 2016). In the US, the government-sponsored enterprises (GSEs), or Fannie Mae and Freddie Mac, are required to serve low- and moderate-income mortgage borrowers as well as underserved geographic regions across the country.² Consistent with this, in 2020, the GSEs comprised approximately 60 percent of the overall first-lien mortgage market originations (Urban Institute 2021), and roughly half of these borrowers were first-time homebuyers (FTHBs), making the GSEs the main source of mortgage credit for the majority of borrowers in the US with a key role for homeownership entry. Therefore, understanding and enhancing mortgage products and outcomes for low- and moderate-income borrowers in the GSE mortgage space is a priority for policymakers.

However, we know from the Global Financial Crisis that affordable mortgage offerings allowing buyers to stretch their monthly income into a larger mortgage using alternative underwriting standards or novel product features were not a sustainable approach to increasing and maintaining homeownership. In fact, they resulted in double-digit default rates for certain pre-crisis cohorts of low-income conventional conforming borrowers in the GSE book of business (Fout et al 2020). Other common solutions suggested by policymakers, such as changing parts of the GSE pricing structure to lower costs, are impossible to evaluate without understanding the marginal contribution of each of these components to overall mortgage and

¹ Throughout this paper, GSE mortgages refer to those that are purchased from lenders by Fannie Mae and Freddie Mac and converted into mortgage-backed securities (MBS). ‘Conventional’ refers to loans that are not part of a government-insured mortgage programs (e.g., the Federal Housing Administration (FHA) or the Department of Veterans Affairs (VA)); while ‘conforming’ refers to loans that fall under the maximum loan dollar amounts set by the government and are eligible to be purchased by the GSEs. The GSEs set underwriting standards that provide guidance for lenders who plan to sell their mortgages to them, but these standards provide a minimum guideline for lenders and actual underwriting rules may be more stringent.

² As stated in the Federal Housing Enterprise Safety and Soundness Act of 1992, and enforced annually through its Housing Goals and other programs.

housing costs. Ultimately, identifying opportunities to meaningfully reduce the cost of homeownership without increasing the chances of mortgage default is the most promising way to achieve a sustained increase in homeownership rates and the motivation for this paper.

To-date, the full picture of housing costs faced by borrowers has been omitted from the research due to lack of data. Most studies that explore housing cost components rely on self-reported information and lack sufficient detail on mortgage and transaction costs. These data are often further aggregated into metrics or indices, without delving into specific components of costs.³ We contribute to this discourse by using examples from the GSE mortgage pricing system combined with other internal lending and transaction cost data from Fannie Mae's 2020 acquisitions to show the breakdown of actual mortgage and closing costs for borrowers in the conventional conforming market. Specifically, we use the user-cost framework to quantify the specific components of owner costs a homeowner faces over a typical ownership period, inclusive of transaction, mortgage, and other housing costs. We use this framework, which allows for us to factor in one-time costs, such as transactions costs, and temporary costs, such as mortgage insurance, to offer insights into the contribution of each expense to overall owner costs. Additionally, we use our unique view of internal lending data to delve into differences in costs across borrower credit profiles in the GSE mortgage space.

Our approach is threefold. First, we provide a unique view into mortgage and closing costs given our access to detailed mortgage and transaction data, so we avoid relying on self-reported surveys or broader estimates of these costs. Second, we put the complexities of mortgage pricing, transaction, and ongoing expenses into the context of overall homeowner costs, and we show how these may differ for typical borrower profiles: an average homebuyer, a First-Time Homebuyer (FTHB), and a low-income FTHB (LI FTHB), as well as across racial and ethnic groups within the conventional conforming mortgage space. Third, we highlight the differences in components of home equity accumulation across borrowers in the context of our analyses.

Our owner cost breakdown leads to some important conclusions for the typical borrower in the conventional conforming mortgage market. Ultimately, we find that during our analysis period, non-mortgage related expenses comprise the majority of housing costs, with consistent expenses appearing as the largest and most salient costs for homeowners—these include: the transactions costs related to home purchase and sale, the ongoing utility, property tax, and home improvement expenses, and the component of mortgage costs that compensates investors for the time value of money.⁴ We also underscore where more work is needed to better understand potential large variation in mortgage pricing and subsequent borrower costs, such as for mortgage insurance pricing and lender 'gain- on-sale.' These same patterns hold across

³ For more information, see:

<https://www.nahb.org/News%20and%20Economics/Housing%20Economics/Indices/Housing%20Opportunity%20Index>, <https://www.nar.realtor/research-and-statistics/housing-statistics/housing-affordability-index>, and <https://www.hudexchange.info/programs/location-affordability-index/>

⁴ Prepayment risk is a well-known and modeled component of the time value of money for mortgage investors and is reflected in the GSE MBS rates in our data.

racial and ethnic groups, although mortgage insurance increases to roughly six percent of total costs for Black and Hispanic FTHB and LI FTHB borrowers, compared to two percent for white borrowers and one percent for Asian borrowers. Turning to potential wealth building for these borrowers, all three of our profiles show equity accumulation from their ownership period, with the average homebuyer experiencing the largest gain in equity from their purchase. However, given the lower down payments, the return on the down payment (initial equity) is higher for FTHBs and LI FTHBs.

2. *Prior literature*

Our paper builds on the interdisciplinary literature on housing costs and sustainable homeownership. Our housing cost model most closely aligns with the user-cost framework, a well-known and useful paradigm in the economics literature that compares the unique costs of rental and owner housing over time to explain household tenure transitions. Specifically, user-cost models, as described in detail by Hendershott and Schilling (1980), Rosen and Rosen (1980), as well as Himmelberg et al (2005), among others, take the present value of the lifetime costs associated with owning housing—not just the ongoing expenses, but also the transaction (buying and selling) costs of owning—and compare these to the costs of renting over the same period. The user-cost model is a helpful guide for our purposes because it approximates actual cash outlays over a multi-year ownership period, which many other models of housing costs and affordability ignore (Bourassa and Haurin 2017). Smith et al (1988), in their overview of housing market models, emphasize that there are considerable homeownership transaction costs, including financing and housing search costs, that directly affect household consumption. Importantly, Hendershott and Schilling (1980) similarly show that the user-cost view of owner costs provides a more accurate and full view into housing ‘affordability’ than simple comparisons of mortgage costs to income. Diaz and Luengo-Prado (2008) build on this work, creating simulations that show how ignoring factors like mortgage terms and transaction costs introduces bias into models that rely on imputing the rental price of housing units to assess affordability in tenure choice.

Most relevant to our analysis, Bourassa and Haurin (2017) also build on the user-cost model and combine it with the affordability literature to create a model of the true “owner cost” of housing. Specifically, they create a metropolitan-level index that incorporates homeownership transaction costs, mortgage rates, property taxes, maintenance, and tax benefits in an effort to account for the full cost of ownership, although they are unable to use actual data points as reference for many of their assumptions—instead, they calculate a constant-quality price of housing using FHFA and Census data, and use these values to calculate housing costs as a share of price, assuming a 20 percent down payment to estimate mortgage costs. Smith and Smith (2006) follow a similar methodology in their comparison of rental versus owned housing costs using multiple listing service data and also assuming a 20 percent down payment. We follow these general frameworks of utilizing the full spectrum of ‘owner costs’ discounted back to present values in our analyses; however, we are able to use actual data on mortgage characteristics and transaction costs to create our model of owner costs. For example, our data

show that the 20 percent down payment assumption is too high and would underestimate mortgage costs.

Our analysis of owner costs also builds on the literature on sustainable homeownership and the role of the government in mortgage subsidies. Many papers explore long-term outcomes of homeownership attainment for low-income and non-white households, with quite a few focused on mortgage outcomes for different mortgage products and across market cycles.⁵ For example, Doerner et al (2022) show the standard mortgage features that drive borrower costs, such as the debt-to-income (DTI) ratio and LTV, explain a large part of increased borrowing risk during the early 2000s. Karamon et al (2022), using a more recent representative sample of borrowers from the National Mortgage Database also find that DTI at origination is an important determinant of future financial distress and homeownership exits. GSE mortgages themselves also play an important role here—Caplin, Corarton, and Tracy (2018) and Lee and Tracy (2018), both argue that ‘graduating’ from FHA into the conventional market is an important marker of sustainable ownership. In fact, Lee and Tracy (2018) show that more than half of their FHA sample moves into the conventional market over a 15-year period. For this strand of the literature, our study offers important insights into the specific mortgage components of DTI in the context of the overall costs borrowers face as they enter the GSE space.

Moreover, a seminal work by Quigley and Raphael (2004) emphasizes that housing cost burdens for lower income households disparately affect their homeownership opportunities, and they highlight several potential policy solutions to mitigate the mortgage cost-component of affordability for lower-income owners, including graduated mortgage payments, longer amortization periods, and shared equity models of ownership. More recently, Kermani and Wong (2021) find that homeowner financial distress (or lack thereof) also plays an important role in local housing value appreciation and subsequent homeowner wealth accumulation. Both these studies suggest that reducing housing costs may have wide-reaching potential benefits.

A number of studies also find that non-mortgage costs are key challenges for sustaining ownership for low-income homebuyers. Santiago et al (2010; 2011) in their analysis of the Denver Housing Study, find that many low-income homebuyers were worried about affording utilities (nearly 80 percent of their sample), as well as home maintenance, repairs, and property taxes. Van Zandt and Rohe (2011) using multistate survey data, also found that roughly one-third of low-income homeowners were dealing with home repairs they could not afford within their first two years of homeownership. Recent work by Mota et al (2022), also using GSE data, shows that lower income and FTHB borrowers tend to have higher closing costs, both related to mortgage origination charges as well as other transaction costs such as title and settlement

⁵ There is a long line of literature here, some examples include: Begley et al (2021); Caplin et al (2015); Faber (2018); Fout et al (2020); Gerardi et al (2020); Hauptert (2022); and Hembre et al (2021) among many others.

charges. Thus, we incorporate these costs into our framework as well to better contextualize the magnitude of mortgage costs.

Finally, breaking out the important contributors to housing costs, including data on transaction costs, has important implications for racial disparities in the homeowner experience. For example, Christensen and Timmens (2021), Turner et al (2013), and Korver-Glenn (2018) all document evidence of real estate ‘actors’ negatively influencing outcomes for non-white households during the home search process. Focusing on mortgage financing, Bhutta and Hizmo (2021) show that much of the interest rate disparities across race and ethnicity in their sample are due to differences in point-rate tradeoffs borrowers make at closing—reinforcing the importance of the focus of our analysis, the contribution of mortgage costs to total housing costs. Also using Fannie Mae data, Mota and Palim (2021) show that Black and Hispanic borrowers are more likely than white or Asian borrowers to pay closing costs that are greater than or equal to their down payment.

This paper builds on this literature by using a proprietary Fannie Mae dataset of its homebuyer borrower loans in 2020 to provide unique insights into the often-aggregated or unavailable components of mortgage and transaction costs used in ‘owner cost’ models. We provide a thought exercise that details the marginal contribution of each specific element related to the mortgage, purchase, sale, and other ongoing costs with the intent of informing policy decisions related to easing costs burdens and fostering sustainable homeownership for FTHBs, low-income, and non-white households.

3. Data & Methods

To better understand housing costs in the conventional conforming market, we create an owner cost view for our three different types of borrowers—the average homebuyer, FTHBs, and LI FTHBs—using actual loan data from all of Fannie Mae’s single-family purchase mortgages acquisitions matched with Fannie Mae’s closing cost data for 2020, a sample of approximately 1.1 million owner-occupied single-family mortgages. These data offer the advantage of providing actual credit costs, typically unavailable to researchers and policymakers, for a large population of borrowers who comprise a key segment of the mortgage market. However, while we are able to explore costs by borrower income, race, and ethnicity, our analysis is limited to the average borrower profiles within the GSE book of business, meaning we are unable to provide insights into geographic differences across borrowers or for other mortgage market segments, such as FHA borrowers, who are more likely to be lower income and non-white than GSE borrowers, as discussed further in Section 5.

Table 1 shows a breakdown of the composite borrower purchase and credit profile characteristics based on population averages for each of our borrower profiles, and Table 1A in the Appendix shows the same information for borrower race and ethnicity. The three main borrower profiles are nested (i.e., not mutually exclusive), so that the average borrower includes

the FTHB and the LI FTHB borrower profiles in the sample. LI borrowers are defined based on their disclosed income on the mortgage application being at or below 80 percent of the local area median income (AMI) in accordance with the Federal Housing Finance Agency (FHFA) mandated Housing Goal definitions. For context, FTHBs were more than half of total purchase borrowers in Fannie Mae's 2020 acquisitions, and LI FTHB were roughly 40 percent of all Fannie FTHB acquisitions. The differences across borrowers are as expected: the average homebuyer is older, has a notably higher monthly income, lower LTV, higher down payment, and higher average home purchase price than both FTHBs and LI FTHBs. In contrast, the LI FTHB has less than half of the average monthly income and the smallest average purchase price across borrowers.⁶

Looking at these same characteristics by race and ethnicity, in Appendix Table 1A, shows that white non-Hispanic and Black borrowers are slightly older than other borrowers, and Black and Hispanic borrowers have lower average home purchase prices and credit scores, but higher LTVs than Asian and white borrowers. Even with slightly lower LTVs, however, Asian and white borrowers have the highest purchase prices and the largest annual mortgage payments.

Table 1: Average of Each Loan Attribute by Type of Borrower⁷

	Homebuyer	First-Time Homebuyer	Low-Income First-Time Homebuyer
Average monthly income	\$9,377	\$7,453	\$4,161
Average borrower age	42	36	35
Average purchase price	\$318,281	\$291,139	\$222,243
Average credit score	754	746	747
Average loan-to-value	83%	89%	89%
Average mortgage	\$258,978	\$253,442	\$193,740
Average mortgage payment, yr. 1	\$13,730	\$13,437	\$10,272
Average purchase closing costs	\$6,693	\$6,228	\$5,298
Average broker fees at sale, yr. 7	\$27,214	\$24,893	\$19,002
Average other costs at sale, yr. 7	\$2,826	\$2,585	\$1,974

Source: Fannie Mae purchase acquisitions and closing cost data, 2020. The three categories are not mutually exclusive. Average mortgage payment is calculated by the authors using the average purchase price, LTV, mortgage, each borrower profile, combined with the mortgage note rate from the Freddie Mac PMMS. Due to data limitations, the sales costs are averaged for the whole sample and applied to each borrower profile as a share of sales costs.

We use the associated costs for each borrower profile in our pro forma, which reflect overall housing costs to each buyer for the standard 30-year fixed rate mortgage over a typical seven-

⁶ The small differences in credit scores across the three samples are not economically meaningful for GSE credit pricing. This is consistent with Beer et al (2018), who demonstrate there is only a moderate correlation between income and credit scores.

⁷ We use Fannie Mae averages as noted above, for illustrative purposes. Since we are relying on averages, we face differing distributions within each variable. Therefore, using the average purchase price, LTV, closing costs, and mortgage amounts may not align to an individual borrower.

year ownership period,⁸ including: closing costs at purchase, annual mortgage payments, and annual estimates of utilities, property taxes, basic home insurance (not including additional hazard insurance), repairs and maintenance, and major home improvements. We further itemize the components of mortgage costs to reflect the share attributed to the annual g-fee, upfront g-fee (also known as a Loan-Level Price Adjustment, or LLPA), servicing fee, lender revenue at time of loan sale in the secondary market (lender gain-on-sale—GOS), private mortgage insurance (or PMI, when applicable), and the remaining mortgage interest. We take these expenses as given, and are not addressing individual household-level decision-making with respect to different housing, mortgage, and location tradeoffs.

Transaction costs

We begin with the transaction costs incurred by the borrower for a home purchase and sale. Transaction cost data come from internal Fannie Mae closing costs data collected in the Uniform Closing Dataset (UCD), reflected in Table 1. In the conventional conforming mortgage market, an aspiring homeowner must have sufficient funds at purchase to cover their share of the down payment, closing costs, and sufficient remaining liquid savings (reserves) to meet their lenders' requirements to approve the mortgage. Closing (transaction) costs are not restricted to financing costs, and include all key transaction costs, such as: loan origination, appraisal, credit reports, title reports, title insurance, settlement charges, local transaction taxes and recordation fees, along with similar related costs. At sale, there are again fees related to closing, as well as seller broker fees, which we incorporate using the average broker fee percentage from the UCD and the estimated resale price for each typical borrower's home based on the year-over-year FHFA average nominal home price growth since 1992 (3.75 percent).⁹

For the purposes of this analysis, we display the down payment and principal repayment in the pro forma but separate them from the other costs that are true expenses and not part of asset building. We also assume borrowers have only one mortgage, and do not have down payment assistance. Of course, accumulating wealth for a down payment is a burden for transitioning to homeownership, and there is an opportunity cost associated with owning in the form of the return the homeowner would have made in an alternative investment had they remained a renter. However, in this exercise we are not examining the optimal tenure choice for a household, but rather, focusing on housing expenses for homeowners, and therefore treating equity as a contribution to savings and a separate consideration. We return to the wealth

⁸ While the ownership period for individual borrowers varies based on a number of factors (age, income, household composition, local housing market, and overall housing market cycle), the average owner duration has fluctuated between seven and eight years in recent years:

<https://www.attomdata.com/wp-content/uploads/2021/04/Average-U.S.-Homeownership-Tenure-Q1-2021.png>. Lengthening or reducing our assumed ownership period for different borrower profiles does not change our results or conclusions meaningfully.

⁹ Unfortunately, we have fewer data points for sales costs, so we cannot use precise cuts by borrower profile, instead we use the average broker fee (6.7%) and other sales costs (0.7%) for the whole sample. Given this average is higher than the typically negotiated fee of 6.0% (Schnare et al 2022), we also try using the median sales broker fee in our data of 5.0%, but our results are similar.

building aspect of homeownership at the end of this paper. We also include a version of our analysis where we incorporate principal repayment into overall borrower costs in Appendix B.

General housing costs

Next, we estimate ongoing housing costs for an existing home. Our model assumes the typical homeowner faces: utility costs (e.g., water, electric, gas), annual property taxes, home insurance, routine repairs and maintenance (e.g., lawn mowing, minor plumbing or electrical work), and larger capital (home improvement) expenditures (e.g., a roof or HVAC system upgrade or replacement).¹⁰ For each of these items, we rely on data from the full sample of homeowners in the 2019 American Housing Survey (AHS) and incorporate inflation over time in our pro forma using the typical inflation rates for each cost, which for most items comes from the Bureau of Labor Statistics (BLS). More information about each of these categories is detailed in Table 2. For each expense and borrower population, we tailor the average amount based on the corresponding range of property values in the data (e.g., for the average homebuyer, we calculate the average utility expense for a \$300 to 400k owner-occupied unit in 2019). This allows for variation in these costs based on property values for each type of borrower. However, this approach may underestimate the costs of critical home repair and improvements, which as noted earlier, may be necessary to protect the property's value but also difficult for lower income homeowners to afford.¹¹ On the other end of the spectrum, higher income homeowners may budget for discretionary luxury upgrades and spend more on home repairs and improvements than the average buyer.¹² We discuss these issues further in Section 5.

Table 2: Ongoing Annual Owner Non-Mortgage Costs

Item	\$ Amount	Inflation	Sources (\$; %)	Description
Utilities	\$3,444 avg \$3,324 FTHB \$3,192 LI FTHB	1.4%	AHS 2019; BLS/ Haver Data Utility Inflation, NSA, YoY, 2018	The self-reported unit-level average utility costs per month for utilities paid, which includes gas, electricity, fuel oil, other fuel, trash collection, and water (AHS 2019).

¹⁰ We exclude other potential fees such as condominium and homeowner association (HOA) fees, since only five percent of owner-occupied units are condominiums, and only roughly one-quarter of owner households pay an HOA fee. However, their inclusion in our analysis would only increase the share of non-mortgage ongoing costs relative to other owner costs.

¹¹ A recent JCHS (2021) report on home improvement expenditures shows that lower income homeowners are less likely to spend money on home upgrades. Similarly, Melzer (2017) finds that homeowners at higher risk of default spend less on both basic repairs and larger home improvements.

¹² There is a wider literature discussing the distinction between smaller maintenance expenditures and more substantial improvements, as well as disparities in housing upkeep and repair needs by age, geography, and socioeconomic status, see: Begley and Lambie-Hanson (2015); Bendimerad (2005); Davidoff (2006); Divringi et al (2019); Gyourko and Tracy (2006); Holupka and Newman (2011); Mayer and Lee (1981), among others.

Property taxes	\$4,104 avg \$3,576 FTHB \$3,084 LI FTHB	3.0%	AHS 2019; ATTOM 2018	The self-reported average property taxes include all real estate taxes on the unit, including special assessments, school and county taxes, and any other relevant tax (AHS 2019).
Home insurance	\$1,356 avg \$1,212 FTHB \$1,116 LI FTHB	1.9%	AHS 2019; BLS/ Haver: Tenants' and Household Insurance growth, NSA, YoY, 2018	The self-reported amount of average homeowner's insurance paid by homeowners (AHS 2019).
Repairs and maintenance	\$1,010 avg \$909 FTHB \$859 LI FTHB	4.5%	AHS 2019; BLS/ Haver: Repair of household items inflation YoY, 2018	The self-reported routine home maintenance activities. This includes preventive maintenance of the exterior and interior structure (for example, painting, repairing fences, fixing water pipes, termite inspections, among many others) (AHS 2019).
Capital expenditures	\$3,558 avg \$3,261 FTHB \$3,136 LI FTHB	4.5%	AHS 2019; BLS/ Haver: Repair of household items inflation YoY, 2018	The self-reported homeowner expenses towards home remodeling or major improvements or replacements over the prior two years. This number excludes routine minor repair work. We divide this number by two to get our annual estimate (AHS 2019).

Source: Amounts and description come from authors' calculations and summary from the AHS 2019, and AHS Codebook Definitions (AHS 2019). Inflation data from the BLS/ Haver and ATTOM as indicated.¹³ For expenses sourced from the AHS, we tailor the average amounts based on the corresponding range of property values: \$300–400k for the average homebuyer, \$250–350k for a FTHB, and \$200–300k for a LI FTHB.

The mortgage contribution to housing costs

The mortgage is a central focus in discussions of homeowner costs. In its simplest form, borrowers take out a mortgage to buy a home—providing a down payment from their own savings and receiving the rest of the funds for purchase from a lender. The mortgage includes an interest rate or *note rate* (in the U.S., typically a fixed rate) charged against the outstanding principal balance, which amortizes over the mortgage term (typically 30 years). In addition, for most mortgage products when the origination LTV for the mortgage is greater than 80 percent, the borrower must also pay a mortgage insurance payment, the amount of which is subject to risk-based pricing based on borrower and property characteristics and is not readily transparent in public data.

¹³ For more information, see: 2019 AHS Definitions.pdf (census.gov). Given the well documented disruptions to various housing data series during the COVID-19 pandemic, we have used 2019 or earlier data for the costs in this table.

The consequent interest payment compensates the lender for the time value of money (the 30 years to pay back the full amount of the loan), including prepayment risk (due to the penalty-free prepayment option) and the risk that the borrower may default on the loan (credit risk) along with, presumably, an element of expected profit margin. While borrowers may refinance their loan, and this will happen more often in periods of declining interest rates as borrowers seek to lower rates and costs, we are conservative in our examples and assume the same note rate exists during the seven-year homeownership period.

Once the mortgage is closed, the lender, if they are a depository, can retain the loan on their balance sheet or sell the loan in the secondary market, typically to the GSEs. Since at least 2008, most non-government loans below the conforming loan limits are eventually sold to the GSEs (Urban Institute 2021). Therefore, understanding the decomposition of charges, or revenue streams, among the various institutions once a mortgage is sold in the secondary market is required to fully understand what affects the cost of mortgage credit and homeownership for middle-class Americans.

In most research, the interest rate used to estimate mortgage costs is the Freddie Mac Primary Mortgage Market Survey (PMMS). The PMMS is based on a weekly lender survey of rates offered for the most common mortgage products, including the 30-year, fixed-rate, 80 percent LTV mortgage. Therefore, the PMMS reflects a national average of rates at a given point in time, but there is considerable variation in the rates charged to borrowers for several reasons, outlined below.

Using the PMMS rate and Fannie Mae's internal data, we apportion the zero-point 30-year fixed rate mortgage interest rate for loans sold to Fannie Mae in 2020 for each of our borrower profiles to the institution or activity being paid for by the interest payment. On a given loan, the note rate paid by the borrower is split every month to: pay the loan servicer for administrative activities (e.g., sending out statements, collecting monthly payments and making disbursements); make interest payments to the MBS investor who purchased a bond that contains the mortgage; and pay the GSE for their guarantee of the timely payment of principal and interest on the mortgage to the MBS investor, thereby relieving the lender and the MBS investor of borrower credit risk. In theory, any remaining part of the borrower's interest payment can be retained by the lender who sold the loan. In practice, that excess payment is generally converted into a one-time source of additional revenue to the lender at the time they sell a loan; this is termed gain-on-sale (GOS). These components are shown in Equation (1).¹⁴

$$\text{Mortgage Note Rate} = \text{MBS Rate} + \text{Servicing Fee} + \text{GSE G-Fees} + \text{Lender Gain-on-Sale} \quad (1)$$

¹⁴ Here, we focus on mortgage costs as relevant to the borrower. For a detailed overview of the primary-secondary spread and components of lender profits over time, see Fuster et al (2013, 2021).

Thus, once a loan is going to be sold into the secondary market, the note rate paid by the borrower needs to be sufficient to cover the yield demanded by mortgage-backed investors (MBS Rate) and related services to make the MBS security attractive to global investors. The GSEs allow lenders to collect a servicing fee of at least 25 basis points from the borrower's interest payment, with a maximum of 50 basis points starting in 2019.¹⁵ While the servicing fee may vary across lenders and loan type, we use 25 basis points in our examples below. In addition to the MBS rate and servicing fee, the borrowers' payment must be sufficient to cover the fee charged by the GSEs for guaranteeing the timely payment of principal and interest to MBS investors and ongoing administration of MBS (g-fees). Every loan sold to a GSE is charged an ongoing g-fee. In some cases, lenders also pay an additional one-time fee at the time of loan delivery, the LLPA. It is important to note that a borrower may also choose to offset some of the overall ongoing interest charge on their mortgage by paying points upfront as part of their closing costs to lower their rate, but for our analysis, we use the zero-point rate for 2020 as a starting point (i.e., we assume no upfront interest rate offset by the borrower). To calculate the zero-point rate from the PMMS series, we take the PMMS rate and associated points, then divide the points by four and add this value to the rate (i.e., each point is equal to a one-fourth of a percentage point reduction in note rate).

The ongoing g-fee is an annual payment charged as a percentage of the loan balance for the life of the loan, which the lender passes onto the borrower through the interest (note) rate. Since April 2012, the ongoing g-fee rate incorporates 10 basis points as a contribution to a payroll tax cut enacted as part of the Temporary Payroll Tax Cut Continuation Act of 2011 (TCCA), and since August 2012 it has included an additional 10 basis points mandated by FHFA. The ongoing g-fee varies by product type, and regulation limits disparities in the fees charged to lenders based on their specific loan volumes (FHFA 2020). The FHFA sets the ongoing g-fee floor for MBS transactions (as of 2021, it is around 44 basis points). Thus, we use the ongoing g-fee average of 44 basis points in our analysis below.¹⁶

The LLPA reflects specific borrower credit risk for a loan based on borrower credit scores, LTV, and other property and loan characteristics. The specific LLPA fees are publicly available in a matrix regularly updated by the GSEs.¹⁷ While these fees are charged to lenders upfront, lenders often convert them to an annual flow charge for purposes of passing through the fee to the borrower. Thus, for borrowers, the ongoing g-fee and the LLPA are both folded into the interest rate. The lender conversion of the LLPA into an ongoing charge is based on the specific LLPA fee for the borrower divided by the expected life of the loan, as shown in Equation (2). While

¹⁵ <https://servicing-guide.fanniemae.com/THE-SERVICING-GUIDE/Part-A-Doing-Business-with-Fannie-Mae/Subpart-A2-Getting-Started-with-Fannie-Mae/Chapter-A2-3-Servicer-Compensation/A2-3-02-Servicing-Fees-for-Portfolio-and-MBS-Mortgage/1581707841/A2-3-02-Servicing-Fees-for-Portfolio-and-MBS-Mortgage-Loans-09-09-2020.htm>

¹⁶ FHFA puts out an annual summary report on g-fee characteristics and trends, which includes summary information on g-fee dynamics using GSE data (FHFA 2020).

¹⁷ For example, Fannie Mae's LLPA matrix is available here:
<https://singlefamily.fanniemae.com/media/9391/display>

this may vary by specific loan characteristics and prepayment risk, for our purposes we assume the LLPAs for a single-family purchase mortgage are divided by five and applied to the rate, based on typical lender behavior. For example, for the average purchase borrower profile for a single-family detached home in 2020, the LPA would be 25 basis points, divided by five provides an annual amount of five basis points, which we assume is passed through to the borrower in their note rate.¹⁸

$$\text{Ongoing LPA Charge} = \text{Upfront LPA} / \text{Expected Life of Loan} \quad (2)$$

The upfront LPA charge has a wide potential range of values and can be as high as 375 basis points for a borrower with a credit score below 620 and LTV greater than 97 percent. However, in practice due to the availability of special mortgage products geared to lower income borrowers with low down payments, such as HomeReady®, Housing Finance Agency (HFA) loans, and Duty To Serve lending programs, in addition to the actual credit attributes of loans delivered to Fannie Mae, many loans to low-income purchase borrowers in 2020 received LPA rebates or credits.¹⁹ These loans also typically allow lower PMI coverage levels, which gets passed through to borrowers, as PMI is typically paid directly by the borrower. As an illustration of the typical variation across lower income borrowers, Table 3 shows the median LLPAs for different low-income borrower profiles in Fannie Mae’s 2020 owner-occupied purchase mortgages along with their share of total purchase owner-occupied acquisitions. For low-income purchase borrowers, the median LLPAs ranged from -50 to 50 basis points.

Table 3: Median LLPAs for Low-Income Purchase Borrowers

	LTV ≤ 90%	LTV > 90%	% of total volume
LI, not FTHB, HomeReady, or HFA	25	25	8%
LI FTHB, Not HomeReady, or HFA	50	50	10%
LI FTHB, HomeReady	0	0	7%
LI FTHB, HFA	-50	-50	1%

Note: Median LLPAs for each subpopulation and LTV from Fannie Mae’s 2020 acquisitions. The sample is restricted to conventional 30-year fixed rate loans on single-family homes, excluding the additional LPA associated with condominiums.

Next, we turn to the additional lender revenue, or GOS, received when selling a loan into the secondary market. The GOS is a direct function of any remaining interest stream from the borrower once all items have been covered (MBS rate, servicing fee, and g-fees). For a view of

¹⁸ Note, 25 basis points is the average LPA, which we assume is fully included in our calculated zero-point rate. For LLPAs above 25 basis points, the note rate may increase to take into account the additional LPA. For borrower profiles that face an additional LPA, we divide the amount above 25 by five and add the additional basis points to the stated note rate.

¹⁹ HomeReady® is also subject to an LPA cap. Begley et al (2021) provide an overview of borrower characteristics and early performance outcomes for the HomeReady® affordable mortgage, along with a view of the borrower cost and performance tradeoffs between FHA and HomeReady across the credit score-LTV matrix. Hembre et al (2021) similarly provide a comparative analysis of HFA loan performance using GSE data.

this borrower cost, we rely on the primary-secondary spread, which is the difference between a mortgage's interest rate and the coupon rate on the MBS pool into which it is sold. Differences in this gap are indicative of the magnitude of the lender GOS. The MBS pools have coupon rates that are less than the mortgage rate, and the excess between the two is split between the g-fees, servicing fees, and remaining interest that is converted into the lender GOS, as reflected in Equation (3). We use the Bloomberg 365-day average primary-secondary spread for 2020, which was 147 basis points (PSSACF30 IR Index). We then backout the 25 basis points for servicing and the 49 basis points in g-fees, which is inclusive of the ongoing g-fee and LLPA, as described above. Thus, for our typical borrower, we assume the remaining 73 basis points of ongoing borrower payments is available to be capitalized into a one-time gain that goes to the lender upfront when the loan is sold. Practically, this means the 73 basis points from the annual note rate as shown in Equation (1) is converted to a one-time flow to the lender at sale. For our thought exercise, we assume the same five-year multiple as is typically applied to LLPAs. Multiplying the annualized 73 basis point charge by five equals 365 basis points or a 3.65 percent upfront gain to the lender, which they receive on the unpaid principal balance of the mortgage being securitized.²⁰

While we use 73 basis points as an approximation of the typical GOS allocated in the note rate for our analysis, the GOS for any individual loan varies quite a bit across lenders depending on their business model, lender-specific costs, loan terms, and loan origination channel.²¹

$$\text{Lender GOS} = \text{Primary-Secondary Spread} - \text{Servicing Fee} - \text{G-Fees} \quad (3)$$

For most loans where the origination LTV is greater than 80 percent the borrower must pay for PMI, typically as a separate payment. Mortgage insurance may also be paid entirely upfront by the borrower, partially paid upfront and or paid by the lender (which presumably the lender folds into the note rate offered to a potential borrower). Mortgage insurance rates vary by insurer and are not readily available to the public. Additionally, as is the case with lenders, mortgage insurance providers often have their own risk-based pricing for risk-layers that may increase charges beyond those seen in the LLPA grid (such as the number of borrowers). We use

²⁰ While there is also the difficult to predict issue of interest rate fluctuations and hedging by lenders between loan closing and sale to the secondary market, this is close to the MBA estimate of an average of 355 basis points in lender net secondary marketing income for 2020, although they also show that this number varies widely based on lender characteristics and the average was smaller in 2018 and 2019 (282 basis points) (MBA 2021, Tables B2, C2, and D2).

²¹ For example, mortgage brokers typically charge more for their services than direct lenders. Lenders may also have their own internal risk-based loan charges and / or lenders may also “buy-up” or “buy down” the g-fee in their transaction with the GSEs, both of which will also change their specific profits. For a detailed explanation of lender tradeoffs in the secondary market, see Fuster et al (2013). Additionally, a discussion of market frictions, increases in lender profits and GOS, and credit supply constraints during COVID is covered in Fuster et al (2021).

the mortgage insurance rate card published by MGIC in 2019,²² assume it is paid separately, and that it remains in place until the LTV of the mortgage drops below 78 percent based on the Fannie Mae servicing guide²³ and our assumptions of price appreciation, mentioned earlier.

Net proceeds

Finally, we include an estimated price for the sale of the home in year seven, as described above, and we calculate net proceeds using this amount less the mortgage balance and average seller closing costs (including broker fees) as a share of sale price at the end of year seven.²⁴ An example of the pro forma for the average purchase borrower in Fannie Mae's 2020 acquisitions is shown in Table 4.

Putting the mortgage costs in context: a stylized example

For our approximation of the full view of costs, we use a simplified version of the user-cost framework to model a seven-year ownership period. This view of owner costs factors in transaction costs, ongoing mortgage and non-mortgage costs, and mortgage costs that vary over time, such as mortgage insurance and LLPAs. To do this, we use a discounted cash flow pro forma model, which includes the initial outlays (down payment, average closing costs) for the home purchase assumed to be in the present period (or 'year 0'); the housing- and mortgage-related annual costs for each of the next seven years inflated by relative inflation measures for each line item, if applicable, and incorporates the net proceeds upon sale in year seven. With the full seven-year pro forma in hand, we then discount the entire stream of flows to the present (year 0). We use a two percent discount rate, which is aligned with the Federal Reserve's inflation target.²⁵ Table 4 reflects the layout of the pro forma for our average homebuyer.

Table 4: A Pro Forma View of Purchase Borrower Costs and Payments

	Year 0	Years 1–6 (per-year)	Year 7
<i>Purchase Costs</i>			
Closing Costs	\$6,693		
<i>Annual Housing Costs</i>			

²² <https://www.mgic.com/-/media/mi/rates/rate-cards/71-61284-rate-card-pdf-bpmi-monthly-july-2018.pdf?la=en>

²³ [B-8.1-04: Termination of Conventional Mortgage Insurance \(05/15/2019\) \(fanniemae.com\)](https://www.fanniemae.com/resources/insights/articles/B-8.1-04-Termination-of-Conventional-Mortgage-Insurance-05152019)

²⁴ Of course, price appreciation will vary greatly by location, price tier, and market cycle. We believe that 3.75 percent nominal growth rate is conservative given we also use a 2.0 percent discount rate in our analysis, implying real price growth of 1.75 percent over time. Additionally, the three borrower profiles include housing values that are solidly within the middle-tier of typical national housing values for 2020 according to the Zillow ZHVI (\$268,418 as of December 2020).

²⁵ We also tried a range of discount rates to reflect different risk premiums and borrower opportunity costs, but higher rates do not substantially change our results.
https://www.federalreserve.gov/faqs/economy_14400.htm

Utilities		\$3,444	\$3,744
Property Taxes		\$4,104	\$4,900
Insurance		\$1,356	\$1,518
Repairs & Maintenance		\$1,010	\$1,315
Capital Expenditures		\$3,558	\$4,633
<i>Annual Mortgage Costs</i>			
MBS Rate		\$4,739	\$4,121
Ongoing G-Fee		\$1,140	\$991
Servicing		\$647	\$563
LLPA/5		\$129	\$113
Lender GOS		\$1,891	\$1,644
Mortgage Insurance		\$518	
<i>Sales Costs</i>			
Broker Commissions			\$27,758
Other Closing Costs			\$2,883
Total Outflow	\$6,693	\$22,536	\$54,183

Note: An example pro forma for the average home purchase borrower in Fannie Mae's 2020 acquisitions in nominal \$. Authors' calculations using inputs as described above and shown in Tables 1 and 2. Year 1 amounts are reflected in the table, the inflation-adjusted values for years 2–6 and owner equity payments are not shown.

4. Results

Table 5 shows the results of our analysis for the average borrower. Here, we can see that the largest components of overall costs for the average borrower are property taxes (16.0 percent), interest paid to MBS investors (15.9 percent), capital improvement expenditures (14.5 percent), the home sale-related broker fees (13.3 percent), and ongoing utility costs (12.8 percent).²⁶ In contrast, the other components of housing costs are relatively small—except for lender GOS (6.2 percent), the rest of the line items comprise five percent or less of total costs. Ongoing non-mortgage housing costs are more than half of overall costs. Total mortgage costs not including principal repayment are about 30 percent of total costs, with the g-fee and LLPA comprising 4.2 percent of total costs, and the servicing fee 2.2 percent. Additionally, transaction costs related to purchase and sale costs comprise 18.4 percent of total costs, with closing costs summing to roughly four percent of total costs, but also 10 percent of *upfront* outlays, and broker fees comprising 13.3 percent of total costs and 91 percent of the closing costs *at sale*.

²⁶ When we use the median broker fee in our sample of 5.0%, broker fees as a share of total costs fall to 10.3%, and the other costs increase slightly so that utility costs now overtake broker fees. However, the overall results, including the key components of housing costs, remain the same.

Table 5: Total Present Value of All Ownership Costs, Average Borrower

Ownership Costs	Investment Flows & Price Data	Costs \$	Total Costs & % of Costs
<i>Total</i>			\$181,518
<i>At Time of Purchase</i>			
Purchase Price	\$318,281		
Down Payment	\$59,303		
Closing Costs		\$6,693	3.7%
<i>Ongoing Costs Yrs. 1-7</i>			
Total Annual Utility Costs		\$23,222	12.8%
Total Annual Property Taxes		\$29,007	16.0%
Total Annual Insurance		\$9,279	5.1%
Total Annual Repairs & Maintenance		\$7,462	4.1%
Total Annual Capital Expenditures		\$26,288	14.5%
MBS Rate		\$28,779	15.9%
Annual Interest Cost for GOS		\$11,480	6.3%
Total Annual G-Fee		\$6,919	3.8%
Total Annual Servicing		\$3,932	2.2%
LLPA		\$786	0.4%
Total PMI Payments		\$996	0.5%
Principal Repayment Yrs 1-7	\$36,967		
<i>At Time of Sale</i>			
Estimated Sales Price	\$403,764		
Remaining Mortgage Balance	\$214,601		
Broker Fees		\$24,165	13.3%
Other Closing Costs		\$2,510	1.4%
Net Proceeds	\$141,297		

Source: Author calculations of the total lifetime costs of ownership for the average purchase borrower in Fannie Mae's 2020 acquisitions.

Housing costs for FTHBs

While the focus of Table 5 is the average borrower, we saw earlier that borrower costs will vary based on credit profile, loan size and home purchase price. Here, we turn to the remaining two borrower profiles we outlined in Table 1: the average FTHB, and the average low-income FTHB.

Table 6: Total Present Value of All Ownership Costs, Average FTHB Borrower

Ownership Costs	Investment Flows & Price Data	Costs \$	Total Costs & % of Costs
<i>At Time of Purchase</i>			\$172,561

Purchase Price	\$291,139		
Down Payment	\$37,697		
Closing Costs		\$6,228	3.6%
<i>Ongoing Costs Yrs 1-7</i>			
Total Annual Utility Costs		\$22,413	13.0%
Total Annual Property Taxes		\$25,275	14.6%
Total Annual Insurance		\$8,293	4.8%
Total Annual Repairs & Maintenance		\$6,716.13	3.9%
Total Annual Capital Expenditures		\$24,093.85	14.0%
MBS Rate		\$28,164	16.3%
Annual Interest Cost for GOS		\$11,235	6.5%
Total Annual G-Fee		\$6,772	3.9%
Total Annual Servicing		\$3,847	2.2%
LLPA		\$769	0.4%
Total PMI payments		\$4,355	2.5%
Principal Repayment	\$36,176		
<i>At Time of Sale</i>			
Estimated Sales Price	\$376,719		
Remaining Mortgage Balance	\$210,013		
Broker Fees		\$22,104	12.8%
Other Closing Costs		\$2,296	1.3%
Net Proceeds	\$131,841		

Source: Author calculations of the total lifetime costs of ownership for the average FTHB purchase borrower in Fannie Mae's 2020 acquisitions.

Despite different purchase, leverage, and operating expense assumptions leading to lower costs by dollar amount, the overall breakdown of costs for FTHB borrowers is similar to that of the average borrower. Once again, non-mortgage ongoing costs comprise roughly half of total costs, and mortgage-costs are 32 percent. The largest components of overall costs are still the property taxes, interest charges net of fees and GOS, the broker fees paid at sale, utility costs, and capital improvement expenditures. The one notable difference is that the additional cost of mortgage insurance, while still relatively small, is a bigger share of costs due to the higher initial mortgage balances and LTVs at purchase (2.5 percent of total costs in Table 6 compared to 0.5 percent of total costs in Table 5).

Similar to Table 5, transaction costs for purchase and sale over the seven-year period sum to roughly 18 percent of total costs, with closing costs other than broker fees comprising only 4.9 percent of total costs, but notably a larger share, 14 percent, of total *upfront* outlays, and broker fees are 12.8 percent of total *overall* costs.

Finally, we turn to the ownership costs for low-income FTHB borrowers as shown in Table 7. These results show the same approximate breakdown in costs for the borrower—although ongoing non-mortgage costs are now 55 percent of total costs and mortgage costs drop to 29 percent of overall costs. Transaction costs are 16.3 percent of overall costs, with closing costs now comprising 16 percent of *upfront* outlays, and broker fees are 11.5 percent of total *overall* costs. One caveat here is that, as shown in Table 3, while the LLPAs comprise 0.4 percent of the total costs in this example, LLPAs vary based on a number of factors and may be slightly higher, close to zero or negative for high-LTV lower-income FTHB borrowers due to the availability of mortgage products that offer LPA credits instead of charges for these borrowers.

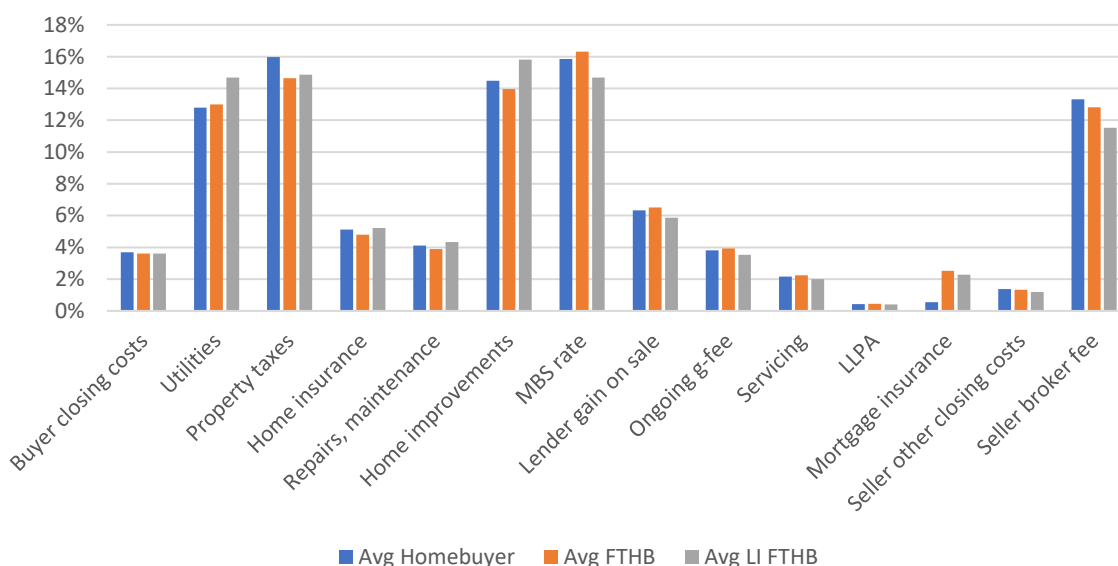
Table 7: Total Present Value of All Ownership Costs, Average LI FTHB Borrower

Ownership Costs	Investment Flows & Price Data	Costs \$	Total Costs & % of Costs
<i>At Time of Purchase</i>			\$146,550
Purchase Price	\$222,243		
Down Payment	\$28,504		
Closing Costs		\$5,298	3.6%
Total Upfront Outlays	\$33,802		
<i>Ongoing Costs Yrs 1-7</i>			
Total Annual Utility Costs		\$21,523	14.7%
Total Annual Property Taxes		\$21,797	14.9%
Total Annual Insurance		\$7,636	5.2%
Total Annual Repairs & Maintenance		\$6,347	4.3%
Total Annual Capital Expenditures		\$23,170	15.8%
MBS Rate		\$21,529	14.7%
Annual Interest Cost for GOS		\$8,588	5.9%
Total Annual G-Fee		\$5,176	3.5%
Total Annual Servicing		\$2,941	2.0%
Total LPA		\$588	0.4%
Total PMI payments		\$3,329	2.3%
Principal Repayment	\$27,655		
<i>At Time of Sale</i>			
Estimated Sales Price	\$281,932		
Remaining Mortgage Balance	\$145,747		
Broker Fees		\$16,873	11.5%
Other Closing Costs		\$1,752	1.2%
Net Proceeds	\$100,415		

Source: Author calculations of the total lifetime costs of ownership for the average low-income FTHB purchase borrower in Fannie Mae's 2020 acquisitions.

These cost breakdowns across the three borrower profiles are shown in Figure 1. While many categories were found to be a similar share of costs across borrowers, utilities and home improvements are disproportionately larger shares of low-income FTHB borrower costs. Not surprisingly, the costs that are charged as a percentage of property or mortgage value, such as property taxes, the MBS rate, and the seller broker fee, decline as a share of overall cost for FTHB and low-income FTHBs who have lower property values and mortgage balances at origination. Appendix B includes an analogous version of this figure incorporating the total principal repayment for each borrower as a share of costs as well, with utilities and home improvement expenses consistently a larger share of low-income FTHB costs. We discuss these disparities in costs further in Section 5.

Figure 1: Breakdown of Borrower Costs by Borrower Profile



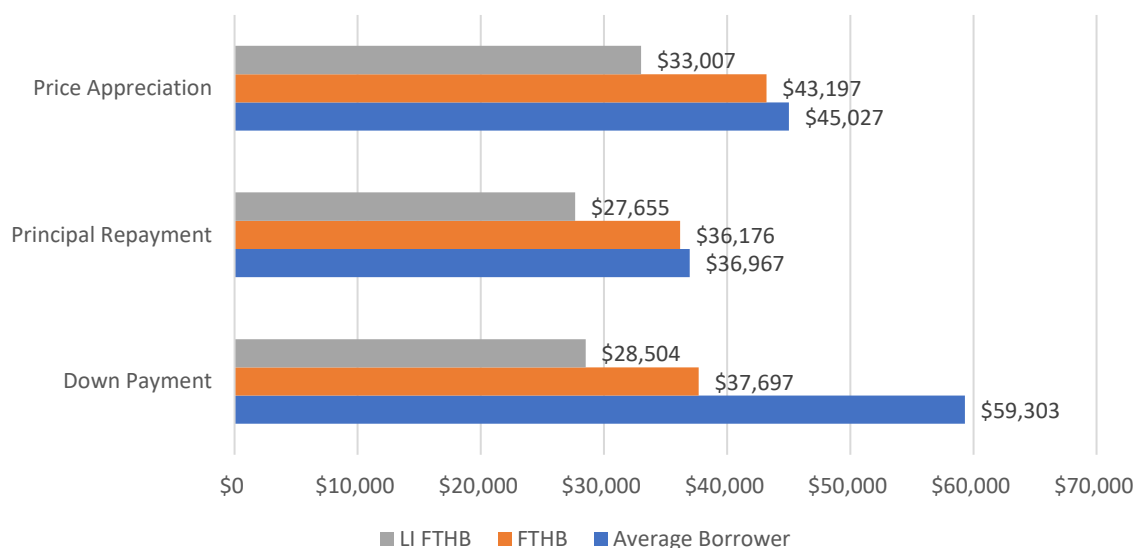
Source: Author calculations of the total lifetime costs of ownership for the average homebuyer, FTHB, and low-income FTHB purchase borrower in Fannie Mae's 2020 acquisitions.

The general patterns are similar when we parse these data by race and ethnicity, with the largest share of costs dominated by utilities, property taxes, home improvements, the MBS rate, and the seller broker fee appearing as the largest share of costs. What stands out, however, is that mortgage insurance is a larger share of costs for Black and Hispanic FTHB and LI FTHB borrowers, increasing to five percent of costs, presumably due to higher LTVs (leading to PMI being in force for a longer period of time). These figures cut by race and ethnicity are shown in Appendix A (Figures 1-3).

Contributions to Housing Equity

Next, we use our stylized examples to explore differences in equity and wealth building for each borrower profile. As shown in Table 1, the main differences across borrowers are with the purchase price and LTVs. We use this information to estimate the down payment for each borrower profile, and then use the differences in our pro forma assumptions, the mortgage amortization schedules, and our estimates of future sales values of properties net of sale costs described earlier to calculate the relative components of overall housing equity at the time of sale for each borrower. These results are shown in Figure 2.

Figure 2: Projected Homeownership Equity Accumulation, by Borrower Profile



Source: Author calculations of the total lifetime equity accumulation attributed to homeownership for the average borrower, average FTHB, and average low-income FTHB purchase borrower in Fannie Mae's 2020 acquisitions as described in Table 1.

This figure highlights some notable differences in equity building for different borrowers. For example, for the average borrower, total net wealth at sale would be more than \$141k, with principal repayment and price appreciation account for 63 percent of this total. On the other hand, for LI FTHBs, the total net proceeds at sale are roughly \$90k, with 72 percent of that total accumulation due to principal repayment and appreciation. The average borrower with the initial higher down payment and purchase price ultimately experiences a greater dollar increase in wealth, but the return on the investment for the LI FTHB is higher given the lower initial down payment. Looking at this same breakdown by race and ethnicity shows even starker patterns for Black and Hispanic FTHB and LI FTHB borrowers, with close to 80 percent of equity coming from the principal repayment and price appreciation, and more than half of this amount coming from price appreciation. In contrast, Asian borrowers have roughly two-thirds of their equity coming from principal repayment and price appreciation, but overall higher cumulative total wealth levels due to larger down payments, appreciation, and principal payment in dollar amounts (Appendix A, Figures 4-6).

This reliance on principal repayment and price appreciation poses challenges for wealth accumulation, especially when transaction costs are a large share of owner costs and homeownership spells vary. Longer periods of homeownership will be more advantageous for building up principal and benefitting from price appreciation, but lower income homeowners are also more likely to face volatile local home prices and to exit homeownership during economic downturns, potentially erasing these gains (Belsky et al 2005, Goodman and Mayer 2018). Importantly, a number of papers show that differences in housing price appreciation for racially diverse neighborhoods affect housing wealth outcomes accumulation for Black homeowners (examples include: Immergluck et al (2019), Flippen (2004), and Newman and Holupka (2016)). Yet, Santiago et al (2010) and Herbert et al (2013) still demonstrate consistent positive financial gains to low-income and non-white homeowners from homeownership overall. Recent work by Kermani and Wong (2021) suggests that financial distress is a key driver of these wealth disparities, making this work identifying the key components of housing costs particularly important.

5. *Discussion*

Identifying opportunities to reduce the cost of owning without increasing the chances of mortgage default is a key challenge to achieving sustainable homeownership. As mentioned earlier, past policies emphasizing alternative underwriting standards to expand mortgage access led to negative borrower outcomes, particularly for lower income and non-white homebuyers. In response, the availability of riskier products has declined, underwriting practices have improved, and the mortgage credit box has tightened substantially (Goodman 2017). Policymakers continue to search for opportunities increase homeownership rates while reducing the risk of default and foreclosure.

Our analysis suggests a few key takeaways and multiple potential ‘high-impact’ areas for policymakers to address. First, our decomposition shows that policy efforts would be most effective by focusing on ways to reduce the largest components of overall costs (transaction costs, ongoing utility expenses, property taxes, home improvement costs, and component of the mortgage note rate that compensates investors for the time value of money). The recent increases in mortgage rates and non-mortgage costs (given the general rise in inflation) may result in some alteration in the relative contribution of each expense to overall costs for new homebuyers; however, for our sample of current borrowers with fixed note rates, the overall rise in inflation has likely made the non-mortgage expenses more salient since 2020.

For these ongoing non-mortgage costs in particular, expanding programs that help to reduce utility costs and limit property tax burdens for low-income households are obvious solutions. Lower utility costs would benefit renters as well, affording them more disposable income and savings. Potential programs to address high utility and property tax burdens for lower income households include income-based utility-assistance programs, such as through the Low Income Home Energy Assistance Program (LIHEAP) (Perl 2015; Murray and Mills 2014), and targeted property tax-relief programs, such property tax deferrals, homestead exemptions credits, and

circuit breakers (Langley and Youngman 2021). Langley and Youngman (2021) provide an overview of each of these tax programs and offer detailed insights into the costs and benefits of these policies for both jurisdictions and homeowners.

Home repair and improvement expenses also stand out as a particular area of concern. Prior research shows that lower-income households are more likely to have critical home repair needs, and that even relatively modest unexpected budget shocks due to necessary home repairs and improvements may create stress for low-income households and force difficult spending tradeoffs (Acquaye 2011, Divringi et al 2019, Van Zandt and Rohe 2011). A recent JCHS (2021) report analyzing the same AHS repair and improvement data we use in more detail shows that lower income homeowners are more likely to spend money on replacement projects, and disaster repairs than their higher income counterparts. Moreover, we see an increased importance of home appreciation in overall wealth building for lower income and non-white borrowers, making expenditures that will potentially improve or maintain value and stave off depreciation particularly crucial. Energy-efficient home improvements would also lower household energy-related utility costs. Thus, expanding programs that help homeowners with home repairs and improvements expenses may have the most meaningful influence on sustaining homeownership. Some examples include: home warranties, home improvement subsidies through grants or low-cost financing, weatherization assistance programs, dedicated reserve requirements, and pre-and post-purchase home maintenance training and coaching.²⁷

Second, given the potential for GOS and PMI payments to vary across lender and mortgage insurance provider, the fact that the GOS marginal contribution to housing costs is large, the PMI contribution is a larger component of mortgage costs for Black and Hispanic borrowers, along with the steep rise in interest rates in 2022, more transparency into lender GOS and mortgage insurance contribution to costs would help policymakers and researchers address these ‘black-box’ components of housing costs.

Of course, refinancing may lower mortgage costs during periods of declining interest rates.²⁸ Policies to further reduce barriers to refinancing may contribute to sustaining homeownership as discussed in Eberly and Krishnamurthy (2014). Recent efforts have included low-cost refinancing options offered by the GSE, FHA and VA borrowers. Research also suggests that programs that provide financial counseling to help households navigate mortgage options, lower overall costs, and to understand when refinancing is beneficial are also beneficial for borrowers (for example: Bhutta et al 2020; Mallaris et al 2021; Moulton and Roll 2019; and Moulton et al 2013).

²⁷ Papers exploring programs and policy solutions to assist with energy efficiency, weatherization and other home repair costs in detail include: Acquaye (2011); Begley and Lambie-Hanson (2015); Divringi et al (2019); Fuller et al (2010); Moulton (2022); Murray and Mills (2014); Perl (2015); Rohe et al (2010); and Van Zandt and Rohe (2011).

²⁸ Mortgage research overwhelmingly finds that lower income and non-white borrowers are less likely to refinance and that lower balance loans are less likely to benefit from refinancing (Agarwal et al 2017; Gerardi et al 2020, 2021; Keys et al. 2016).

Finally, we see that transaction costs consistently comprise close to 20 percent of overall costs, indicating another potential area for addressing costs. To that end, Mota and Palim (2021) highlight disparities in these costs as well as potential solutions, such as capping closing costs for qualified FTHB. Programs aimed at reducing purchase costs to borrowers, such as shared equity and down payment assistance programs are potential ways to help reduce upfront borrower costs and outlays. Additionally, the real estate broker fees paid at sale contribute to a large share (~13 percent) of overall costs and the majority of closing costs at sale, pointing to another area of potential innovation.²⁹

While our results are stylized examples for several representative borrower profiles using data from over a million actual homebuyers in 2020, we have some caveats about the findings. First, given our use of averages and our combining of different data sources, we will certainly miss variation within the distributions of different variables in our analysis—for example, our averages will mask differences in housing prices and improvement costs within our borrower categories across geographies. As we are using data from 2018 through 2020, we do not incorporate COVID’s influence on the housing market and housing financing, which led to significant increases in home prices and large movements in mortgage rates from March 2020 through December 2022. As the ongoing normalization of monetary policy illustrates the full effects of the pandemic and associated policy responses have probably not run their full course, making a post-pandemic assessment a bit premature. Additionally, as mentioned earlier, some items like lender GOS and mortgage insurance rates are not readily available to the public and will also vary greatly across entities, thus our assumptions are market-wide averages and general estimates. We are also not including income tax benefits in our analysis. Our view is of the costs associated with the housing unit only. This means we are not accounting for state and local property tax deductions or the potential wealth-building benefits of taking the mortgage interest deduction, which is less likely to be taken by low-income households.³⁰

Finally, our view into mortgage costs is specific to the GSE mortgage space, so it is only generalizable to the costs for those borrowers. Notably, it does not include government-insured mortgages, such as FHA and VA loans—roughly 20 percent of the market in 2020 (Urban Institute 2021). FHA and VA loans have lower credit score requirements, serve a large share of low-income borrowers, and incorporate different credit pricing schemes. For example, Black home purchase borrowers were approximately seven percent of the entire first-lien mortgage market in 2020, roughly four percent of Fannie’s 2020 purchase book of business, but 15 percent of FHA purchase originations (CFPB 2021, Fannie Mae 2021, HMDA 2020). And while FTHBs are a large share of Fannie Mae’s market, 50 percent, FHA has a larger share of FTHBs, around 70 percent. Unfortunately, we do not have access to the necessary data to quantify an analogous mortgage cost breakdown for these borrowers. However, as Begley et al (2021) show, these

²⁹ Indeed, innovation is already occurring in this area, with new models of online brokerages offering rebates and flat fees. One such example is Yoreevo: <https://yoreevo.com/how-it-works>.

³⁰ Only roughly 14 percent of all taxpayers itemize deductions, making them eligible for such deductions (Eastman and Tyger 2019).

markets do overlap, and whether FHA or HomeReady® is the lower cost mortgage option depends on where specific borrowers fall within their relevant LLPA matrix.

6. *Conclusion*

This paper identifies the biggest contributors to housing costs for homeowners in the hope of informing policy to reduce housing costs and facilitate wealth-building through sustainable homeownership. We provide a thought exercise that elucidates the specific costs related to the mortgage, home purchase, sale, and other related costs that are difficult to measure from other data sources. This emphasis is particularly important today, given the wide swings in mortgage note rates and inflation over the last decade and the important current policy focus on addressing barriers to and the sustaining of homeownership for low-income and non-white households.

A key challenge for researchers is an accurate enumeration of housing costs. Thus, we focus on breaking out the components of housing costs for homeowners, particularly low-income and FTHBs, which we feel is crucial for informing policymakers as to the key contributors to the cost of homeownership; and, thereby, highlighting the areas and institutions that could work to reduce these costs. We use Fannie Mae 2020 acquisitions and closing cost data combined with 2019 AHS data to derive detailed cost estimates for three different typical borrower profiles and highlight their largest components of expenses. A major contribution is our focus on the mortgage-specific components of housing costs. We also look at differences in wealth accumulation over time from homeownership for each type of borrower, and we examine potential racial and ethnic disparities in costs.

Despite differences in borrower profiles, the largest components of overall housing costs are consistently non-mortgage ongoing costs (about 50 percent of total costs). Specifically, utilities, property taxes, and home improvement expenses are the largest of these expenses for all homeowners. Of mortgage costs, which are roughly 30 percent of total costs, the note rate net of other fees (the MBS rate) is the largest component of costs, followed by the lender GOS. Transaction costs are also a critical part of overall costs, collectively comprising about 20 percent of the total costs, with seller broker fees at sale as the largest expense. The fees charged to cover borrower credit risk that are part of the cost of the mortgage, GSE g-fess (roughly four percent) and PMI (roughly one to six percent) are a relatively small part of the cost of homeownership. However, PMI is a disproportionately larger share of costs for Black and Hispanic FTHB and LI FTHB borrowers (roughly six percent, compared to two percent for white borrowers and one percent for Asian borrowers).

While we did not find a single cost that stands out as the panacea fix for addressing housing costs, the above analysis highlights several key areas for policymakers to address and also offers a view into potential disparities in housing costs for different borrowers. We hope this analysis will help frame future conversations related to the costs of homeownership and the barriers to sustainable transitions, ownership, and lifetime wealth building for lower income households.

References

- Acquaye, Lucy. "Low-income homeowners and the challenges of home maintenance." *Community Development* 42.1 (2011): 16-33.
- Agarwal, Sumit, Itzhak Ben-David, and Vincent Yao. "Systematic mistakes in the mortgage market and lack of financial sophistication." *Journal of Financial Economics* 123.1 (2017): 42-58.
- Beer, Rachael, Felicia Ionescu, and Geng Li. "Are income and credit scores highly correlated?" *FEDS Notes* (2018).
- Begley, Jaclene, et al. "Benchmarking a New Affordable Home Mortgage." *Available at SSRN 3910816* (2021).
- Begley, Jaclene, and Lauren Lambie-Hanson. "The home maintenance and improvement behaviors of older adults in Boston." *Housing Policy Debate* 25.4 (2015): 754-781.
- Belsky, Eric S., Nicolas Retsinas, and Mark Duda. 9. *The Financial Returns to Low-Income Homeownership*. Cornell University Press, 2018.
- Bendimerad, Amal. *Understanding generational differences in home remodeling behavior*. Joint Center for Housing Studies, Graduate School of Design [and] John F. Kennedy School of Government, Harvard University, 2005.
- Bhutta, Neil, and Aurel Hizmo. "Do minorities pay more for mortgages?" *The Review of Financial Studies* 34.2 (2021): 763-789.
- Bhutta, Neil, Andreas Fuster, and Aurel Hizmo. "Paying too much? Price dispersion in the US mortgage market." (2020).
- Bourassa, Steven C., and Donald R. Haurin. "A Dynamic Housing Affordability Index." *International Real Estate Review* (2016).
- Caplin, Andrew, Anna Cororaton, and Joseph Tracy. "Is the FHA Creating Sustainable Homeownership?" *Real Estate Economics* 43.4 (2015): 957-992.
- Consumer Finance Protection Bureau (CFPB). "Data Point: 2020 Mortgage Market Activity and Trends." *Consumer Finance Protection Bureau Report*, August 2021.
- Díaz, Antonia, and María José Luengo-Prado. "On the user cost and homeownership." *Review of Economic Dynamics* 11.3 (2008): 584-613.

DiPasquale, Denise, and Edward L. Glaeser. "Incentives and social capital: Are homeowners better citizens?" *Journal of urban Economics* 45.2 (1999): 354-384.

Divringi, Eileen, et al. "Measuring and Understanding Home Repair Costs: A National Typology of Households." *Philadelphia, PA: Federal Reserve Bank of Philadelphia and PolicyMap*. <https://www.policymap.com/issues/housing-quality> (2019).

Eastman, Scott and Anna Tyger. "The Home Mortgage Interest Deduction." *Tax Foundation Fiscal Fact No. 671*, October 2019.

Eberly, Janice, and Arvind Krishnamurthy. "Efficient credit policies in a housing debt crisis." *Brookings Papers on Economic Activity* 2014.2 (2014): 73-136.

Faber, Jacob William. "Segregation and the geography of creditworthiness: Racial inequality in a recovered mortgage market." *Housing Policy Debate* 28.2 (2018): 215-247.

Fannie Mae. "Annual Housing Activities Report, Annual Mortgage Report 2020." *Fannie Mae Report*, 2021.

Federal Housing Finance Agency. "Fannie Mae and Freddie Mac Single-Family Guarantee-Fees in 2019." (December 2020).

Flippen, Chenoa. "Unequal returns to housing investments? A study of real housing appreciation among black, white, and Hispanic households." *Social Forces* 82.4 (2004): 1523-1551.

Fout, Hamilton, et al. "Credit risk of low income mortgages." *Regional Science and Urban Economics* 80 (2020)

Fout, Hamilton and Oundee, Ozge Savascin. "Homeowner Mobility and Impediments to Moving." *Fannie Mae Housing Insights Research* (July 2020).

Fuller, Merrian C. *Driving Demand for Home Energy Improvements: Motivating residential customers to invest in comprehensive upgrades that eliminate energy waste, avoid high utility bills, and spur the economy*. No. LBNL-3960E. Lawrence Berkeley National Lab.(LBNL), Berkeley, CA (United States), 2010.

Fuster, Andreas, et al. "The rising gap between primary and secondary mortgage rates." *Economic Policy Review* 19.2 (2013).

Fuster, Andreas, et al. *How resilient is mortgage credit supply? evidence from the covid-19 pandemic*. No. w28843. National Bureau of Economic Research, 2021.

- Gan, Quan, and Robert J. Hill. "Measuring housing affordability: Looking beyond the median." *Journal of Housing economics* 18.2 (2009): 115-125.
- Gerardi, Kristopher S., Lauren Lambie-Hanson, and Paul S. Willen. "Racial differences in mortgage refinancing, distress, and housing wealth accumulation during covid-19." *FRB of Philadelphia Payment Cards Center Discussion Paper* 21-2 (2021).
- Gerardi, Kristopher, Paul Willen, and David Hao Zhang. "Mortgage prepayment, race, and monetary policy." *Race, and Monetary Policy (December 1, 2020)* (2020).
- Gerardi, Kristopher, et al. "Can't pay or won't pay? Unemployment, negative equity, and strategic default." *The Review of Financial Studies* 31.3 (2018): 1098-1131.
- Goodman, Laurie, Wei Li, and Jun Zhu. "Housing affordability: local and national perspectives." *Urban Institute: Housing Finance Policy Center Research Report* (2018).
- Goodman, Laurie S. "Quantifying the tightness of mortgage credit and assessing policy actions." *BCJL & Soc. Just.* 37 (2017): 235.
- Goodman, Laurie S., and Christopher Mayer. "Homeownership and the American dream." *Journal of Economic Perspectives* 32.1 (2018): 31-58.
- Gyourko, Joseph, and Joseph Tracy. "Using home maintenance and repairs to smooth variable earnings." *The Review of Economics and Statistics* 88.4 (2006): 736-747.
- Hauptert, Tyler. "The racial landscape of fintech mortgage lending." *Housing Policy Debate* 32.2 (2022): 337-368.
- Hembre, Erik, Stephanie Moulton, and Matthew Record. "Low-Income Homeownership and the Role of State Subsidies: A Comparative Analysis of Mortgage Outcomes." *Journal of Policy Analysis and Management* 40.1 (2021): 78-106.
- Hendershott, Patric H., and James D. Shilling. "The economics of tenure choice: 1955-79." NBER Working Paper # 0543 (1980).
- Herbert, Christopher E., Daniel T. McCue, and Rocio Sanchez-Moyano. "Is homeownership still an effective means of building wealth for low-income and minority households? (Was it ever?)." *Homeownership Built to Last* 10.2 (2013): 5-59.
- Hill, Robert J., and Iqbal A. Syed. "Hedonic price-rent ratios, user cost, and departures from equilibrium in the housing market." *Regional Science and Urban Economics* 56 (2016): 60-72.

Himmelberg, Charles, Christopher Mayer, and Todd Sinai. "Assessing high house prices: Bubbles, fundamentals and misperceptions." *Journal of Economic Perspectives* 19.4 (2005): 67-92.

Jaffee, Dwight M., John M. Quigley, and Roger G. Noll. "Housing subsidies and homeowners: what role for government-sponsored enterprises? [with comment]." *Brookings-Wharton Papers on Urban Affairs* (2007): 103-149.

Joint Center for Housing Studies (JCHS). "Improving America's Housing 2021." *Joint Center for Housing Studies of Harvard University Report* (2021).

Karamon, Kadiri, Liyi Liu, and Doug McManus. "The Drivers of Financial Stress and Sustainable Homeownership." *Freddie Mac Research Note* (2022)

Kermani, Amir, and Francis Wong. *Racial Disparities in Housing Returns*. No. w29306. National Bureau of Economic Research, 2021.

Keys, Benjamin J., Devin G. Pope, and Jaren C. Pope. "Failure to refinance." *Journal of Financial Economics* 122.3 (2016): 482-499.

Korver-Glenn, Elizabeth. "Compounding inequalities: How racial stereotypes and discrimination accumulate across the stages of housing exchange." *American Sociological Review* 83.4 (2018): 627-656.

Langley, Adam H, and Joan Youngman. "Property Tax Relief for Homeowners." *Lincoln Institute of Land Policy: Policy Focus Report* (2021).

Lee, Donghoon, and Joseph S. Tracy. "Long-term outcomes of FHA first-time homebuyers." *Available at SSRN* 3298997 (2018).

Malliaris, Steven, Daniel A. Rettl, and Ruchi Singh. "Is competition a cure for confusion? Evidence from the residential mortgage market." *Real Estate Economics* (2021).

Mayer, Neil S., and Olson Lee. "Federal home repair programs and elderly homeowners' needs." *The Gerontologist* 21.3 (1981): 312-322.

Melzer, Brian T. "Mortgage debt overhang: Reduced investment by homeowners at risk of default." *The Journal of Finance* 72.2 (2017): 575-612.

Mortgage Bankers Association. "Annual Mortgage Bankers Performance Report | 2020 Data." (2020)

Mota, Nuno and Mark Palim. "Barriers to Entry: Closing Costs for First-Time and Low-Income Homebuyers." *Fannie Mae Working Paper*. (2021).

Mota, Nuno, Mark Palim and Susan Woodward. "Mortgages are still confusing... and it matters – How borrower attributes and mortgage shopping behavior impact costs." *Fannie Mae Working Paper*. (2022).

Moulton, Stephanie, et al. "Borrowing capacity and financial decisions of low-to-moderate income first-time homebuyers." *Journal of Consumer Affairs* 47.3 (2013): 375-403.

Moulton, Stephanie. "Researching Homeownership Inequalities." *Cityscape* 24.2 (2022): 153-164.

Murray, Anthony G., and Bradford F. Mills. "The impact of low-income home energy assistance program participation on household energy insecurity." *Contemporary Economic Policy* 32.4 (2014): 811-825.

Newman, Sandra J., and C. Scott Holupka. "Is timing everything? Race, homeownership and net worth in the tumultuous 2000s." *Real Estate Economics* 44.2 (2016): 307-354.

Perl, Libby. "LIHEAP: program and funding." Library of Congress, Congressional Research Service, 2015.

Quigley, John M., and Steven Raphael. "Is housing unaffordable? Why isn't it more affordable?." *Journal of Economic Perspectives* 18.1 (2004): 191-214.

Rohe, William M., Spencer M. Cowan, and Roberto Quercia. "Supporting low-income homeowners: lessons from a program to coordinate weatherization and rehabilitation services." *Housing Policy Debate* 20.3 (2010): 523-546.

Roll, Stephen, and Stephanie Moulton. "Credit counseling and consumer credit trajectories." *Economic Inquiry* 57.4 (2019): 1981-1996.

Rosen, Harvey S., and Kenneth T. Rosen. "Federal taxes and homeownership: Evidence from time series." *Journal of Political Economy* 88.1 (1980): 59-75.

Santiago, Anna Maria, et al. "Foreclosing on the American dream? The financial consequences of low-income homeownership." *Housing Policy Debate*, 20.4 (2010): 707-742.

Santiago, Anna Maria, et al. "Be It Ever So Humble, There's No Place Like Home: The Experiences of Low-Income, Minority Homebuyers." in Robert M. Silverman and Kelly L. *air and Affordable Housing in the US*. Brill, (2011): 289-342..

Schnare, Ann, Amy Crews Cutts, and Vanessa Gail Perry. "Be Careful What You Ask For: The Economic Impact of Changing the Structure of Real Estate Agent Fees." *Available at SSRN* 4106600 (2022).

Stone, Michael E., Terry Burke, and Liss Ralston. "The residual income approach to housing affordability: The theory and the practice." (2011).

Turner, Margery Austin et al . (2013) "Housing discrimination against racial and ethnic minorities 2012" *HUD Office of Policy Development & Research Research Report*

Urban Institute. "Housing Finance at Glance: A Monthly Chartbook." *Urban Institute: Housing Finance Policy Center Report* (2021).

Van Zandt, Shannon, and William M. Rohe. "The sustainability of low-income homeownership: the incidence of unexpected costs and needed repairs among low-income home buyers." *Housing Policy Debate* 21.2 (2011): 317-341.

Vandenbroucke, David A. "Housing affordability data system." *HUD Brief*, (2011).

Appendix A: Breakdown of Borrower Costs by Race and Ethnicity

In this section, we show additional results from our analyses broken out by race and ethnicity. The race and ethnicity categories we use are aligned with the definitions used in Fannie Mae's Annual Housing Activities Report (Table 5A). Fannie Mae defines loans to Asian and Black borrowers as those where there is any borrower on the mortgage who identifies as Asian or Black, and the other borrower also identifies as non-white. Loans to white non-Hispanic borrowers are categorized based on all borrowers identifying as such, or ethnicity information is missing for all borrowers. These four categories comprise 85 percent of the purchase mortgages from 2020.

Table 1A: Average of Each Loan Attribute by Borrower Race and Ethnicity for all Homebuyers

	White Non-Hispanic	Black	White Hispanic	Asian
Average monthly income	\$9,408	\$8,022	\$8,053	\$10,322
Average borrower age	43	43	40	40
Average purchase price	\$314,076	\$275,318	\$298,669	\$374,301
Average credit score	756	736	740	758
Average loan-to-value	83%	89%	87%	81%
Average mortgage	\$253,499	\$242,579	\$254,304	\$298,197
Average mortgage payment, yr. 1	\$13,440	\$12,861	\$13,483	\$15,810
Average purchase closing costs	\$6,556	\$6,507	\$6,970	\$7,140
Average broker fees at sale, yr. 7	\$26,854	\$23,540	\$25,537	\$32,003
Average other costs at sale, yr. 7	\$2,789	\$2,445	\$2,652	\$3,324

Source: Fannie Mae purchase acquisitions and closing cost data, 2020. Racial and ethnic categories as defined in Fannie Mae's Annual Housing Activities Report, Table 5A. Average mortgage payment is calculated by the authors using the average purchase price, LTV, mortgage, each borrower profile, combined with the mortgage note rate from the Freddie Mac PMMS. Due to data limitations, the sales costs are averaged for the whole sample and applied to each borrower profile as a share of sales costs.

Table 2A: Average of Each Loan Attribute by Borrower Race and Ethnicity for all FTHB

	White Non-Hispanic	Black	White Hispanic	Asian
Average monthly income	\$7,407	\$6,730	\$6,752	\$8,269
Average borrower age	35	39	36	36
Average purchase price	\$280,039	\$258,416	\$279,186	\$372,811
Average credit score	748	733	736	752
Average loan-to-value	88%	92%	91%	85%
Average mortgage	\$243,451	\$237,197	\$250,328	\$309,739
Average mortgage payment, yr. 1	\$12,907	\$12,576	\$13,272	\$16,422
Average purchase closing costs	\$5,990	\$6,056	\$6,633	\$6,990
Average broker fees at sale, yr. 7	\$23,944	\$22,095	\$23,871	\$31,876
Average other costs at sale, yr. 7	\$2,487	\$2,295	\$2,479	\$3,311

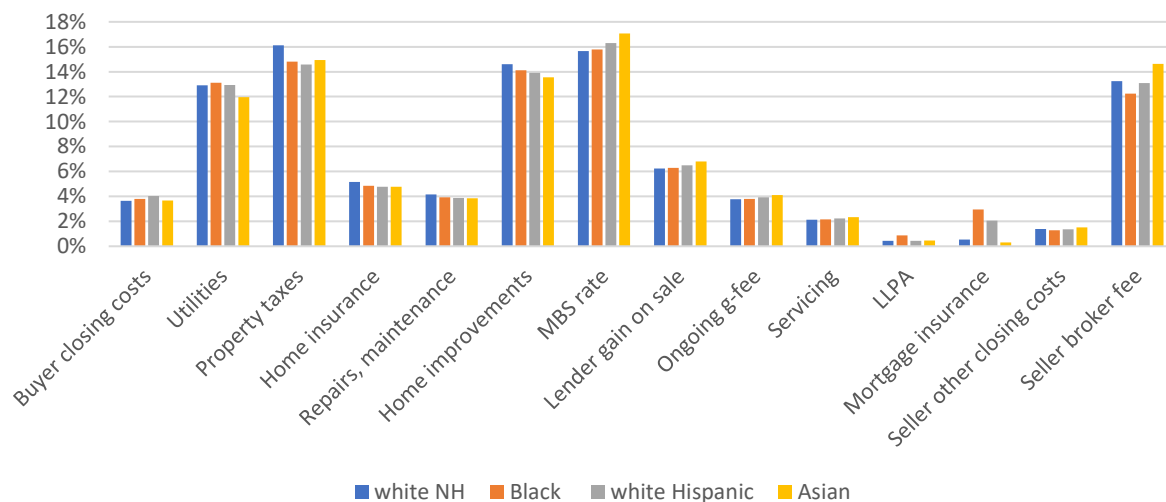
Source: Fannie Mae purchase acquisitions and closing cost data, 2020. Racial and ethnic categories as defined in Fannie Mae's Annual Housing Activities Report, Table 5A. Average mortgage payment is calculated by the authors using the average purchase price, LTV, mortgage, each borrower profile, combined with the mortgage note rate from the Freddie Mac PMMS. Due to data limitations, the sales costs are averaged for the whole sample and applied to each borrower profile as a share of sales costs.

Table 3A: Average of Each Loan Attribute by Borrower Race and Ethnicity for all LI FTHB

	White Non-Hispanic	Black	White Hispanic	Asian
Average monthly income	\$4,137	\$4,206	\$4,012	\$4,438
Average borrower age	34	39	35	37
Average purchase price	\$214,962	\$208,158	\$220,017	\$286,747
Average credit score	750	736	737	748
Average loan-to-value	88%	92%	91%	83%
Average mortgage	\$187,156	\$190,686	\$197,917	\$232,496
Average mortgage payment, yr 1	\$9,923	\$10,110	\$10,493	\$12,326
Average purchase closing costs	\$5,087	\$5,262	\$5,588	\$6,340
Average broker fees at sale, yr 7	\$18,380	\$17,798	\$18,817	\$24,517
Average other costs at sale, yr 7	\$1,909	\$1,848	\$1,954	\$2,546

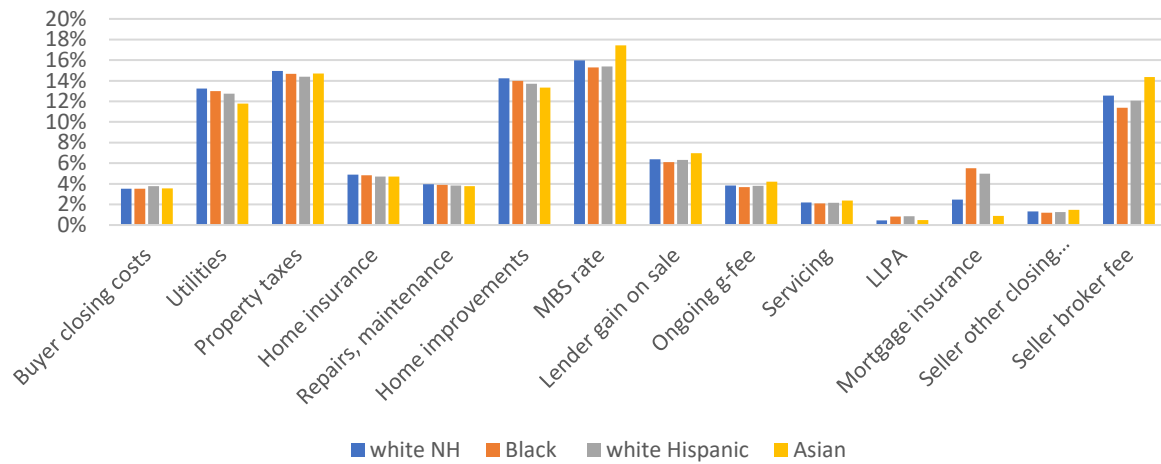
Source: Fannie Mae purchase acquisitions and closing cost data, 2020. Racial and ethnic categories as defined in Fannie Mae's Annual Housing Activities Report, Table 5A. Average mortgage payment is calculated by the authors using the average purchase price, LTV, mortgage, each borrower profile, combined with the mortgage note rate from the Freddie Mac PMMS. Due to data limitations, the sales costs are averaged for the whole sample and applied to each borrower profile as a share of sales costs.

Figure 1A: Breakdown of Borrower Costs by Race and Ethnicity, Average Homebuyer



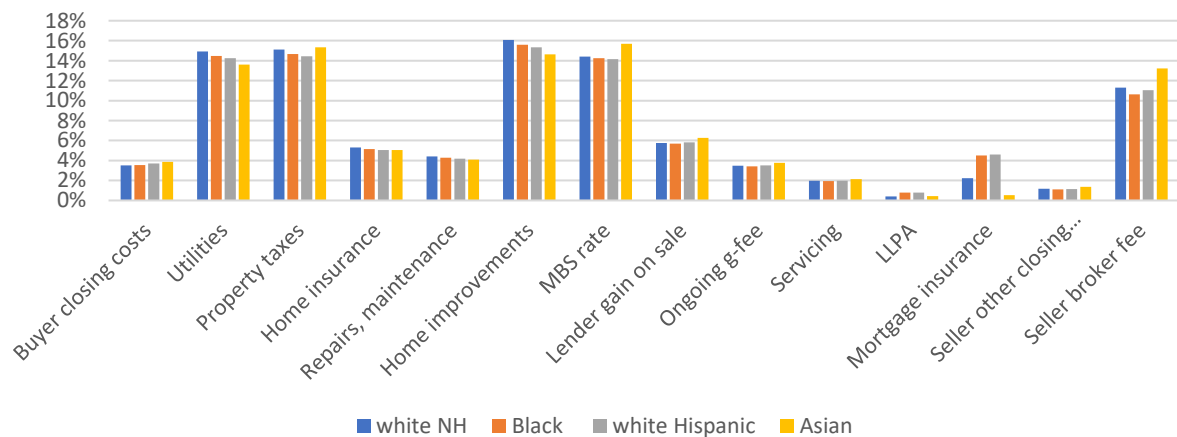
Source: Author calculations of the total lifetime costs of ownership for the average homebuyer in Fannie Mae's 2020 acquisitions. Racial and ethnic categories as defined in Fannie Mae's Annual Housing Activities Report, Table 5A.

Figure 2A: Breakdown of Borrower Costs by Race and Ethnicity, FTHB Borrower



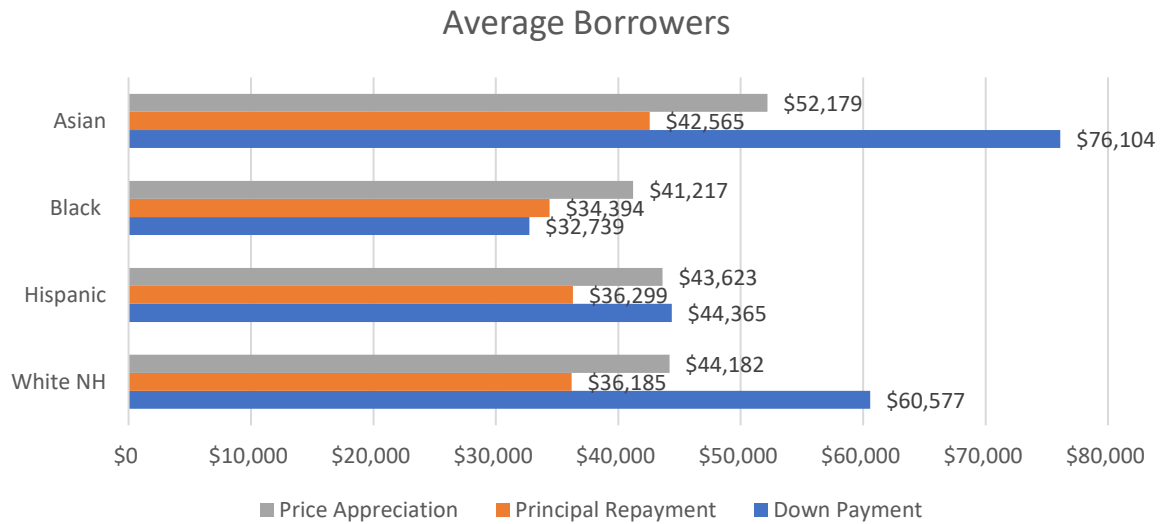
Source: Author calculations of the total lifetime costs of ownership for the average homebuyer in Fannie Mae's 2020 acquisitions. Racial and ethnic categories as defined in Fannie Mae's Annual Housing Activities Report, Table 5A.

Figure 3A: Breakdown of Borrower Costs by Race and Ethnicity, Average LI FTHB Borrower



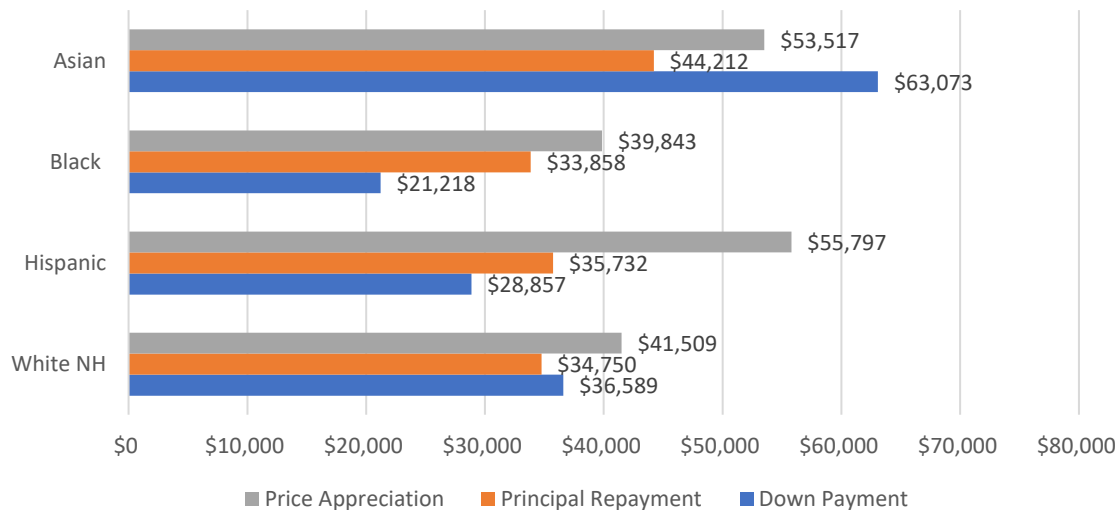
Source: Author calculations of the total lifetime costs of ownership for the average homebuyer in Fannie Mae's 2020 acquisitions. Racial and ethnic categories as defined in Fannie Mae's Annual Housing Activities Report, Table 5A.

Figure 4A: Projected Equity Accumulation by Race and Ethnicity, Average Homebuyer



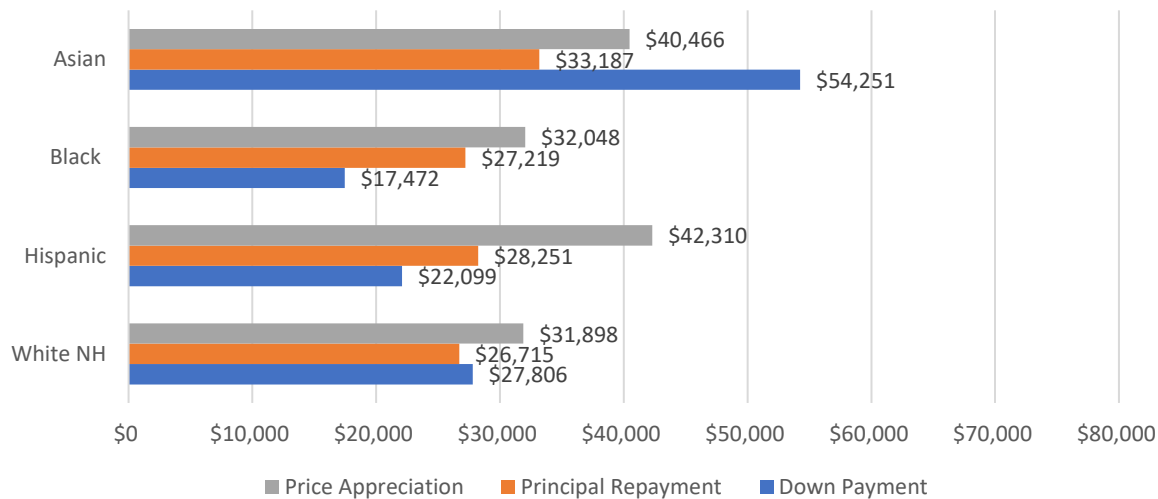
Source: Author calculations of the total lifetime equity accumulation attributed to homeownership for the average homebuyer borrower. Racial and ethnic categories as defined in Fannie Mae's Annual Housing Activities Report, Table 5A.

Figure 5A: Projected Equity Accumulation by Race and Ethnicity, Average FTHB



Source: Author calculations of the total lifetime equity accumulation attributed to homeownership for the average FTHB borrower. Racial and ethnic categories as defined in Fannie Mae's Annual Housing Activities Report, Table 5A.

Figure 6A: Projected Equity Accumulation by Race and Ethnicity, Average LI FTHB

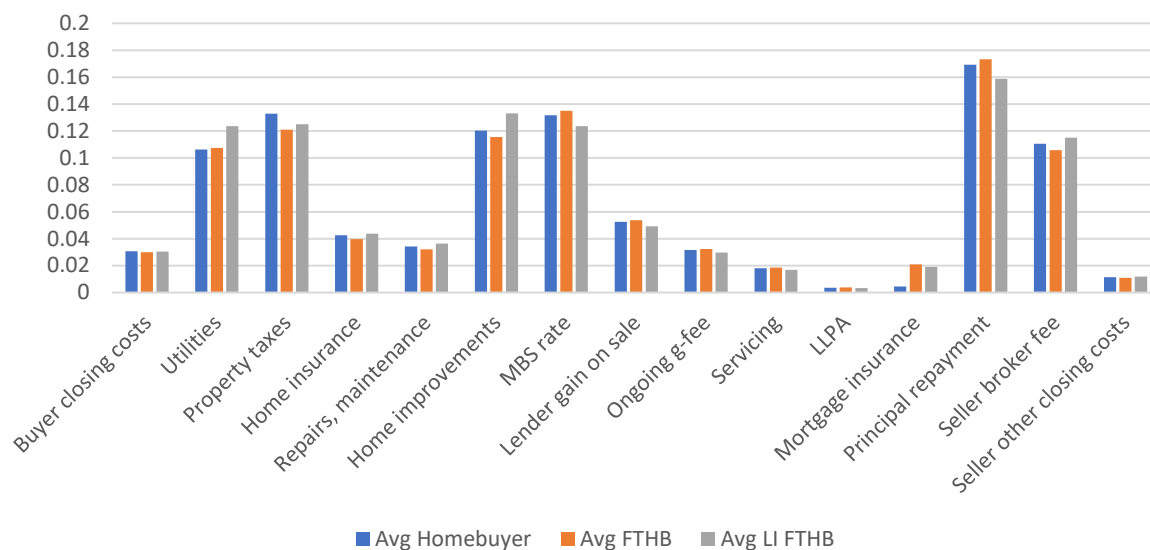


Source: Author calculations of the total lifetime equity accumulation attributed to homeownership for the average LI FTHB borrower. Racial and ethnic categories as defined in Fannie Mae's Annual Housing Activities Report, Table 5A.

Appendix B: Breakdown of Borrower Cost including Principal Repayment

Here, we recalculate the shares of costs shown in Figure 2 to show what the breakdown of costs would look like including the principal component of mortgage repayment that contributes to owner's housing equity. Incorporating principal repayment shows that transaction costs are 15 to 17 percent of total costs, ongoing non-mortgage housing expenses are 39 to 44 percent of the total, and total mortgage costs including principal are similarly 41 to 44 percent of the total, with the principal repayment comprising roughly 40 percent of the total mortgage costs. On its own, the principal repayment itself comprises 16 to 17 percent overall expenses. The other main individual expenses remain the same as before: utilities, property taxes, home improvements, the MBS rate net of other costs, and transaction costs all still stand out as key components of total costs, as reflected in Figure 1B.

Figure 1B: Breakdown of Borrower Costs by Borrower Profile, Including Principal Repayment



Source: Author calculations of the total lifetime costs of ownership for the average homebuyer, FTHB, and low-income FTHB purchase borrower in Fannie Mae's 2020 acquisitions. This version incorporates principal repayment as a share of overall costs.