Racial disparities in home selling

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Abstract

In this study, we investigate the financial disparities faced by black sellers in the US housing market. Using repeat-sale transactions from 2003 to 2020, we document that black sellers earn, on average, 0.36% lower annualized unlevered returns on their property sales compared to non-black sellers, when selling comparable properties at the same time in the same neighborhood. We find that the racial disparities in housing returns are not explained by seller characteristics, property renovations, the race of the buyer, seller agent fixed effects, and appraisal measures. However, controlling for listing prices and time on market reduces the racial gap to effectively zero. This suggests that black sellers face higher search frictions, which leads to worse selling outcomes.

1 Introduction

Housing wealth serves as a fundamental means for households to accumulate wealth. Historically, various forms of structural discrimination have hindered Black households from entering homeownership and benefiting from its wealth appreciation benefits. It might be expected that such discriminatory practices are no longer relevant today, but many papers find that Black households continue to face a higher rate of mortgage application rejections, pay more when purchasing homes, and experience lower housing returns during distressed sales (Bhutta, Hizmo, and Ringo (2022), Bayer, Casey, et al. (2017), Kermani and Wong (2022)).

In this paper, we focus on the home selling process and view the home as a financial asset that provides capital gains returns. We investigate whether there exist any racial disparities during the selling process since the early 2000s, and if present, what are the underlying mechanisms that drive these racial disparities. One would expect identical houses in the same neighborhood to have the same sale price and experience the same house price growth on average. If all else equal, one would expect that the race of the owner should have no impact on the selling outcomes. However, the data suggests otherwise.

We use repeat-sale transactions to estimate the racial gap in housing returns for regular non-distressed sales. We compare housing returns of properties in the same Census tract, sold in the same year and quarter, but where one is owned by a black household and the other one owned by a non-black household. The repeat-sale sample allows us to control for time-invariant property characteristics, thereby addressing omitted variable bias that may be present in the hedonic approach. To identify the race of the sellers and buyers, we merge the property transaction data with self-reported race from the Home Mortgage Disclosure Act (HMDA).

Using over 1.1 million repeat-sale transactions in the US, we find that on average, black households earn 1.74–1.88% lower total unlevered capital gains when selling their homes. To adjust for varying duration of homeownership, we also calculate the annualized capital gains. We find that the annualized unlevered return gap for black sellers ranges between -0.36% to -0.38%. Due to our inclusion of Census tract and year-quarter date of sale fixed effects,

we state that differences across neighborhoods nor differences in market timing explain the estimated racial gap.

We then explore the sources of the racial gap. Our main contribution to the literature is identifying which factors do and do not contribute to explaining the racial gap in unlevered housing returns. The home-selling process involves multiple parties including the seller, potential buyers, and intermediaries like realtors and appraisers. Discrimination can occur during the interactions between these parties. Moreover, unobserved property characteristics, potentially correlated with race, can contribute to differential selling outcomes. We examine each of these factors to identify which ones contribute most to the existence of the gap.

We first examine the sellers' reason to sell. Liquidity-constrained sellers may be willing to sell at lower prices to ease their financial constraints. To investigate this mechanism, we merge the property transaction data with mortgage performance data from Black Knight McDash. Using the seller's mortgage delinquency status as a proxy for liquidity constraints, we find that the racial gap in annualized housing returns continues to exist.

We also explore whether unobserved housing quality can account for the differential returns. Although we observe a detailed set of structural property characteristics, there exist other property features that impact property values but are not observed in the data. For example, the age of appliances, the aesthetic appeal, and the number of parking spaces can affect property values. To the best of our knowledge, a comprehensive dataset of all these variables does not exist, so we choose to focus on substantial renovations and remodeling to capture differences in housing quality. If black homeowners systematically put less effort into maintaining and renovating their homes, it is reasonable to expect that they will experience lower housing returns. We use building permit data to obtain the renovation status of the property two years before the home sale. We find that property renovations do not explain the racial gap.

Next, we investigate whether potential racial prejudices by white buyers can explain the gap. One may speculate that white buyers hold prejudiced beliefs against black sellers and thus offer lower prices. However, after controlling for the race of the buyer, we find that black sellers experience lower housing returns regardless of the buyer's race. This suggests that any possible direct discrimination between the seller and the buyer is not a dominating force

driving the racial gap. It is important to note that racial prejudices from potential buyers may affect this gap if the home seeker is unwilling to purchase a home owned by a black seller or is more willing to purchase a home owned by a white seller. This decision adds an additional friction to black sellers seeking to match with a potential buyer and would show up in our search friction analysis.

Given that none of the characteristics of the property, seller, and buyer explain much of the gap, we shift our focus to intermediaries. We begin by examining the role of real estate agents and brokers, who charge commission fees to sellers for their services in facilitating housing transactions. If the realtor holds prejudiced biases against black sellers or believes that black-owned homes are of inferior quality, they may recommend lower selling prices or put in less effort in selling the property. On the other hand, if black sellers select agents who are less experienced or of lower quality, this can also lead to worse selling outcomes. To test the mechanism, we merge property listing data to control for real estate agents and brokerage office fixed effects. We find that controlling for real estate agents and brokerage offices only marginally reduces the racial gap.

Additionally, we examine the role of another key intermediary in the selling process: appraisers. Appraisers are expected to provide objective market valuations of properties, which can help lenders, sellers, and buyers determine a fair price. A report from Freddie Mac (Mac (2021)) finds that homes in predominantly black neighborhoods often receive much lower appraisal values compared to similar homes in predominantly white neighborhoods. Motivated by this fact, we would want to control for the appraisal value at the time of sale. Unfortunately, we do not observe the actual appraisal estimates at the time of sale, so we calculate an implied appraisal value by multiplying the appraisal value at the time the seller refinances their mortgage with the tract-level housing price growth rate. We find the implied appraisal values suggest, on average, black homes are not valued less than non-black homes. Moreover, controlling for this appraisal does not explain the racial gap.

Lastly, we examine the racial differences during the listing process. We find that black sellers often set lower listing prices, negatively adjust their listing prices while a home is on the market, offer greater price discounts, and take longer to sell their properties. These findings suggest that black sellers may experience higher search frictions, compelling them

to reduce listing prices to increase the probability of sale. Within the context of a search model, our findings suggest that black sellers face a different level of market tightness than non-black sellers, which induces the price disparity. To test the mechanism, we control for listing price and days on market. Controlling for the listing price accounts for approximately three-fourths of the racial gap. The racial gap reduces to almost zero after we control for both factors.

However, it is important to note that the listing price may be a noisy measure of a home's true market value, as it can affected by the biases from various parties. Sellers may tie the listing price to the appraised value that they observe – in which case, any bias from the appraisers would be present in the listing price. Also, agents or the sellers themselves may negatively influence the listing price due to their knowledge that the market on average discounts black home prices or that black homes stay on the market longer. The latter suggests that listing prices are influenced by differences in time on market which is likely caused by search frictions.

Time on market maps directly to probability a seller matches with a buyer. Given that black sellers face longer time on market and time on market partially explains the racial gap in housing returns, we conclude that black sellers face different levels of market tightness than non-black sellers. Within the context of a search model, these differences in levels of market tightness directly affect prices. Overall, we find that search frictions faced by black sellers explain a large share of the racial gap in housing returns. Additionally, we argue that the estimated contribution of 25% in explaining the racial gap by search frictions is a lower bound due to the likely impact of time on market on listing prices.

We also provide estimates of the racial gap in neighborhoods with different socioeconomic characteristics. We define a Census tract as a neighborhood and group neighborhoods into quartiles based on their racial composition, education, income, and homeownership rate. We find that the racial gap is economically significant in all types of neighborhoods. However, we also find that the racial gap is larger in neighborhoods with higher population shares of black residents and lower levels of household income. These results are consistent with findings in the literature that uses HUD survey data which provides evidence of racial steering and black home seekers being shown fewer homes (such as Ondrich, Stricker, and Yinger (1998),

5

Yinger (1998), Galster and Godfrey (2005), Zhao, Ondrich, and Yinger (2006), Christensen and Timmins (2022), and Christensen and Timmins (2023)).

Section 2 describes the data used in the analysis. Section 3 describes our empirical strategy to recover the racial gap and presents the baseline results. Section 4 explores the sources of the racial gap. Section 5 provides neighborhood heterogeneity analysis. Section 6 concludes.

Related literature

Our paper contributes to a growing literature that documents racial disparities during home transactions. Kermani and Wong (2022) find that minority home sellers are more likely to enter into distressed sales and when they do, they lose more of their home values compared to white homeowners. Furthermore, our baseline estimates of the annualized unlevered returns gaps for non-distressed sales are of similar magnitudes to their estimates. Our paper's main contribution is to investigate and explain where this gap comes from. Bayer, Ferreira, and Ross (2016) finds similar results that minority homeowners are less likely to sustain homeownership when facing adverse economic shocks. Bayer, Casey, et al. (2017) focuses on the home buying process and finds that black and Hispanic homebuyers pay a 1.6% premium when purchasing similar housing in the same neighborhood. Courant (1978) demonstrates how this premium can arise in a search model where white sellers are unwilling to sell to black buyers. Our paper focuses on the home selling process for regular non-distressed home sales. We merge several micro datasets, including building permits, mortgage performance, and property listing data, to gain a comprehensive understanding of the scope and sources of the racial gap in selling.

Our paper is also related to the literature that examines the role of real estate agents in housing transactions. Several papers (such as Ondrich, Stricker, and Yinger (1998), Yinger (1998), Galster and Godfrey (2005), Zhao, Ondrich, and Yinger (2006), Christensen and Timmins (2022), and Christensen and Timmins (2023)) use the audit studies by the Department of Housing and Urban Development (HUD) to investigate the prevalence of discriminatory practices by real estate brokers. They find that real estate brokers show fewer homes to black households, steer them toward less desirable neighborhoods, and cater

to the prejudiced beliefs of white buyers. Gilbukh and Goldsmith-Pinkham (2023) shows that inexperienced real estate agents often cause worse selling outcomes for their clients. We use property listing data to control for seller real estate agent fixed effects and examine how much seller real estate agents are responsible for the racial gap in housing returns. We find little evidence that seller agents contribute to the racial gap, but acknowledge that our data samples are smaller for this analysis. Ideally we would also investigate the effects of the buyers' agents, however we lack the data required to perform these analyses.

Our study contributes to the growing body of literature that uses high-quality microdata to explore the persistent racial disparities in the housing and financial markets. Avenancio-León and Howard (2022) show that black homeowners pay more property taxes due to inflated property assessment values for tax purposes. Bhutta, Hizmo, and Ringo (2022), Frame et al. (2021), Gerardi, Willen, and D. H. Zhang (2023), and D. Zhang and Willen (2020) find that minority borrowers are less likely to get mortgage approvals and face higher interest rates. Butler, Mayer, and Weston (2022), Argyle et al. (2023), and Laouénan and Rathelot (2022) find that black households face racial discrimination in the auto loan market, short-term rental market, and personal bankruptcy courts.

Our paper is also closely related to papers that study differential housing outcomes for other demographic groups. For example, Goldsmith-Pinkham and Shue (2023) find that single women experience 1.5% lower annualized housing returns compared to single men. Similar to Goldsmith-Pinkham and Shue (2023), we explore various channels that can drive the gap by utilizing detailed property transactions and listing data.

2 Data

We compile data from various sources to gain a comprehensive view of the sales process and the key players involved. In addition to sales records, we also gather information on the renovation status of the property, the sellers' mortgage payment status history, and property listing details.

Property transaction and characteristics. The property transactions and sales records are from ATTOM, a proprietary data provider that compiles national data from

county deed and assessor records. For each property transaction, we observe the transaction date, sale price, deed type, property type, transaction type, property address, and the distressed status of the sale (i.e., foreclosure, short sale). We restrict our sample to repeat-sale transactions, that is, properties that were transacted at least twice during our sample period. We exclude non-arms length transactions and partial-consideration sales as well as non-individual sellers. We also merge the property transaction data with ATTOM's assessor panel to get detailed property characteristics, such as the number of bedrooms, bathrooms, and assessment values.

Race of sellers and buyers. While the property transaction records provide the names of the sellers and buyers, their race is not recorded in the dataset. We merge the self-reported race of mortgage applicants from the Home Mortgage Disclosure Act (HMDA) to the ATTOM dataset. We follow the same merging procedure used in previous studies, such as Bayer, Casey, et al. (2017), Bartlett et al. (2022), Kermani and Wong (2022), and Avenancio-León and Howard (2022). We link each property transaction to its respective mortgage origination record using the time and amount of the property transaction, as well as the Census tract where the property is located[1]. To identify the race of the seller, we use the race of the buyer from the previous transaction, where the current seller was the prior buyer.

Given that multiple individuals may be involved in selling and purchasing the home, such as a married couple, we differentiate between mixed-race households and households consisting of members from a single race. We define a household to be black if either the main applicant or any of the co-applicants are black, so black households can include mixed-race households by definition. We define a household to be black-only if both the main applicant and co-applicants are black. White and white-only households are defined in a similar manner.

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[1]Note that we are only able to match properties that were purchased with a mortgage. Moreover, the merge is only up to 2016 because HMDA rounds property values to the nearest $10,000s which makes it more challenging to find perfect matches. So our sample is unable to include selling transactions where the seller purchased their home after 2016. Combined with the transaction data, we are able to observe the race of buyers between 2003 and 2016 and consequently, the race of sellers conditional on purchasing their home between 2003 and 2016.

Borrower and appraisals. We get loan-level mortgage performance data from Black Knight McDash. It provides monthly mortgage payment history for each mortgage, and appraisal values if the mortgage was refinanced. We merge the loan-level information to property transaction data from ATTOM following the same procedure used in Issler et al. (2023) and Kermani and Wong (2022). The matching algorithm uses a set of property and transaction attributes, such as loan amount, loan purpose, and interest rate, to find the k-nearest neighbors. We use the mortgage delinquency status as a measure of liquidity constraints for sellers. Specifically, we create an indicator variable to determine whether the seller was delinquent for 90 days within twelve months prior to selling their home. If the seller's mortgage was refinanced within two years of the sale, we use the appraisal value to impute the appraisal value at the time of sale by multiplying it with tract-level housing price growth rate between the appraisal date and the sale date.

Building permits. We use national-level building permits data from BuildFax. We construct indicator variables for properties that have undergone significant improvements two years before the sale date. The improvements we consider include roof replacement, home remodeling, and other substantial renovations that require a permit. For the subsample used in the empirical analysis, we drop property transactions in Census tracts that have zero building permits.

Property listings. We use national-level property listing data between January 2011 and December 2020 from Altos's Multiple Listing Service (MLS) data. The property listing data provides weekly updates on the listing price, close price, days on market, and names of sellers' real estate agents and broker offices. We merge the listing data to the property transaction records using the property address, price, and sale date.

Neighborhood characteristics. We use the 2010 American Community Survey 5-year estimates from IPUMS to obtain sociodemographic characteristics at the Census tract level. The neighborhood characteristics we use include racial composition, median household income, median education level, and homeownership share.

Final data sample. Our main sample consists of 1.1 million repeat-sale transactions of single-family homes between 2003 and 2020. We restrict our sample to non-distressed, arms-length, and full-consideration sales. We drop properties that have undergone structural

modifications, that is, properties with different numbers of bedrooms and bathrooms between the two transactions. We also exclude transactions with price differences exceeding 100% or falling below -100% to remove outliers. Finally, we remove transactions where the time between purchasing and selling the property is less than two years.

3   The racial gap in housing returns

This section describes our empirical strategy to identify the racial gap in housing returns during property sales and presents our baseline results.

3.1   Empirical strategy

The ideal experiment is to compare the selling outcomes of two identical homes sold by sellers of different races. To replicate the ideal experiment as much as possible, we use a repeat-sales approach. The key advantage of the repeat-sale approach is that it controls for any time-invariant property characteristics between the two transactions, including unobserved property characteristics. We focus on comparing the growth in prices between homes within the same neighborhood while controlling for the timing of the sale and the mean house price growth between purchase and sale dates. This allows us to control for differences in neighborhood amenities and time-varying market conditions. By using a repeat-sales approach, adding neighborhood and time fixed effects, and accounting for mean house price growth between purchase and sale, we believe we are able to appropriately isolate the racial gap in housing returns.

Our baseline specification estimates whether sellers of different races realize different housing returns. For property i located in neighborhood c sold in time t_1 and purchased in time t_0, we run the following regression

$$r_{i,c,t_0,t_1} = \beta \mathbf{1}(Seller Race_{i,c,t_1} = Black) + \gamma X_{c,i,t_0,t_1} + \alpha_{c,t_1} + \epsilon_{i,c,t}. \tag{1}$$

The dependent variable is the housing return on property i. The parameter of interest is β, which captures differential housing returns attributed to the race of the seller in the

transaction occurring at time t_1. X_{c,i,t_0,t_1} denotes the control variable we use, specifically the Census-tract level housing price growth rate, calculated between the year the home was sold and the year the home was purchased. The control variable allows us to directly control for differential house price growth trends across different neighborhoods. α_{c,t_1} denotes neighborhood-by-time fixed effects, capturing unobserved shocks at neighborhood-time levels. For example, a neighborhood may start with few nice amenities but experience positive amenity shocks five years later, possibly due to the opening of a new school or a beautiful park. In our estimation, we use Census tracts to define neighborhoods c and year-quarter of sale date to define time t_1.

We use two measures of housing returns. The first is the total unlevered capital gains between the sale date t_1 and purchase date t_0, measured as the log price difference between the two transactions,

$$r^{tot}_{i,c,t_0,t_1} = \ln P_{i,c,t_1} - \ln P_{i,c,t_0}.$$

Our preferred measure is annualized returns to standardize housing returns across transactions with varying holding periods. Unlike total capital gains, which do not differentiate the lengths of ownership, the annualized measure explicitly accounts for the variation in the lengths of asset holding. We define the annualized unlevered capital returns similar to Goldsmith-Pinkham and Shue (2023) and Kermani and Wong (2022). It is defined as

$$r^{ann}_{i,c,t_0,t_1} = \left(\frac{P_{i,c,t_1}}{P_{i,c,t_0}} \right)^{365/(t_1-t_0)} - 1$$

where the difference between the two transaction dates t_1 and t_0 is measured in days.

3.2   Baseline results

Table 1 presents the average racial gap in total and annualized capital gains from housing using the baseline regression from Equation 1. Intuitively, the regression compares homes located in the same neighborhoods sold in the same year-quarter, differing only in being owned by black versus non-black homeowners. In all specifications, we cluster standard errors at the Census tract level. As discussed in Section 2, we use two measures to categorize

the race of the seller: whether at least one member of the sellers is black, and whether all sellers involved in the transactions are black.

Columns (1) and (2) show that on average, black sellers realize 1.74% lower total capital gains when selling their houses compared to non-black sellers. If the sellers are black only, the total capital gains are 1.88% lower. Columns (3) and (4) present the average gap in annualized capital gains for black and black-only sellers, respectively. We find that the average gap in annualized capital gains of a black seller is 0.36% lower than that of non-black sellers, and 0.38% lower for black-only sellers than that of non-black-only sellers.

Table 1: Gap in returns to housing

	Capital gains returns		Annualized returns	
	(1)	(2)	(3)	(4)
Black seller	-0.0174***		-0.0036***	
	(0.0011)		(0.0003)	
Black-only seller		-0.0188***		-0.0038***
		(0.0013)		(0.0003)
Observations	1151718	1151718	1151718	1151718
R^2	0.701	0.701	0.680	0.680

Notes: This table presents the average racial gap in total and annualized capital gains using the baseline regression Equation 1. Columns (1) and (2) report the gap in total capital gains, while Columns (3) and (4) report the gap in annualized returns. Black sellers are defined as sellers that include at least one black individual, and black-only sellers are defined as sellers that are all black individuals. All regressions include the Census tract-level annualized mean house price growth rate between the purchase year and sale year, as well as the Census tract by sale year-quarter fixed effects. Standard errors are clustered at the Census tract levels. * denotes $p < 0.05$, ** denotes $p < 0.01$, *** denotes $p < 0.001$.

To assess the magnitude of the gap in dollar terms, imagine two homes, both in the same neighborhood and each bought for $250,000 in February 2012, but one was purchased by a black-only household, while the other one was purchased by a non-black-only household. Furthermore, imagine these two homes were sold after eight years, approximately the average duration of homeownership. In this time period, mean house price growth in the US was approximately 60%. If the non-black household's home was sold for $400,000, our baseline results suggest that the black-only household would have received $11,323 less when selling

the home.

One concern with our findings may be that the gap solely arises due to Bayer, Casey, et al. (2017)'s finding that black home buyers pay more for their homes, which mechanically reducing the returns to housing. If this were true then we would expect the returns gap from a white seller who purchased from a black seller to be no different from the returns gap from a white seller who purchases from a white seller. We find this not to be the case. We shed light on this matter by regressing the annualized housing returns on three binary indicator variables which take the value of one if a black seller purchases their home from a black seller, if a black seller purchases their home from a white seller, or if a white seller purchases their home from a black seller. The last combination of a white seller purchasing their home from a white seller is omitted. The regression specification follows our baseline specification except that we focus on estimating the coefficients of the three indicator variables. Lastly, we restrict the data to only include transactions from the four race pairs mentioned above.

Appendix Table A1 displays the regression results. Each regression column corresponds to a different set of definitions for black and white sellers. Column (1) investigates the interactions between black and white households allowing for mixed race households in both sets, Column (2) investigates the interactions between black and white-only households allowing for mixed race households with black sellers, Column (3) investigates the interactions between black-only and white-only households excluding mixed race households, and Column (4) investigates the interactions between black-only and white households allowing for mixed race households with white sellers. Qualitatively, the results are consistent in each of the four columns. We find that the racial gaps that black sellers face are essentially the same in magnitude regardless if they are purchasing their home from a white seller or a black seller relative to the returns a white seller receives when purchasing their home from a white seller. On the other hand, white sellers on average earn a premium when purchasing their homes from a black seller. If the racial gap in returns to housing were coming from a buyers' premium that black sellers pay, then we would not see a differential between the returns gained by a white seller who purchased their home from a black seller and the returns gained by a white seller who purchased their home from a white seller. Because white sellers gain, on average, higher annual returns of 0.32–0.35% when they purchased their home from a

black seller than from a white seller, we interpret these results as evidence that the racial gaps in housing returns that black sellers experience are not solely explained by a racial gap on the purchasing side.

4   Explanations of the racial gap

In the last section, we documented that on average black households receive lower returns on their homes relative to non-black households. We explore the underlying mechanisms driving the gap. We use the annualized housing return as the outcome variable to account for differences in holding periods. We find that this negative gap in returns is not explained by liquidity constraints, nor by observable differences in housing renovations. Using proxy measures for appraisals, we also find no evidence that appraisal values explain away the gap. However, controlling for listing price and time on market, which is likely influenced by real estate agents involved in a housing transaction, explains most of the gap. The results suggest that black sellers face more search frictions and it is the main driver of the racial gap.

4.1   Seller and property characteristics channel

We begin by examining the role of the seller's liquidity position on sale price differences. If the seller is liquidity-constrained, they may be willing to accept lower prices to sell the house faster. To test the mechanism, we bring in additional data from Black Knight McDash's mortgage performance data. We use the seller's mortgage delinquency status as a proxy for the seller's liquidity position. If a seller has been delinquent on their mortgage payments for more than 90 days, they are nearing default and face the high risk of losing their home soon. Consequently, a liquidity-constrained seller may forgo taking the time to search for a buyer with a high offer in return for selling their home quickly in order to alleviate their budget constraint. Our liquidity constraint control is an indicator variable that identifies whether the seller was 90 days or more delinquent on their mortgage within 12 months of selling their home.

On the other hand, the disparities in housing return might be attributable to differences in unobserved property characteristics correlated with race. Any relation between differential

investment in a seller's home and their race could potentially generate a racial gap. We test the validity of this claim by merging building permit data from BuildFax. We create three indicator variables to capture the renovation status of a property: the installation of a new roof, the presence of home remodeling, and other types of replacements that require a permit. We measure these variables within two years before the sale. We acknowledge that there exist many property features that can impact property values but are not observed in the data. Examples include the aesthetic appeal of the house, the availability of a central air conditioning system, the age of appliances, and the status of the basement finishing. To the best of our knowledge, a complete dataset including all property features does not exist. Therefore, we focus on significant renovations and remodeling to capture differences in housing quality, as these factors are likely to have a more pronounced impact on property values compared to other minor property features.

Table 2 presents estimates of the annualized racial gap, after controlling for the seller's liquidity status and the renovation status of the properties. Since we merge the main transaction sample with data from the Black Knight McDash and BuildFax data, the size of the merged dataset drops from 1.1 million to about 600,000 observations. In Columns (1) and (4), we rerun the baseline regression Equation 1. The coefficients estimated from the newly merged samples have similar magnitudes to those in the baseline sample, shown in Columns (3) and (4) of Table 1. The similarity suggests that the characteristics of the newly merged samples closely align with those in the baseline sample.

In Columns (2) and (5), we control for the mortgage delinquency status of the seller. The estimated racial gap in annualized housing returns is -0.29%, which is very similar to the baseline estimates of -0.32% in Columns (1) and (4). This suggests that the differences in need for liquidity between black and non-black sellers do not substantially account for the gap in final housing returns. We further add controls of property improvements in Columns (3) and (6). The estimated annualized racial gap remains at -0.29%, the same as the estimates in Columns (2) and (5). The results indicate that neither the seller liquidity nor property renovations explain an economically significant part of the observed racial gap.

Table 2: Seller and property characteristics channel

	(1)	(2)	(3)	(4)	(5)	(6)
Black seller	-0.0032***	-0.0029***	-0.0029***			
	(0.0003)	(0.0003)	(0.0003)			
Black-only seller				-0.0032***	-0.0029***	-0.0029***
				(0.0003)	(0.0003)	(0.0003)
Delinquent 90d+		-0.0098***	-0.0098***		-0.0098***	-0.0098***
		(0.0003)	(0.0003)		(0.0003)	(0.0003)
Roof			0.0030***			0.0030***
			(0.0005)			(0.0005)
Replacement			0.0028***			0.0028***
			(0.0004)			(0.0004)
Remodel			0.0114***			0.0114***
			(0.0008)			(0.0008)
Observations	593895	593895	593895	593895	593895	593895
R^2	0.723	0.723	0.724	0.723	0.723	0.724

Notes: This table presents the estimates of the racial gap in annualized returns when we control for seller's mortgage delinquency status and property renovations. All regressions follow the same specification in Equation 1. All regressions include the Census tract-level annualized mean house price growth rate between the purchase year and sale year, as well as the Census tract by sale year-quarter fixed effects. The first three columns show the estimates for black sellers, while the last three columns show the estimates for black-only sellers. Standard errors are clustered at the Census tract levels. * denotes $p < 0.05$, ** denotes $p < 0.01$, *** denotes $p < 0.001$.

4.2 Race of buyers

Next, we examine the role of the buyer, with a specific focus on the buyer's race. Given the historical prevalence of prejudice against black households by white individuals, we assess whether black sellers receive lower housing returns when selling their homes to white buyers. If white buyers hold prejudiced beliefs against black sellers or their homes, they may offer lower prices. The race of the buyer is determined by the self-reported race from HMDA. We classify a buyer as white if the household is exclusively white, meaning the household is not mixed-race.

Table 3 presents the results while accounting for the race of the buyer. The specifications are similar to our baseline regressions, with an additional interaction term between the seller's race and the buyer's race. Columns (1) and (3) follow the same specifications as the baseline regressions shown in Columns (3) and (4) of Table 1, respectively. The sample including the buyer's race is smaller because we are not always able to identify the race of the buyer when we merge the baseline sample with HMDA. The magnitudes of the racial gap are slightly smaller in this subset of the data, but they remain economically meaningful.

Columns (2) and (4) present results where we explore the role of white buyers in explaining the racial gap. We interact the race of the seller with an indicator for the buyer being identified as white-only, i.e., all mortgage applicants and co-applicants are reported as white. We find that the interaction does not absorb the racial gap estimate for black sellers. If the racial gap was primarily caused by potentially prejudiced white buyers, then the interaction term between a black seller and a white buyer would yield a statistically significant negative estimate that absorbs the coefficient of the black seller indicator. However, the estimate on the interaction term is close to zero and is neither statistically nor economically significant. Also, the estimated racial gaps in annualized housing returns are -0.23% for black sellers and -0.30% for black-only sellers. The magnitudes are similar to the baseline regressions without accounting for the race of the buyer. Overall, black sellers experience lower housing returns regardless of the race of the buyer, suggesting that any potential direct discrimination between the seller and the buyer is not a dominating force driving the racial gap.

Table 3: Race of buyers

	(1)	(2)	(3)	(4)
Black seller	-0.0027***	-0.0023**		
	(0.0005)	(0.0008)		
Black seller $\times$ White buyer		-0.0007		
		(0.0011)		
Black-only seller			-0.0032***	-0.0030***
			(0.0006)	(0.0009)
Black-only seller $\times$ White buyer				-0.0002
				(0.0012)
White buyer		0.0005**		0.0005**
		(0.0002)		(0.0002)
Observations	412203	412203	412203	412203
R^2	0.737	0.737	0.737	0.737

Notes: This table presents the estimates of the racial gap when we control for buyer's race. We use the subsample that we can identify the buyer's race for this table. In Columns (1) and (3), we rerun the baseline regression for black and black-only sellers to get the baseline racial gap. We include an interaction term between the race of the seller and the race of the buyer in Columns (2) and (4). All regressions include the Census tract-level annualized mean house price growth rate between the purchase year and sale year, as well as the Census tract by sale year-quarter fixed effects. Standard errors are clustered at the Census tract levels. * denotes $p < 0.05$, ** denotes $p < 0.01$, *** denotes $p < 0.001$.

4.3 Seller real estate agent and broker office

The majority of real estate transactions in the US are facilitated by real estate agents. Specifically, the listing agent, who represents the seller, plays a crucial role in shaping the selling outcomes. The selling agent provides a range of services, including advising on the list price, staging and advertising the property, showing homes to potential buyers, and negotiating the close price on behalf of the seller. If black sellers work with realtors who exert lower efforts due to racial prejudice, inexperience, or lower intrinsic quality, black sellers may experience worse selling outcomes. In this section, we use the detailed property listing data from Altos to investigate how much of the gap can be attributed to real estate agents.

We rerun our baseline regression using the repeat-sale sample of the matched transaction-listing data. To isolate the role of real estate agents, we control for listing agent fixed effects. The names of real estate agents are often missing in the data, so we exclude listings and associated transactions without agent names. The sampling criteria shrink our sample size significantly, with the subsample with real estate agent information dropping to less than 50,000 observations. This reduction in sample size is due to the lack of data reporting issues in Altos, rather than a lack of representations of real estate agents in these transactions. So we create another subsample where we observe brokerage offices and include them as fixed effects. The results for annualized returns are presented in Table 4. In Columns (1) to (4), we use the sample in which we can identify the real estate agents on the listings. Analogously, Columns (5) to (8) use the sample where we can identify the brokerage office. To ensure the subsamples are comparable to our primary sample, we rerun the baseline regressions without agent and brokerage controls. The results are shown in Columns (1), (3), (5), and (7). The estimated racial gaps in the subsamples are around -0.30% to -0.38%, which are very similar to our baseline results shown in Table 1.

Columns (2) and (4) estimate the racial gap including listing agent fixed effects. We find that adding listing agent fixed effects attenuates the racial gap to some extent, reducing the annualized gap by 0.06% for black sellers and 0.03% for black-only sellers. However, they still do not fully explain the racial gap. Columns (6) and (8) estimate the racial gap including brokerage office fixed effects. We find that adding brokerage office fixed effects only reduces

Table 4: Role of listing agent and broker offices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Black seller	-0.0030**	-0.0024			-0.0038***	-0.0035***		
	(0.0011)	(0.0014)			(0.0005)	(0.0005)		
Black-only seller			-0.0036**	-0.0033*			-0.0038***	-0.0036***
			(0.0013)	(0.0017)			(0.0006)	(0.0006)
Observations	48852	48852	48852	48852	231727	231727	231727	231727
R^2	0.735	0.846	0.735	0.846	0.714	0.743	0.714	0.743
FE		agent		agent		office		office

Notes: This table presents estimates of the racial gap in annualized returns when we control for real estate agents and brokerage office fixed effects. Columns (1) to (4) use the matched transaction-listing sample in which the real estate agent information is available. Columns (5) to (8) use the matched transaction-listing sample in which the brokerage office is available. All regressions include the Census tract-level annualized mean house price growth rate between the purchase year and sale year, as well as the Census tract by sale year-quarter fixed effects. Standard errors are clustered at the Census tract levels. * denotes $p < 0.05$, ** denotes $p < 0.01$, *** denotes $p < 0.001$.

the gap marginally, reducing the annualized gap by 0.03% for black-sellers and 0.02% for black-only sellers. We conclude that on average, any direct discrimination from real estate agents towards their black clients does not contribute much to the gap in housing returns.

4.4 Appraisal measures

Appraisals play a crucial role in real estate transactions by providing objective accurate evaluations of a property's market value. The appraisal estimates are widely used in housing transactions. For example, sellers use appraisal values as benchmarks for setting listing prices, lenders use them to assess the collateral value, and buyers use them as references when negotiating the final sale prices with sellers.

When appraising a home, appraisers fill out a form detailing the characteristics of a home and provide an estimation of the fair market value. The appraiser records structural features such as the number of bedrooms and bathrooms. These objective measures leave little room for any sort of bias. Subjective measures such as the drive through a home's neighborhood

is more likely to affect neighborhood differences in the racial gap which are shown in FHFA blog posts (Broadnax and Wylie (2021) and Vajja (2023)), but less likely to affect the within-neighborhood gap that we estimate. However, other subjective measures such as the quality of the home's features may allow any sort of bias to pass in. This introduces the potential for subjective racial biases to influence the fair evaluations. Recent newspaper stories have reported instances in which the appraisal value rose by over $30,000 after a black couple removed family photos and other personal items (Romo (2023)).

Unfortunately, we do not have data on the actual appraisal estimates that home sellers receive before listing their homes on the market, as well as the appraisal estimates requested by lenders on the buyers' side. Therefore, we impute a measure that is likely to be highly correlated with the actual appraisal estimates.

We impute an implied appraisal value based on the appraisal values the seller receives when they refinance their property. For households who refinance their mortgages, the lender re-appraises the property value in order to determine the loan terms of the new mortgage. Using loan characteristics data from Black Knight McDash, we are able to obtain the appraised property value ordered by the lenders for refinancing purposes. We then multiply the appraisal value by the FHFA's house price growth rate at the Census tract level to impute the appraisal value at the time of sale. The key assumption made here is that the racial gap in appraisals does not vary between refinancing a mortgage and selling a home.

We first re-estimate the racial gap in housing returns if sellers were to receive sale prices equal to the imputed appraisal values. Table 5 presents the results. We recalculate annualized returns using the implied appraisal value as the numerator, and rerun the baseline regressions. Columns (1) and (2) report a positive racial gap of 0.44% for black-sellers and 0.48% for black-only sellers if sale prices equal to the implied refinance appraisal values. This result is the opposite of the racial gap in returns to housing which we have been finding and strongly suggests that, on average, the value of homes black owners sell is not less than the value of homes white owners sell. We view this as strong evidence that homes sold by black sellers should, on average, grow in value by at least as much as homes sold by non-black sellers – in other words, these results strongly suggest that racial differences in unobserved home investment or depreciation are likely not valid explanations for the racial

gap in housing returns. It is important to note that this data sample restricts sellers to those who refinanced their mortgage. The next step is to first see if a racial gap exists with this subset of the data and then see if controlling for these implied appraisal values absorbs the racial gap.

Table 5: Appraisal analysis

|	(1)	(2)
Black seller	0.0044*	
	(0.0019)	
Black-only seller		0.0048*
		(0.0021)
Observations	117027	117027
R^2	0.584	0.584

Notes: This table presents the estimates of the racial gap in annualized housing returns after controlling for appraisal values. We use three imputed measures for appraisal values. Columns (1) and (2) use the imputed appraisal value based on the appraised value the seller received when they refinance their mortgages. It is adjusted by housing price growth between the appraisal date and sale data. Columns (3) and (4) use the assessed market value from the County's assessor records. Columns (5) and (6) use the listing price from the property listing data. All regressions include Census tract-level annualized mean house price growth rate between the purchase year and sale year, as well as the Census tract by sale year-quarter fixed effects. Standard errors are clustered at the Census tract levels. * denotes $p < 0.05$, ** denotes $p < 0.01$, *** denotes $p < 0.001$.

Figure 1 presents the point estimates and 95% confidence intervals for the annualized racial gap after controlling for the implied appraisal measure. We do not control for house price growth in the plots.[2] In each plot, the first coefficient provides the annualized gap without controls, and the second coefficient provides the annualized gap after controlling for the appraisal measure.

The results in Figure 1 use our implied appraisal from refinance measure. It provides

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[2]We exclude the FHFA house price growth control because the price growth from our appraisal measures and the seller's purchase price serve a similar role.

Figure 1: Gap controlling for implied appraisals

Black sellers   Black-only sellers
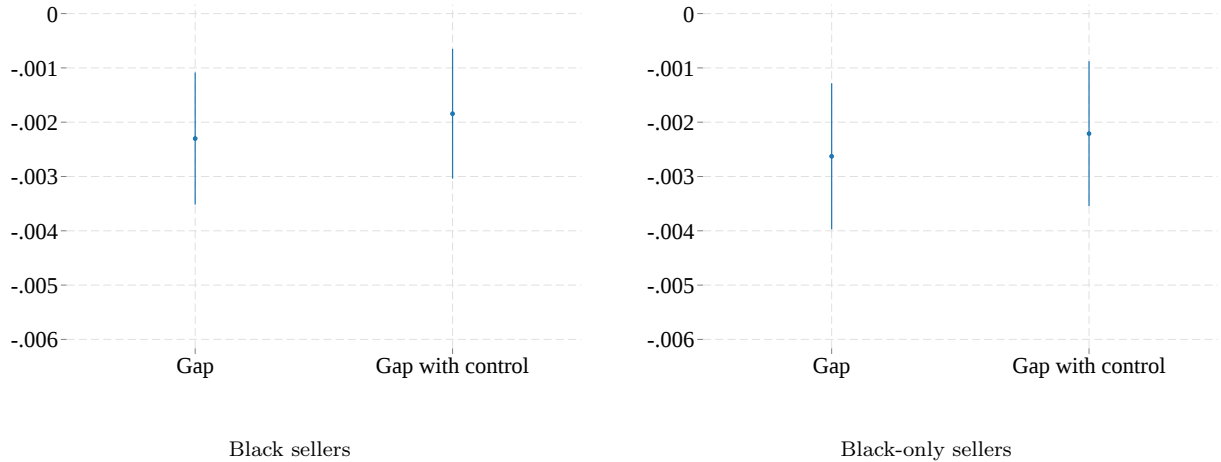
Notes: This Figure plots the point estimates and 95% confidence intervals for the racial gap in annualized housing returns after controlling for appraisal measures. Panel (a) shows the estimates using implied appraisal derived from the appraisal value at mortgage refinancing. Each plot shows the estimates without and with appraisal controls for black and black-only sellers. All regressions include the Census tract by sale year-quarter fixed effects. Standard errors are clustered at the Census tract levels. * denotes $p < 0.05$, ** denotes $p < 0.01$, *** denotes $p < 0.001$.

two plots: one for sellers identified as black and another for sellers identified as black-only. The subsample is restricted to households with refinanced mortgages. For this subsample, the annualized gaps without controlling for appraisal values are -0.22% and -0.27% for black and black-only sellers, respectively, smaller than the estimates provided in Columns (2) and (4) of Table 1, but they are still statistically significant at the 95% level. The estimated gaps after including the implied appraisal values have similar magnitudes, with values -0.19% and -0.22%, respectively. The results suggest that on average appraisers likely do not play a role in explaining the racial gap.

4.5   Search frictions

This section investigates the role of listing prices and time on market in explaining the gap black homeowners face when selling their homes. We find that accounting for both the time on market and listing price can explain nearly all of the racial gap.

We first document a few key facts about racial differences in listing outcomes, shown in Table 6. The listing price and time on market information are merged in from Altos MLS data. We use the baseline regression specification shown in Equation 1, but replace outcome variables with listing characteristics.

Listing price is an estimate of the market value of a home, and it is often closely tied to an appraised value sellers receive. A seller's agent may also provide input on the listing price – for instance, if an agent believes that it would be difficult to find a buyer for a house, and thus be on the market for an extended period of time, they may suggest lowering the listing price. Additionally, sellers themselves may have their own views on what the listing price should be – potentially lowering the listing price themselves if their home is listed for a long period of time without receiving a sufficient offer. As a result, a listing price may be influenced by the bias of several players. If these biases are correlated with race of the seller, they are likely to influence the relative difference in sale prices between black and non-black sellers.

The regression specification in Columns (1) and (2) is similar to that in Table 5 where we re-estimate the racial gap in housing returns if sellers were to receive sale prices equal to the last listing price we observe prior to sale. The results indicate that black sellers would face lower annualized returns implied by our listing price measure. Given our findings from Section 4.4, we suspect that racial differences in listing price are likely due to the influence of biased parties and not due to unobserved quality of the home.

Columns (3) and (4) regress the log change between the final listing price and the first listing price on the race of the seller. We find that black and black-only sellers lower their listing prices by 0.06% more than non-black and non-black-only sellers. Columns (5) and (6) regress the log difference between the final sale price and the final listing price on the race of the seller. The regression results indicate that black and black-only sellers sell their homes at larger discounts of -0.24% and -0.31% relative to non-black sellers.

Columns (7) and (8) regress the number of days it takes to sell the house on the race of the seller. We find that black homes are listed on the market for over a week longer than non-black homes. Given that we include interacted neighborhood and time of sale fixed effects, the difference in days on market between black and non-black sellers is particularly

24

Table 6: Listings characteristics gaps

	Listing price gap		Listing price change		Sale-listing gap		Days on market	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Black seller	-0.0033***		-0.0006**		-0.0024**		8.4589***	
	(0.0005)		(0.0002)		(0.0008)		(0.8008)	
Black-only seller		-0.0032***		-0.0006*		-0.0031***		9.4490***
		(0.0005)		(0.0003)		(0.0009)		(0.9259)
Observations	296052	296052	595242	595242	595245	595245	595249	595249
R^2	0.705	0.705	0.348	0.348	0.411	0.411	0.458	0.458

Notes: This table presents the racial differences in listing outcomes using the matched transaction-listing sample. The first two columns show the racial difference in listing price adjustment, measured by the log difference between the first and final listing prices. The third and fourth columns show the racial difference in the sale-listing price gap, measured as the difference between the sale price and the final listing price. The last two columns show the racial difference in the number of days on market. All regressions include the Census tract by sale year-quarter fixed effects. Standard errors are clustered at the Census tract levels. * denotes $p < 0.05$, ** denotes $p < 0.01$, *** denotes $p < 0.001$.

stark. The results show that black sellers face lower probabilities of matching with a potential buyer, suggesting that black sellers may face higher search frictions during the selling process. Additionally, this racial difference in time on market may likely explain at least a part of the racial difference in listing prices we display in Columns (1) and (2). Within the context of a search model, our findings suggest that black sellers face a different level of market tightness than non-black sellers. This result is consistent with the results from the literature that uses the HUD Discrimination survey to show that real estate agents have steered white buyers away from black neighborhoods, shown black home buyers fewer homes, and catered to prejudiced preferences of home buyers (Galster and Godfrey (2005), Ondrich, Stricker, and Yinger (1998), Yinger (1998), Zhao, Ondrich, and Yinger (2006), Turner et al. (2013)).

Several factors can explain the racial gap in listing outcomes. First, black sellers learn about their true property values during the listing process. If the house receives few visits and offers from buyers, the black seller may learn that they need to adjust prices to attract buyers. Second, the listing agent may put less effort in facilitating the sale of the black-owned properties, lowering the probability of sale. As a result, the black seller may respond by lowering listing prices to increase the probability of sale. Third, black sellers may have less negotiating power when closing the sale, and this can explain why there is a gap between the final sale price and final listing prices. The difference in negotiation skills can be due to bad recommendations by the listing agent, inexperience by sellers, or property defects found during home inspections.

Our next set of results tests whether listing behaviors can explain the racial gap. Table 7 uses our baseline specification, and we incrementally add controls for listing price growth and time on market.[3] The sample is smaller than the baseline sample because we are not able to find matches for all transactions when merging with the MLS data.

In Columns (1) and (4), we rerun the baseline regression using the new subsamples. The estimated racial gaps are of similar magnitudes as the results in Table 1. We control for the annualized price growth between the final listing price and purchase price in Columns (2) and (5). Here, the racial gap in annualized returns decreases substantially, from -0.4%

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[3]We exclude the FHFA house price growth control because the price growth from listing price and the seller's purchase price serves a similar role.

Table 7: Search frictions regressions

	(1)	(2)	(3)	(4)	(5)	(6)
Black seller	-0.0041***	-0.0010*	-0.0004			
	(0.0004)	(0.0004)	(0.0004)			
Black seller × 1/Time on mkt			-0.0013**			
			(0.0005)			
Black-only seller				-0.0043***	-0.0010*	-0.0004
				(0.0004)	(0.0005)	(0.0004)
Black-only seller × 1/Time on mkt						-0.0015**
						(0.0005)
Listing price growth		0.7793***	0.7773***		0.7793***	0.7773***
		(0.1031)	(0.1030)		(0.1031)	(0.1030)
1/Time on mkt			0.0079***			0.0079***
			(0.0007)			(0.0007)
Observations	440386	440386	440386	440386	440386	440386
R^2	0.543	0.905	0.907	0.543	0.905	0.907

Notes: This table presents the estimates of the racial gap in annualized returns after controlling for listing price difference and weeks on market. All regressions include the Census tract by sale year-quarter fixed effects. Standard errors are clustered at the Census tract levels. * denotes $p < 0.05$, ** denotes $p < 0.01$, *** denotes $p < 0.001$.

to -0.1%. Including the listing price reduces the gap for two main reasons. First, any bias inherent in the listing price can transmit to the racial gap in the final returns. Second, the listing price reflects unobserved heterogeneity of the property itself. Although we cannot disentangle these two forces from the listing price, our results from Section 4.4 suggest the latter explanation is less likely to be legitimate. Additionally, listing price may be lower precisely because black sellers' homes spend more time on the market – suggesting that search frictions may directly play a role in the lower listing prices black sellers set.

Columns (3) and (6) include the inverse of the total weeks the home is on the market as well as its interaction with the race of the seller and the listing price control. We include the inverse of time on market because it directly maps to the probability of matching with a buyer. We find that accounting for both the listing price and time on market reduces

the racial gap by a factor of ten, and it removes the statistical significance of the estimate as well. We interpret these results as evidence that accounting for the differential search frictions black sellers face explains the price disparity. When the time on market decreases, that is, it takes a short time to find a buyer, non-black sellers see a higher increase in their annualized returns than black sellers due to the negative coefficient in the interaction term. For instance, the median number of weeks on market in our data is approximately 5 weeks, and the results in Table 6 give the average within-neighborhood difference estimates in time on market between black and non-black sellers and black-only and non-black-only sellers of 8.5 and 9.4 days or close to one and half weeks. If it took a black seller 5 weeks to match with a buyer, a difference in time on market of one and a half weeks between black and non-black sellers and black-only and non-black-only sellers yields a difference in annualized returns of approximately 0.09% and 0.1%, respectively. This equates to roughly one-quarter of the total racial gap we estimate. However, because differences in time on market are likely to impact listing prices, we believe our estimates of search frictions explaining the racial gap to be a lower bound.

5   Neighborhood heterogeneity

This section provides heterogeneity analysis at the Census tract level. Our neighborhood-level analysis provides estimates of the racial gap in annualized unlevered returns to housing across neighborhoods with different socioeconomic characteristics. These estimates give us an understanding on which types of neighborhoods have higher or lower estimated racial gaps.

We define neighborhoods using Census tracts, a common definition used in the literature. We use neighborhood characteristics from the 2010 American Community Survey 5-year estimates. We group Census tracts into quartiles based on the share of black residents, the share of white residents, the homeownership rate, the share of residents with a college degree, and the median household income. Figure 2 displays the racial gap estimates in annualized unlevered housing returns across neighborhoods for each of our socioeconomic characteristics. Overall, we find that the annualized gap persists in each quartile group of

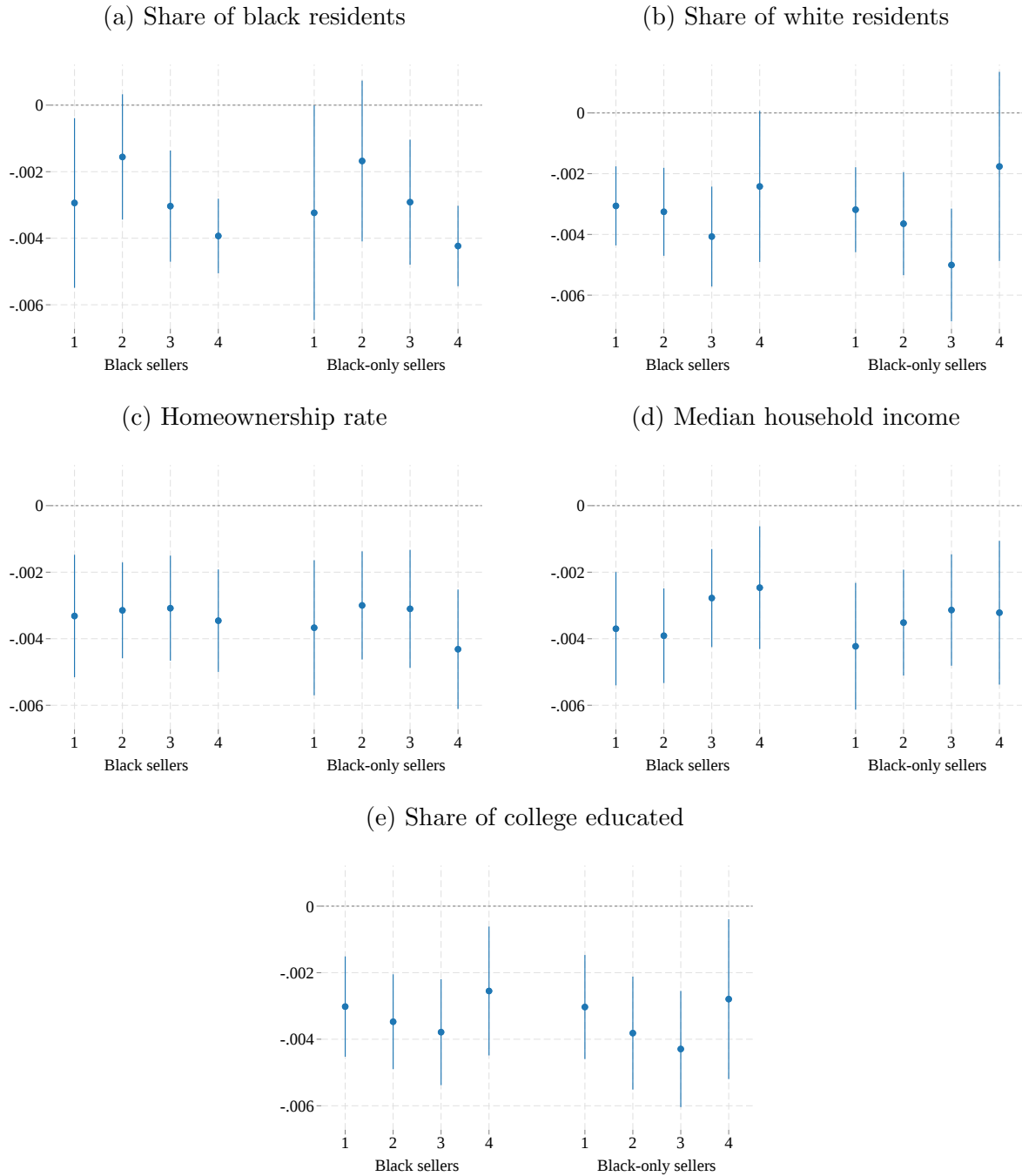Census tracts for every socioeconomic variable we examine.

Figure 2 Panel (a) displays the racial gap estimates across neighborhoods with different black population shares. Neighborhoods with a higher share of black population experience larger racial gaps in housing returns. In neighborhoods at the bottom quartile of black population, the racial gaps are approximately -0.29% for black sellers and -0.32% for black-only sellers, and the estimates are statistically significant. However, although we estimate negative gaps in the second quartile, the estimates are statistically insignificant. The statistical insignificance is probably due to the mechanical fact that these neighborhoods have very few black sellers. In neighborhoods at the top quartile of black population, the racial gap increases to -0.39% for black sellers and -0.42% for black-only sellers. We believe this is due to search frictions negatively impacting black sellers more in neighborhoods with higher black populations. Additionally, we find that the racial gaps are generally higher for households identified as black-only.

Figure 2 Panel (b) displays the racial gap estimates across neighborhoods with different shares of white residents. We find lower gaps in annualized housing returns in neighborhoods with the lowest shares of minority residents, though the relationship does not appear to be linear. The results show that the estimated gaps are consistently negative.

Figure 2 Panels (c) and (d) display the racial gap estimates by the quartile groups of neighborhood homeownership rates and of median household income, respectively. We find that the largest gaps are in neighborhoods in the bottom quartiles of median household income with estimates as large as -0.39% and -0.42% for black and black-only sellers, respectively. This is likely because neighborhoods with low levels of income typically have higher minority populations. Given this relationship, it is likely that search frictions negatively impact black sellers more in neighborhoods with lowest income levels than in neighborhoods with higher income levels. We find a flatter relationship between homeownership rates and the racial gap in housing returns. Overall, the results show that the estimated gaps are consistently negative across these types of neighborhoods.

Finally, Figure 2 Panel (e) displays the racial gap estimates by the quartile groups of neighborhood shares with college education. In short, we find a flatter relationship between college education levels of a neighborhood and the racial gap in housing returns. We find that

Figure 2: Annualized housing return gaps by socioeconomic variable

(a) Share of black residents

(b) Share of white residents

(c) Homeownership rate

(d) Median household income

(e) Share of college educated

Notes: This Figure presents the annualized housing returns in Census tracts with different sociodemographic characteristics. Census tracts are grouped into quartiles based on their characteristics indicated by the title for each panel. All regressions include Census tract-level annualized mean house price index growth between purchase year and sale year and Census tract × year-quarter fixed effects. Standard errors are clustered at the tract level. * denotes $p < 0.05$, ** denotes $p < 0.01$, *** denotes $p < 0.001$.

black sellers realize lower housing returns if their properties are in neighborhoods with lower education levels ranging from -0.43% to -0.26%. However, the gaps for black-only sellers do not follow a similar pattern. One consistency is that the estimated gaps are slightly larger for black-only sellers compared to black sellers realizing an average racial gap of up to -0.46%.

To summarize, we find that both black and black-only sellers have realized lower housing returns in all quartiles of neighborhoods for each of the neighborhood characteristics we examine. This indicates that the racial disparity in housing returns is not confined to certain neighborhoods, but is broadly evident across various geographical areas. We also find that the gap tends to be larger in neighborhoods with higher shares of black residents and lower incomes.

6   Conclusion

This paper investigates whether there exists a racial gap in unlevered housing returns for regular non-distressed sales. Although many papers have studied racial disparities in the housing market, no one has focused on the within-neighborhood disparities during the home-selling process for non-distressed home sales nor provided a detailed empirical explanation of the main causes for the disparities. We use over 1.1 million repeat-sale transactions between 2003 and 2020 in our analysis. When estimating the differences in housing returns between black and non-black sellers, we control for Census tract by sale year-quarter fixed effects and tract-level house price growth between purchase and sale dates. Our main finding is that black and black-only sellers on average realize 1.7% and 1.9% lower total capital gains, and 0.36% and 0.38% lower annualized returns, respectively, when selling their homes. We also find that the gap exists in all types of neighborhoods.

To explore the sources of the gap, we bring in additional data from various sources to examine the roles of seller's liquidity, property renovations, race of the buyer, real estate agents, and appraisers on the racial gap. We find that none of these factors can explain much of the gap. However, our appraisal analysis strongly suggests that, on average, black homes are not valued less than non-black homes.

Motivated by the facts that black sellers tend to set lower listing prices and experience

longer time on market, we investigate the role of search frictions. We first show that black sellers list their homes at lower prices and for over a week longer than non-black sellers. These results suggest that black sellers face different levels market tightness than their non-black neighbors. Within the context of a simple search model, these different levels of market tightness directly affect prices. Accounting for listed prices is key because it is a measure of a home's market value and because its value can be influenced by the biases of several players such as home appraisers, real estate agents, and sellers who likely internalize the racial differences in time on market. As a result, we control for listing prices and days on market, and find that the racial gap drops to near zero, suggesting that both the biases behind listing prices and the search frictions faced by black sellers are the dominating factors contributing to the gap.

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A Additional tables and graphs

Table A1: Race pair transactions

	black seller transactions		black-only seller transactions	
	(1)	(2)	(3)	(4)
Black 1st seller, Black 2nd seller	-0.0031*	-0.0039**		
	(0.0014)	(0.0015)		
Black 1st seller, White-only 2nd seller	0.0024***			
	(0.0005)			
White-only 1st seller, Black 2nd seller	-0.0032***			
	(0.0005)			
Black 1st seller, White 2nd seller		0.0025***		
		(0.0005)		
White 1st seller, Black 2nd seller		-0.0032***		
		(0.0005)		
Black-only 1st seller, Black-only 2nd seller			-0.0034*	-0.0037*
			(0.0016)	(0.0017)
Black-only 1st seller, White-only 2nd seller			0.0035***	
			(0.0006)	
White-only 1st seller, Black-only 2nd seller			-0.0035***	
			(0.0005)	
Black-only 1st seller, White 2nd seller				0.0036***
				(0.0006)
White 1st seller, Black-only 2nd seller				-0.0035***
				(0.0005)
Observations	222572	264049	219567	260891
R^2	0.730	0.729	0.730	0.729

Regressions include Census tract-level annualized mean house price index growth between purchase year and sale year and Census tract $\times$ year-quarter fixed effects. Reported standard errors are clustered at the tract level. * denotes $p < 0.05$, ** denotes $p < 0.01$, *** denotes $p < 0.001$.

Table A2: Listings characteristics mean unconditional gaps

	Black vs. non-black sellers		
	listing_price_chg	ln_sale_listing_gap	days_on_mkt
0	.0022365	-.0242126	66.4779
1	-.0030063	-.0259817	69.65689
	Black-only vs. non-black-only sellers		
	listing_price_chg	ln_sale_listing_gap	days_on_mkt
0	.0021992	-.024188	66.45347
1	-.0028762	-.0272893	71.28378